TEACHER PERSPECTIVES ON VALUE CREATION AND LEARNING IN SOUTH AFRICAN ECO-SCHOOLS: AN EVALUATIVE REVIEW OF TEACHER SUPPORT PROCESSES IN AN ECO-SCHOOL PROFESSIONAL LEARNING COMMUNITY.

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ABSTRACT

The study is framed within the broader policy context of teacher professional development and the Department of Basic Education (DBE) and Department of Higher Education (DHET) strategy to support the development of Professional Learning Communities. Teacher Education and Development initiatives in South Africa face multiple challenges, with the Integrated Strategic Planning Framework for Teacher Education in South Africa: 2011-2025 (ISFPTED) (South Africa, DBE, 2011) providing guidance on priority interventions to address these, including guidance on continuous teacher professional development through teacher education support in professional learning communities.

The Eco-Schools programme has, over its decade-long history, provided support to teachers in schools registered as Eco-Schools. The value created by the diverse support practices is not well known or understood. The study aimed to shed light on the support teachers in the Eco-Schools programme value and how this contributes to environmental learning and practice.

Working with Wenger's Communities of Practice theory (Wenger, 1998) as a conceptual framework and lens, the study set out to describe and explore the processes of teacher learning amongst a sample of teachers supported to function as a professional learning community within the Eco-Schools programme. The findings and recommendations made are in relation to the research goals which are to explore and describe the value being created by the patterns of teacher support in an Eco-Schools node/cluster. To this end, the evaluative study generated evidence in relation to what teachers derive value from through the support they receive; and assessed evidence on how teaching, learning, and practice are developing through participation in the Eco-Schools Professional Learning Community examined.

The study was conducted in 2 phases, the first as a survey of the patterns of support in Eco-School clusters/ nodes. The descriptions enabled a mapping of the patterns of support in

the “coordinator supported model” of Eco-Schools to understand how the coordinator supported model of Eco-Schools enables teacher collaboration and supports the development of an environment and sustainability community of practice between teachers from across the cluster/ node. The second part of the study explored teacher’s perspectives of value derived from participation in an expanded model of Eco-Schools support, using an appreciative inquiry methodology to extract teacher narrations of value creation and meaning-making.

In relation to goal one, the main findings indicate that the patterns of support enabled teachers to develop confidence and skills for action taking and responding to local socio-economic and environmental challenges. The data also reflected local partnerships with other environmental knowledge organisations, thus adding value to the programme through an expanded network of environmental practice and provision of additional resources.

In relation to goal 2 of the study, teachers experienced Eco-School practices as personally meaningful and connected to their identity. Teachers expressed value in the training they had received through the Fundisa for Change programme which deepened their understanding of the implementation requirements of the Curriculum and Assessment Policy Statements (CAPS) and helped to connect knowledge concepts in the curriculum with sustainability practices implemented as part of the Eco-Schools framework.

In relation to goal 3, teachers gained confidence in “Teaching Biodiversity” through the Fundisa for Change training. Teachers were better able to understand the Specific Aims of the Biodiversity curriculum (CAPS) and to adapt their teaching methods to support the CAPS content and assessment requirements. Teacher portfolios also showed evidence of teachers developing skills in analysis of learner performance and an awareness of the need to adjust their teaching and assessment strategies to address “gaps” in learner understanding.

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LIST OF ACRONYMS AND ABBREVIATIONS

CoP	Communities of Practice Theory (Wenger, 1998)
PLC	Professional Learning Community
ISFPTED	Integrated Strategic Planning Framework for Teacher Education and Development
CAPS	Curriculum and Assessment Policy Statements
NCS	National Curriculum Statements
ESD	Education for Sustainable Development
SDG	Sustainable Development Goals
CPTD	Continuous Professional Teacher Development
TED	Teacher Education and Development
DBE	Department of Basic Education
DHET	Department of Higher Education
WESSA	Wildlife and Environment Society of South Africa
F4C	Fundisa for Change

CHAPTER 1: INTRODUCTION TO THIS STUDY

1.1 Introduction

This evaluation research study explores the patterns of support and the learning processes in "supported" Eco-School clusters (nodes)[1] in order to understand how the support provided, creates value for participating teachers and, how this supports teacher learning and enhances teacher education at a local level through the development of an environment and sustainability focused Professional Learning Community. The objective of the study is to contribute to the developmental evaluation of the Eco-School's programme and to make recommendations which could be applied to support its teacher development strategy. The study uses an Appreciative Inquiry methodology (Cooperrider and Srivastva, 1987) to explore teacher's perspectives of value and applies Wenger's (1998) Communities of Practice theory (CoP) as theoretical and conceptual framework. In this chapter, I introduce the study by situating it within the broader policy context on teacher professional development and explain the rationale for exploring Professional Learning Communities as a mechanism for supporting environment and sustainability learning in the Eco-Schools programme. The goals and research questions are outlined and a summary of the chapters concludes this introductory overview.

1.2 Background and Broader Context of the Study

This context and history described here seek to frame the study in terms of the link between the teacher development approach in the Eco-Schools programme and broader national imperatives of achieving educational quality through continuous professional teacher development (CPTD), in particular, enhancing local support for teacher development

[1] Supported Eco-School clusters or nodes refers to groupings of schools who have an Eco-School coordinator assigned to the school and whose responsibility it is to assist the school to implement the Eco-Schools 7- step framework. A cluster or node would be based on geographic (distance between schools) and funding constraints and would have a common coordinator.

through policy changes in support of the development of Professional Learning Communities (PLC's). This has been framed in the Integrated Strategic Planning Framework on Teacher Education and Development (ISFPTED) (South Africa, Department of Higher Education and Training [DHET] and Department of Basic Education [DBE], 2011).

The ISFPTED (*ibid*, 2011) lists improving the quality of teacher education and development in order to improve the quality of teachers and teaching, as one of its aims (p. 4). This was developed following consultation with a wide spectrum of stakeholders and inputs made at the National Teacher Education Summit held in 2011. The policy acknowledges that CPTD has to be relevant to teacher's work contexts and recommends that support for teacher education at the local level is enhanced through the development of Professional Learning Communities (PLC's). This is where the Eco-Schools programme could make a valuable contribution, in supporting environment and sustainability-focused Professional Learning Communities at a local level. The Eco-Schools programme is an environmental education programme developed by the Foundation for Environmental Education (FEE) and implemented in South Africa by the Wildlife and Environment Society of South Africa (WESSA). The programme boasts one of the largest networks of teachers and students in the world (UNESCO, 2014) and provides a framework for whole-school development and inquiry-based learning, which promotes learner-driven action (learner agency) to address environment and sustainability challenges. In South Africa, there is a strong teacher support focus to Eco-Schools as a "lead teacher" is often responsible for leading Eco-Schools implementation activities and reporting. This teacher- centred focus is due to the historical context of unequal development and challenges of educational quality facing schools, where teacher education and educational quality have been negatively affected by historical disparities and consequent infrastructural, human capacity and other inequalities (Taylor, Van der Berg & Mabogoane, 2013).

The ISFPTED, which provides the DBE's framework for enhancing support for teacher development at a local level through support for Professional Learning Communities, and the National Development Plan, suggest that urgent action is needed to address the

provision of quality education (National Planning Commission, 2011). The plan, together with the National Senior Certificate Diagnostics Report (South Africa. Department of Basic Education [DBE], 2016), points to a lack of teacher capacity as one of the possible reasons for low learner attainment levels, with the diagnostics report suggesting that in the NSC examinations, there appeared to be a deficiency in (teachers) understanding specific content subject areas. The report (*ibid,* 2016*)* also indicated that there appeared to be a shallow grasp of some of the content areas by teachers, or by teachers neglecting to cover certain aspects of the curriculum (p. 11). These factors are believed to contribute to the low learner retention and learner attainment levels in National Senior Certificate examinations. In terms of learner retention levels, the Equal Education Report (2016) found that of the 2015 cohort of matric learners (those who had registered in grade one and should have matriculated in 2015), 40.7% had dropped out since Grade 10. This is believed to point to a critical need to address the underlying causes of the high learner attrition rate, with addressing teacher's content knowledge and capacity constraints being an important part of any intervention to improve learner attainment levels.

The impact of low learner retention and attainment levels has consequent socio-economic and development impacts as well as contributing to the skills challenges in the environment and sustainability sectors (SANBI and the Lewis Foundation, 2010). The Eco-Schools programme, with its local support for teachers, and expanded through professional development qualifications offered through the Fundisa for Change programme, could help address content gaps which may impact teacher's ability to teach environmental content in the curriculum. Songqwaru (2012) emphasises the importance of teacher professional development with an environment and sustainability education focus. In her research on environment and sustainability knowledge in the Grade 10 Life Sciences (CAPS) curriculum, Songqwaru (2012) also found that, "teachers have content gaps in environment and sustainability knowledge and that these can be addressed through professional development activities that address rich subject knowledge," (p.i).

The Eco-Schools programme was well situated to help support the development of environment and sustainability-focused professional learning communities and was working at a local level with networks of teachers, DBE subject advisors, and other environmental education stakeholders, in over 1000 schools for over a decade. Lotz- Sisitka (2011) describes this support as providing useful tools for reviewing current practices in schools, and providing practical and useful sets of resources and tools for teachers to integrate environment and sustainability concerns (such as biodiversity, resource management, health, and nutrition, etc.) into curriculum and teaching practices (p.33). The mechanism for this support had been developing through direct engagement between Eco-School coordinators and teachers through earlier support for Eco-Club activities and through the traditional model of teacher workshops supporting lesson plan development and "hands-on" activities. The nature of this support and the impact that this was having in supporting teacher professional development was not fully elaborated or understood. This became the goal of the evaluation research undertaken through this study.

1.3 Rationale for Study

While many examples of good practice exist in schools (via the Eco-Schools Programme's annual portfolios and ongoing school-based practices), it appeared that very little had been achieved to ensure that environment and sustainability issues were consistently and coherently integrated into teacher education (*ibid*, p. 33). As a situated learning model, the Eco-Schools approach to teacher development had seemingly been responsiveness to local environmental needs and was appearing to usefully contextualize environmental learning, however, the approach presented as somewhat fragmented. Reed-Johnson (2009) in her comparison between an Eco-School in England and an Eco-School in South Africa, had found weaknesses in terms of achieving the whole school development vision of these schools and recommended that the pedagogy of environment and sustainability learning needed to be integrated into teacher professional development approaches in order to enable schools to achieve their common visions (p.289). As a response to uncertainties in the Eco-Schools programme and the apparent weaknesses in traditional models of teacher professional

development, in 2011, the Eco-Schools South Africa programme joined the Fundisa for Change (F4C) Teacher Education Network. Fundisa for Change (F4C) is a National network of partners and stakeholders working towards the common goal of providing environment and sustainability-focused CPTD and aiming to strengthen teacher's environmental content knowledge, pedagogy and assessment practices. The conceptual framework for the Fundisa for Change teacher professional development programme was refined through a 2 year piloting phase, as part of the Rhodes University Post- Graduate Certificate in Education (PGCE) (Rhodes, 2011) as well as through a piloting phase involving Life Sciences teachers from Eco-Schools in the KwaZulu-Natal Midlands area (Songqwaru, 2012). The programme is based on a model of work- integrated learning and assessment. Lotz-Sisitka (2011) comments that Eco-Schools South Africa, as part of the Fundisa for Change programme, is now situated as supporting National policies aimed at education quality enhancement through improved teacher knowledge and practices (p.58) as well as supporting National CPTD policy as outlined in the ISFPTED calling for the establishment of Professional Learning Communities (*ibid*, p. 59).

Following the initial piloting phase, the Fundisa for Change CPTD programme was rolled out (funded in partnership with the Deutsche Gesellschaft für Internationale Zusammenarbeit) (GIZ) to clusters of Eco-School's teachers in Mpumalanga, the Northern Cape, Gauteng, the Eastern Cape and the Western Cape. These were offered as short courses accredited through Rhodes University, using a "work together" and "work away" model (O'Donoghue, 2014, unpublished) where teachers applied the learning from the 3-day course, and the knowledge resources provided, in context, through a workplace-based assignment. The knowledge focus areas for these courses were on Biodiversity and Climate Change, with a plan for further rollout and expansion of content to include other subject areas in following years. Eco-School teachers were supported to complete their workplace-based assignments through peer support and support provided by Eco-Schools and other Fundisa for Change partners.

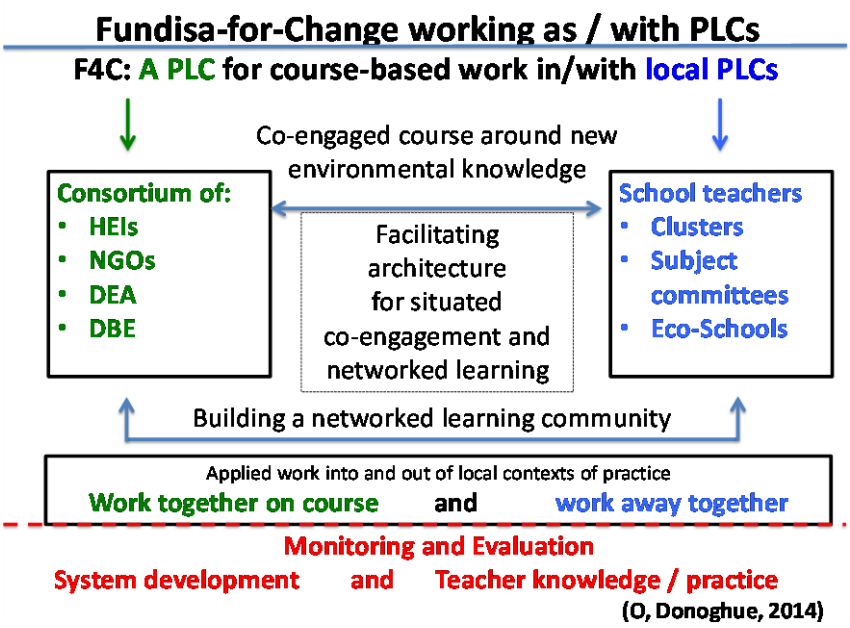

Fig1: Network of Interconnected Professional Learning Communities

The teachers from the Mpumalanga Eco-School's cluster who participated in the Fundisa for Change Life Sciences professional development programme (2014) were chosen as the research group for this evaluation case study. While the value of participating in an Eco-School's cluster has been anecdotal, Tshiningayamwe (2016) found that:

> If professional development programmes take account of underlying mechanisms and respond to teachers‟ capabilities" i.e. their valued functionings for biodiversity teaching in the Life Sciences curriculum, the professional development programmes can be an important conversion factor that enables the expansion of teachers‟ capabilities" (especially their biodiversity knowledge, pedagogical and assessment practice but also other capabilities) in ways that have the potential to reshape teachers "classroom practices" related to the teaching of biodiversity. (p.297)

As Eco-School clusters become sites for the development of environment and sustainability-focused Professional Learning Communities (PLC's) it is important to explore teacher's perspectives of value creation in an Eco-Schools PLC and to analyse how these patterns of support enable teacher learning, a goal of this study.

1.4 Research Goals and Objectives

The study will gather evidence of value creation and assess this in relation to the support provided to teachers engaged in environment and sustainability teaching, learning and practice through participation in Eco-Schools. This is to be achieved through a two-phase research process, with phase 1 exploring and describing the patterns of support in the Eco-Schools model of a "coordinator supported" Eco-School and phase two delving deeper into evaluating these support processes through a case study of a supported cluster of Eco-Schools in the Mpumalanga area. The evidence in phase one was gathered from Eco-School coordinators and cross-referenced with supporting evidence from teacher narrations that described the support they received through the programme. In phase two of the study, an expanded model of support which includes a Fundisa for Change professional development qualification is presented as a case study on teacher's perspectives of value creation in an Eco-Schools cluster in Mpumalanga, South Africa. The case study explores teacher's perspectives of value they derive from participation in Eco-Schools and evaluates how a participatory approach which includes support for teacher content knowledge, pedagogy and assessment practice, through the inclusion of a Fundisa for Change professional development qualification as an expanded model of Eco-School support, could contribute to collaborative learning and the development of a professional learning community.

To summarise the main research goals are:

Goal 1: To explore and describe the patterns of teacher support in an Eco-Schools node/cluster;

Goal 2: To generate evidence in relation to what teachers derive value from through the support they receive in the Eco-Schools programmes examined; and

Goal 3: To assess evidence on how teaching, learning, and practice are being supported and developed through participation in the Eco-Schools Professional Learning Community examined.

The research questions which guide this study are:

1. How does the current "coordinator supported" model of Eco-Schools support teacher learning and enable the development of an environment and sustainability professional learning community?

2. What value are teachers deriving through their participation in Eco-Schools?

3. How is an expanded model of professional development support enhancing value in an Eco-Schools Professional Learning Community?

1.5 Locating my Interest in this Study

My professional career began as a Geography school teacher before joining the Wildlife and Environment Society (WESSA) as an Eco-School's cluster coordinator for the South Durban district, and later as Programme Manager: Teacher Development. I have an interest in environment and sustainability-focused teacher professional development models and it is intended that the recommendations and findings contained herein will contribute to the developmental evaluation of the Eco-Schools programme. It is hoped that this developmental evaluation will contribute to the development of the programme's teacher education strategy and provide evidence to support the programme's further engagement with the Fundisa for Change Teacher Education Network. The monitoring and evaluation of the Eco-Schools South Africa programme had been largely ad-hoc, with the last evaluation conducted by Rosenberg in 2008 (Towards Realising the Potential of Eco-Schools, 2008). While "whole school development" has been explored by other researchers, there are still gaps in understanding what is valued by teachers in terms of how the programme is contributing to the development of their environmental content knowledge and teaching methods as well as understanding the learning processes supported in Eco-School nodes/clusters as emergent Professional Learning Communities.

The study is intended to contribute to the developmental evaluation of Eco-Schools. Patton (2011) explains the value of this approach as supporting social innovation and adaptive management. By evaluating how the patterns of support in Eco-Schools coordination and

how learning is enhanced in an expanded model of teacher support which includes a Fundisa for Change professional qualification, recommendations from the study could lead to adaptive management and social innovation in order to "realign" the programme's support strategy for teacher education and development. Wals and Alblas (1987) state that:

> *One could argue that despite their good intentions, many environmental education projects seem to fall short in realising ambitious learning goals such as helping citizens become environmentally knowledgeable, skilled and dedicated people who are willing to work individually and collectively towards achieving a balance between the quality of life and the quality of the environment (Gigliotti, 1990; Wals, 1994a). Without always challenging the nature and content of these goals, many researchers and practitioners are trying to resolve the discrepancy between the theory and practice of environmental education. (p.253)*

The Eco-Schools programme sets its goals and objectives as supporting environmental learning and practice and has shown adaptive capability through its ability to respond to local contextual needs. It is hoped that the recommendations from this evaluation study will help to align the goals and objectives of the programme with the perspectives of value generated from teacher narratives and from theory on social learning in Professional Learning Communities. This should strengthen the support provided by the programme and the impact that this will have on environment and sustainability learning and practice.

1.6 Overview of the Chapters

This section provides a brief overview of the six chapters in this research study, to help the reader to understand the logical flow of the research study presented.

Chapter One introduces the study by providing a rationale for the study and situating this within the broader context of national teacher education and development policy. The chapter outlines the research goals and guiding research questions. It explains the relevance of conducting this as part of the developmental evaluation of the Eco-School's South Africa teacher support model and how this relates to expanded support with a professional

development qualification through the Fundisa for Change programme. The concept of value creation is introduced in relation to exploring the learning processes in the Professional Learning Community studied.

Chapter Two presents a review of the literature, providing a detailed rationale for environment and sustainability-focused CPTD and explains the historical context of CPTD in South Africa. Teacher education policy on the development of professional learning communities (PLC's) as outlined in the Integrated Strategic Planning Framework on Teacher Education and Development (ISFPTED) is presented. The conceptual and theoretical framework of the study is introduced and learning processes in a Community of Practice are explored using Wenger's (1998) Communities of Practice Theory (CoP). Models of Professional Learning Communities are presented and the Fundisa for Change teacher professional development model is presented as an example of an "alternative" cluster.

Chapter Three introduces this study as evaluation research and outlines the research methodology used to explore teacher learning in PLC's. The evaluation approach is briefly described and the study is situated as an appreciative evaluation of the patterns of support in a "coordinator-supported" model of Eco-Schools, with a deeper analysis of the learning processes in a single Professional Learning Community. The use of "Appreciative Inquiry" (Cooperider and Srivastva, 1987) is presented as a data generation tool for gathering evidence of teacher perspectives on the value being created through their participation in an Eco-School's Professional Learning Community. The case study of schools is presented and the sample and site are described. The data generation tools used and data analysis methodology are also reported. The chapter concludes with an explanation of the research protocols relating to ethics, trustworthiness, and validity.

Chapter Four presents the data in two parts: part one presents data from Eco-School coordinators and teachers in order to identify and understand the patterns of support in a "coordinator- supported" model of Eco-Schools. Part 2 presents teacher's narrations and reflections on the value they have derived from participation in this Professional Learning

Community. The data is presented using an Appreciative Inquiry (AI) methodology in order to delve deeper into understanding how their participation in an Eco-Schools Professional Learning Community has enabled environmental learning and practice. This will be described within the context of environment and sustainability issues and challenges faced by the schools as narratives of value creation. Data will be ordered using Wenger's (1998) Communities of Practice Theory, which provides a useful framework for understanding the social learning processes which support teacher learning in a community of practice and for understanding value creation.

Chapter Five provides an analysis and discussion of the findings presented in Chapter 4. In particular, the data is examined and discussed from narrations of teacher's perspectives of value creation, using Wenger's (1998) Communities of Practice Theory to describe how learning in an Eco-schools Community of Practice is valued, and how value creation is supported and expanded by applying a model of support for environmental learning which includes a professional qualification through the Fundisa for Change programme. This will be discussed as contributing to Teacher Professional Development Policy through the strengthening of environmental learning and sustainability practices in a Professional Learning Community.

Chapter Six concludes the thesis by presenting the main findings and making future recommendations for the strengthening of the models of support in the Eco-Schools programme in South Africa. The limitations of the research will also be briefly discussed and recommendations made for strengthening of future evaluations of teacher development in the Eco-Schools programme.

1.7 Conclusion

This chapter explains the context and rationale for a developmental evaluation of Eco-Schools through a research study of the support patterns and value derived by teachers in support of their teacher professional development. The chapter also positions the study within the broader policy context and provides a roadmap to the chapters which follow.

2. CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter situates the evaluation of Eco-School's support for teacher professional development within the wider context of environmental and sustainability education. It outlines the rationale for supporting the development of teacher professional learning communities as an approach to teacher development for environmental and sustainability education and explains how this is underpinned by the South African education policy imperative to enhance support for teacher learning and development at a local level. It also introduces Wenger's (1998) Communities of Practice theory as theoretical and conceptual framework, which is useful for understanding processes of learning and teacher development in a professional learning community. These concepts inform the practices of Eco-Schools' support for teacher learning and underpin the Department of Basic Education (DBE) and Department of Higher Education and Training (DHET) Policy on Professional Learning Communities as outlined in the ISFPTED (South Africa. DBE and DHET, 2011).

Communities of Practice theory (Wenger, 1998) is also used to introduce the concept of value creation, which is a central concern of the study. Value creation is associated with identity formation, meaning-making and belonging in a Community of Practice. The application of Communities of Practice theory to the review of identity and learning in in a Professional Learning Community (PLC) is introduced through a local case study of a cluster of Eco-School teachers who received support for environment and sustainability activities at their schools and expanded support through a professional development qualification in "Teaching Biodiversity" through the "Fundisa for Change" teacher development programme. Background on the "Fundisa for Change" programme is provided as an example of a local response to strengthening teacher's environment and sustainability content knowledge, pedagogy and assessment practices.

2.2 Rationale for Environment and Sustainability focused Teacher Professional Development

2.2.1 Context- Living in times of Accelerating Change

An educational response to socio-ecological and environmental change is widely agreed as being one of the most effective means that society possesses for confronting the challenges of the future (UNESCO, 1998). Historically, global change has impacted on education policies and had consequent impacts on teaching and learning as well as on approaches to teacher education. The environmental movement of the late 1970's to 1990's, was marked by the publication of seminal works such as Rachel Carson's "Silent Spring" and the Club of Rome's "Limits to Growth" reports which precipitated a global educational response to the emergence of environment and sustainability learning (Tilbury, 1995; Wals and Corcoran, 2012), captured in the Belgrade Charter and the Tbilisi Declaration (UNESCO, 1977). Following this period, at the United Nations Conference on Environment and Development (also referred to as the 1992 Rio Earth Summit) countries ratified Agenda 21 (UNCED, 1992) which, amongst other commitments, called for environmental education to be included in schools. This gave rise to a number of schools-based "whole school development" programmes such as Eco-Schools and the Green Schools movement.

The 1990's also saw a shift in language from Environmental Education to Education for Sustainable Development. This broadened the concept of "environment" to include not only the natural environment or ecology, but also a focus on social justice, environmental ethics and values, and the link between environment, economy, and society. Tilbury (1995) comments that this shift in language from EE to EfS was significant, as it reflected a broadening of concern away from an educational approach that largely focused on environmental and conservation issues, to one which integrates concerns for social, political and economic development, and addresses education for long-term ecological and social sustainability (Tilbury, 1995; Parliamentary Commissioner for the Environment, 2004).This shift was marked also by the publishing of the Brundlandt Report "Our Common Future"

(World Commission on Environment and Development [WCED], 1987) which defined sustainable development as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs." (p.41). This report set a global agenda for environmental action but was largely criticised for not defining the timescales involved and for its vagueness with regard to the definition of development (Tilbury, 1995). The report and recognition of the importance of an educational response to environmental change and the human impact on the environment, later led to the declaration of the Decade of Education for Sustainable Development (DESD 2005- 2014) (UNESCO, 2007), which called for interdisciplinary and values-based learning, critical thinking, participatory decision making and locally relevant actions. The evaluation of the DESD has led to renewed environment and sustainability education commitments by countries globally, through the Global Action Programme on Education for Sustainable Development (GAP commitments) which mark the end of the DESD, (UNESCO, 2014). The Eco-Schools programme South Africa has committed to the GAP on Quality Education and Youth-Led Change.

While these commitments signal a global commitment to education for environmental sustainability, socio-ecological and environmental risks are on the increase, with 2016 marking some of the warmest months globally in the modern temperature record dating back to 1880 (NASA, Institute for Space Studies, 2016) and with South Africa currently experiencing extreme weather conditions and a prolonged drought. Accelerating change means living with "wicked problems", uncertainty and unknown climatic "tipping points" (Rittel and Weber, 1973; Allan and Wilson, 2009) which also has implications for education and teacher knowledge, since knowledge is "contested and uncertain" particularly in terms of the local impacts of climate change and adaptation responses to this. In a context of uncertainty and change, teachers are required to teach this "new and contested knowledge", for example in the Biodiversity FET Curriculum and Assessment Policy Statements, dealing with Climate Change and the human impacts on the environment. This is relevant for teacher professional development approaches which support teacher

reflexivity and which help teachers to understand their own knowledge gaps and professional development needs.

2.2.2 Education 2030: Teacher Education for Global Citizenship Education and the Sustainable Development Goals (SDG's)

Teacher Professional Development is an essential element of the post-2015 educational response to the achievement of Sustainable Development Goal 4 on Quality Education. The UNESCO Education Technical Advisory Group (TAG) (UNESCO, 2015), developed a set of draft "thematic" indicators that can be adapted by countries to monitor and track country and global progress in the implementation of the post-2015 education agenda. The indicator on Quality Education (Sustainable Development Goal 4) is that, "by 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development," (*ibid*, p. 12). Sub-indicators include references to the provisioning and knowledge that would be needed to achieve this. This is further clarified as the extent to which global citizenship education and education for sustainable development are mainstreamed into national education policies, curricula (or as an approach to learning), student assessment and teacher education.

The policy implementation of South Africa's teacher education strategy (ISFPTED, 2011) does not make specific reference to environment and sustainability-focused professional learning communities (PLC's), however, there is evidence of Global Citizenship Education (GCE) and Education for Sustainable Development (ESD) being mainstreamed in the Curriculum and Assessment Policy Statements (CAPS) as evident in the principles of CAPS. As the Eco-Schools programme supports the mainstreaming of environment and sustainability education, it strengthens efforts towards the achievement of the Sustainable Development Goals (SDG's).

This study uses the terminology environment and sustainability education, as Education for Sustainable Development (ESD) remains a contested term. McGregor (2013) describes Education for Sustainable Development as a normative concept (p.3562) and as such, the GAP commitments and an Education for Sustainable Development approach to education represents a contested educational ideology. Bob Jickling (in Wals and Jickling, 2002), argues that an ESD approach to education is counter to the ideals of education as the term uses the preposition "for" which prescribes that education must be in favour of some specific, undisputed product, namely sustainability (p.222). Sumner (2012) responds that as a contested term, sustainable development can mean business as usual in a highly corporatized world or it can mean promoting the civil commons – co-operative human constructions that protect and/or enable universal access to life goods (p.77). Lotz Sisitka, Fien and Ketlhoilwe (2013) also challenge views of ESD as a business as usual approach and state that, "education can no longer be about the reproduction of knowledge and skills for production and consumption patterns that were the focus of nineteenth and twentieth-century aspirations" (*ibid,* p.195). Similarly, Pigozzi (2007) proposes that ESD learning processes contribute to quality education (Goal 4 of the SDG's) by promoting the same learning outcomes as quality education, such as the skills to continue learning throughout life, to think critically, to work cooperatively, and to seek out and apply knowledge (p.29).

By applying a teaching and learning methodology which incorporates ESD learning processes as proposed by Pigozzi (*ibid*), teachers can play a critical shaping role in the development of learner norms and values, particularly as this relates to global citizenship education and the development of empathy which is regarded as essential to understanding and relating to the lives of others. The Curriculum and Assessment Policy Statements (CAPS) (South Africa. DBE, 2011) lists the general aims of the curriculum statements (R-12) as giving expression to the knowledge, skills, and values "worth learning" in South African schools. This is clarified as aiming to ensure that children acquire and apply knowledge and skills in ways that are meaningful to their own lives (the curriculum promotes knowledge in local contexts while being sensitive to global imperatives). The predecessor to CAPS, the National Curriculum

Statements (NCS) (South Africa. DBE, 2005) also aimed to infuse the principles and practices of social and environmental justice and human rights, as defined in the Constitution of the Republic of South Africa, whilst also being sensitive to issues of diversity, such as: poverty; inequality; race; gender; language; age; disability and other factors. While the normative value of an ESD approach to CPTD can help to achieve some of the broader goals of education, particularly as this relates to local, contextualized knowledge, it is equally important that the content knowledge of students and teachers be addressed.

2.2.3 Teaching and Learning of Environmental Content Knowledge

The Education 2030 "provisioning" indicators for mainstreaming Education for Sustainable Development and Global Citizenship Education (UNESCO Technical Advisory Group (TAG), 2016) also outlined the knowledge requirements needed to achieve the 2030 targets. The TAG (*ibid*, 2016) suggests indicators for achieving these targets as "the percentage of students per age group showing adequate understanding of issues relating to global citizenship and sustainability", and "the percentage of 15 year olds with adequate knowledge of environmental science and geoscience", (UNESCO, 2015, p. 12). While these are suggested as indicators, the report does not clearly define what is meant by "adequate knowledge", particularly in times of accelerating environmental change and in an age of "post-normal science" where "facts are uncertain, values in dispute, stakes high and decisions urgent," (Hessels and Van Lente, 2008, p. 744).

This focus on knowledge or disciplinary learning is equally important for teacher education, particularly in South Africa, where the curriculum is strongly content referenced. The revised policy on the minimum requirements for teacher education qualifications (South Africa, 2015) refers to the "various types of knowledge that underpin teachers' practice" (p.9) and makes specific reference to integrated and applied knowledge, which should be understood as being both the condition for, and the effect of scrutinising, fusing together and expressing different types of knowledge in the moment of practice (*ibid*, p.9). This is further clarified as "explicitly placing knowledge, reflection, connection, synthesis, and

research in the foreground, it gives renewed emphasis to what is to be learned and how it is to be learned." This emphasis on content knowledge and pedagogy provides a strong rationale for environment and sustainability-focused teacher development as Sonqwaru (2014, p. 1) states that in the South African curriculum, environment and sustainability content and concepts are integrated into a number of the subjects, with some subjects integrating up to 50% of environmental content knowledge and where environment and sustainability content permeates a wide range of subjects," (Lotz- Sisitka, 2011, p. 31). Environment and sustainability content is also embedded in the principles of the CAPS (South Africa. DBE, 2011) which promotes social transformation, active and critical thinking, human rights, inclusivity, social and environmental justice, and valuing indigenous knowledge systems. Lotz- Sisitka (2009) also stated in her overview of environmental learning in the National Curriculum Statements (South Africa. DBE, 2005) that:

> *Environmental learning is not just about values and practical outdoor activities, it involves a body of content that is an essential part of the knowledge people need to live in the 21st century. It is also an essential part of the South African curriculum. Educators across the curriculum need to develop appropriate levels of understanding of this content. (p.2)*

Taylor (2008), also states that addressing teachers' development needs are fundamental to improving the quality of teaching and learning in South Africa. More specifically he states that:

> *A second area which offers a lever for instructional improvement concerns the subject knowledge of teachers. Every indication is that the subject knowledge of many teachers does not meet the curriculum standards set for the children they are teaching. It goes without saying that teachers cannot teach what they do not know, and improving the subject knowledge of teachers must be a top priority for any intervention. (p.24)*

Songqwaru (2012) emphasises the importance of teacher professional development with an environment and sustainability education focus. In her Master's research study (*ibid*) on supporting environment and sustainability knowledge in the Grade 10 Life Sciences curriculum (CAPS) (South Africa. DBE, 2011), she (*ibid)* found that, "teachers have content gaps in environment and sustainability knowledge and that these can be addressed through professional development activities that address rich subject knowledge," (p.i).

2.2.4 Environment and sustainability learning processes as quality teaching and learning

The Revised Policy on the Minimum Requirements for Teacher Education (South Africa. DHET, 2015) refers to integrated and applied knowledge which requires teacher education programmes to prepare teachers for classroom learning which:

> *incorporates situational and contextual elements and which assists teachers in developing competencies that enable them to deal with diversity and transformation, brings the importance of interconnections between different types of knowledge and practices into the foreground, as well as the ability of teachers to draw reflexively from integrated and applied knowledge, so as to work flexibly and effectively in a variety of contexts.(pp. 8-11)*

In an expanded support model of Eco-Schools' support for teacher education, situational and contextual learning is combined with a focus on the knowledge requirements of the Curriculum and Assessment Policy Statements through the Fundisa for Change programme. Lotz- Sisitka (2009) comments that:

> *Environmental learning has a number of contributions to make to enhance the quality and relevance of learning, particularly because it seems to motivate and interest teachers, and helps learners gain epistemological access to other forms of school knowledge, particularly concepts and complex contents…and that…environmental learning makes socio-cultural links with learners existing repertoires and knowledge*

structures, thus creating starting points for extension of these through formal and systematic teaching and learning practices that are content and/ or concept based. (p.8)

This is relevant for teacher professional development in South Africa, particularly in terms of learner attainment and retention as the Education for All (EFA, 2005) Global Monitoring Report suggests that how well pupils are taught and how much they learn, can have a crucial impact on how long they stay in school and how regularly they attend.

2.3 Continuous Professional Teacher Development (CPTD) in South Africa

Teacher education and development refers to the training of pre-service teachers as well as the continuous professional development of in-service teachers. For the purposes of this research study, this review of the literature and the analysis which follows refers to the continuous professional development of in-service teachers (CPTD). The teacher education and development approach post-1994 aimed to address inequities which arose as a result of a complex and fragmented education system during Apartheid, with Sayed (2002) listing 19 different education departments responsible for teacher education in South Africa in 1994 (p.382) . He (*ibid*) refers to teacher education during Apartheid as, "a system of systems characterised by a multiplicity of curricula and qualifications and where most of the graduates from "Black" teacher training colleges being trained in religious studies and history" (p.382). The Department of Basic Education (DBE) National Education Evaluation Unit (NEEDU) points to the historically poor teacher education received by most teachers as a possible reason for learner underperformance, with the NEEDU in the DBE Curriculum News (2014) finding that, "lax practices are present in around 30% of schools, the main factors inhibiting quality schooling is not the fault of teachers, but of their own poor education" (p. 4).

This fragmented and inequitable system of teacher training is a contributory factor for the poor learner attainment rate and the high drop-out rate of students before they reach the Grade 12 (school exit level) National Senior Certificate examinations. According to Taylor and Vinjevold (2013, p. 5), some possible explanatory factors for the underperformance of

South African schools are: poverty; civil service capacity; teacher subject knowledge; time management; classroom practice; instructional leadership; and moves towards systemic accountability. Following the release of the 2013 National Senior Certificate results, Joubert (2013) of the Solidarity Research Institute commented that the number of learners progressing from grade one to matric remains very low, with only 34% of the almost 1.2-million grade ones of 2002 having passed matric in 2013, furthermore, Taylor (2008), states that "addressing teachers' development needs are fundamental to improving the quality of teaching and learning in South Africa" (p.8). More specifically he (*ibid*) states that:

> *Every indication is that the subject knowledge of many teachers does not meet the curriculum standards set for the children they are teaching. It goes without saying that teachers cannot teach what they do not know, and improving the subject knowledge of teachers must be a top priority for any intervention. (p.08)*

There is a complex system of factors which contribute to the poor learner attainment rates and high attrition rates, however, improving teacher subject knowledge and addressing the wider development needs of teachers would help to achieve scalable and long-term benefits. Strategies to improve teacher knowledge and practice are addressed in the Integrated Strategic Framework Plan on Teacher Education and Development (South Africa. DHET and DBE, 2011).

2.3.1 Context- CPTD in response to curriculum change

In 2002 the Department of Basic Education (DBE) introduced an outcomes-based education system (OBE) (South Africa, National Curriculum Statements [NCS] (R-12), 2005). The principles of the South African Constitution underpin the NCS and intended to support wider transformation and social justice objectives. As such, the NCS left much of the content up to teachers to provide and adopted a participatory approach to teaching and learning. Chisholm, (2003, p. 3) explains that, "in its emphasis on results and success, on outcomes and their possibility of achievement by all at different paces and times rather than on a subject-bound, content-laden curriculum, it constituted the decisive break with all that was

limiting and stultifying and in the content and pedagogy of education." OBE and C2005 provided a broad framework for the development of an alternative to apartheid education that was open, non-prescriptive and reliant on teachers creating their own learning programmes and learning support materials (DOE, 1997a, 1997b, no date). This learner-centredness and emphasis on teachers developing their own learning programmes also had implications for teacher education. Lotz-Sisitka and O' Donoghue (2008, p. 118) describe this as being characterised by a pedagogic rhetoric of "out with the old and in with the new" with consequent negative impacts also on the development of teacher knowledge. Teacher development approaches were open-ended and usually involved lesson planning workshops which did not include content, but which rather provided templates and frameworks for lesson planning, provided by an expert facilitator with the content being left open to the teacher to integrate into the lesson (Lotz-Sisitka and O' Donoghue, 2008).

Sfard (1998) warns of the dangers of an either/ or approach to learning where the focus is either on the acquisition of content knowledge or only participatory approaches to learning. She (ibid) cautions that because no two students have the same needs and no two teachers arrive at their best performance, in the same way, theoretical exclusivity and didactic single-mindedness can be trusted to make even the best of educational ideas fail. Some of these pitfalls have been the experienced in the implementation of the National Curriculum Statements (2005) with the 2009 review of the NCS, (South Africa, 2009, p. 47) finding that in some subjects, learning outcomes were expressed as broad investigation skills, devoid of content. Another of the findings of the review of the NCS was that the curriculum was too complex for teachers to implement (DBE, 2011, Curriculum and Assessment Policy Statement, p.1). This was attributed in part to a lack of teacher capacity to implement an outcomes-based curriculum (Taylor et al, 2013), which had the effect of reduced literacy and numeracy rates, as indicated by the poor performance of learners in the Annual National Assessments (ANA's) and other comparative tests as well as the generally poor quality of learner performance in the National Senior Certificate examinations (NSC Grade 12). An analysis of the NSC Grade 12 results from (South Africa. National Senior Certificate Diagnostic Analysis Report, DBE, 2013) found that although the class of 2013 has recorded

the highest pass rate in the six years of the implementation of the National Curriculum Statements (2005), the quality of passes in key subjects such as Mathematics, Physical Sciences, Accounting, Life Sciences, Economics and Agricultural Sciences, were still below desirable level. Chisholm (2003) also comments that "while learner-centredness may be a necessary tool to break down decades of learning habits formed to create uncritical and unthinking persons, it was argued that achieving this was undermined in large under-resourced classes with poorly qualified teachers who were unconfident of their subject knowledge" (p.4).

Following the review of the implementation of the NCS (South Africa, 2009), the report recommended that the NCS (2005) be reorganised around the knowledge (content, concepts, and skills) to be learnt, recommended texts, recommended pedagogical approaches and assessment requirements and that these documents should specify the level at which content, concepts and skills should be taught, and how and when they should be assessed. This more structured approach resulted in the implementation of the Curriculum and Assessment Policy Statements (CAPS) (South Africa. DBE, 2011). The implications for CPTD was a renewed focus on content and subject-specific training and a call for classroom-based monitoring, mentoring and support (South Africa, DBE, 2009).

The implications for environment and sustainability-focused teacher education, was a greater focus on linking environment and sustainability content with subject content and pedagogy in subject areas such as Life Sciences, Social Sciences and Economics and Management Sciences. The principles of Global Citizenship Education and Environment and Sustainability learning, such as social and environmental justice and environmental ethics, are more closely linked to the subject Life Orientation and as part of the general aims of the curriculum captured in the Principles of the Curriculum and Assessment Policy Statements (CAPS) and in the learning outcomes which underpin the CAPS (South Africa, DBE, 2011). The policy documents which reflect the inclusion of these principles are the: Curriculum and Assessment Policy Statements (South Africa, 2011); the Action Plan 2014: Towards the Realisation of Schooling 2025 (South Africa, 2011); the Revised Policy on the Minimum Requirements for Teacher Education Qualifications (South Africa, DHET, 2015); and the

Integrated Strategic Planning Framework for Teacher Education and Development, (South Africa, 2011).

2.3.2 South African Teacher Education and Development Policy (CPTD)

2.3.2.1 The Integrated Strategic Planning Framework for Teacher Education in South Africa: 2011-2025

The Integrated Strategic Planning Framework for Teacher Education in South Africa: 2011-2025 (ISFPTED) (South Africa, DBE, 2011) is a comprehensive plan to improve teacher education and development in the country. Following the July 2009 Teacher Development Summit, the ISFPTED was drafted following a collaborative process involving a broad range of education stakeholders. The implementation of the policy is driven by the Department of Basic Education (DBE) and the Department of Higher Education and Training (DHET). The strategy aims to achieve quality teaching and learning through support for pre-service and in-service teacher development. A quality pipeline approach was adopted to ensure a good cohort of appropriately qualified educators are drawn into the profession, and a professionalization of teaching strategy adopted to improve teacher knowledge and practices for in-service teachers. The South African Council for Educators (SACE) is the professional body responsible for the implementation of the strategy for in-service teachers and includes the management of an accreditation system for professional development short course training.

The ISFPTED (South Africa. DBE, 2011) lists the primary outcome of the plan as aimed to "improve the quality of teacher education and development in order to improve the quality of teachers and teaching," (p. 1). The plan has 4 main outputs in order to achieve this, namely:

1. Individual and systemic teacher development needs are identified and addressed

2. Increased numbers of high-achieving school leavers are attracted into teaching

3. Teacher support is enhanced at a local level

4. An expanded and accessible formal teacher education system is established

Each of these outputs lists key activities to achieve these objectives, with the establishment of Professional Learning Communities (PLC's) identified as key for achieving the objective of enhancing teacher support at a local level (Output 3, Activity 3.3).

The ISPFTPD (South Africa. DBE, 2011) describes Professional Learning Communities (PLC's) as:

> *Communities that provide the setting and necessary support for groups of classroom teachers, school managers and subject advisors to participate collectively in determining their own developmental trajectories, and to set up activities that will drive their development. (p. 14)*

This definition places emphasis on the teacher as a reflexive practitioner, able to determine their own knowledge and competence gaps and to work together with others to collectively address these gaps. The emphasis on collectively working together in joint activity is outlined in Wenger's (1998) Communities of Practice (CoP) theory, which identifies a key dimension of practice in a Community of Practice as being that members of this community are engaged in a joint activity where members of that community are bound together through mutual engagement (how it functions) and where members of this community share a collective repertoire that has developed over time.

2.3.2.2 The Revised Policy on the Minimum Requirements for Teacher Education Qualifications

The emphasis on critical self-reflection and support for the development of professional learning communities is also reflected in the Revised Policy on the Minimum Requirements for Teacher Education Qualifications (South Africa. DHET, 2015) which states that, "newly qualified teachers must be able to reflect critically on their own practice, in theoretically informed ways and in conjunction with their professional community of colleagues in order to constantly improve and adapt to evolving circumstances" (p.62). Steyn (2008, p. 14) cites

this as a challenge for CPTD to encourage a collaborative culture in communities of practice where teachers are involved in joint activities and discussions, assist one another and share knowledge and skills so as to improve the competence of teachers in South Africa.

The Revised Policy on the Minimum Requirements for Teacher Education Qualifications (South Africa, DHET, 2015) also refers to the applied competence required by teachers. Applied competence refers to three interconnected kinds of competence, namely: practical competence; foundational competence and reflexive competence. Practical competence is the demonstrated ability, in an authentic context, to consider a range of possibilities for action, make considered decisions about which possibility to follow, and to perform the chosen action. It is grounded in foundational competence where the learner demonstrates an understanding of the knowledge and thinking that underpins the action taken; and integrated through reflexive competence in which the learner demonstrates ability to integrate or connect performances and decision-making with understanding and with an ability to adapt to change and unforeseen circumstances and to explain the reasons behind these adaptations. The combination of these competencies provides a framework which "expands the notion of competencies to a framework which recognizes the importance of knowledge in shaping competence, and a framework which recognizes teacher's and learner's capabilities to define future trajectories that are valued in their societies (Sen, 1990, in Lotz-Sisitka 2011). The 2016 National Senior Certificate Diagnostics Report (2016) also refers to the need for teachers to prepare learners adequately by creating learning opportunities to reflect, analyse and evaluate the content, in order to develop their holistic understanding and applied competence.

The Revised Policy on the Minimum Requirements for Teacher Education Qualifications (South Africa, DHET, 2015) also describes the community, citizenship and pastoral role of teachers which is to practice and promote a critical, committed and ethical attitude towards developing a sense of respect and responsibility towards others. The teacher (ibid) should uphold the Constitution and promote democratic values and practices in schools and society. Within the school, the teacher should demonstrate an ability to develop a supportive and empowering environment for the learner, and respond to the educational

and other needs of learners and fellow-teachers. Furthermore (*ibid*), the teacher should develop supportive relationships with parents and other key persons and organisations, based on a critical understanding of community and environmental development issues (p. 59).

2.3.3 Environment and Sustainability Focused Teacher Professional Learning Communities (PLC's)

Stoll and Louis (2007) found that there is no universally accepted definition of a professional learning community (PLC) but that what is common is that they display sharing and critical interrogation of their practice in an ongoing, reflective, collaborative, inclusive, learning orientated, and growth-promoting way (p.2). Emerging perspectives on Professional Learning Communities (PLC) have been informed by Wenger's (1998) description of a Community of Practice (CoP). Collaborative learning in a community is defined through participation in a practice characterised by processes of mutual engagement, shared repertoires and joint enterprise related to this practice (the dimensions of a community). The practice is the source of coherence of a community (*ibid* p. 73) and through the dimensions of a community, individuals are able to develop their competence around valued enterprises which involves not only our competence but the competence of others (*ibid*, p.76). Here the idea of a community of practice also draws on our ability to meaningfully connect and learn from the contributions and knowledge of others. This is particularly relevant for teacher education practice in South Africa as the competence of teachers around valued enterprises can be enhanced through these dimensions of practice.

Dooner, Mandzuk, & Clifton, (2008, p. 564) state that many educators argue that professional learning communities offer an important and distinct perspective on collaborative professional development because they are situated between the educational policies of school districts and the realities of schools and practising teachers. From this perspective, professional learning communities can translate knowledge from the district

into an understanding of a particular school's day-to-day practice (McLaughlin & Talbert, 2006, in Dooner et. al., 2008).

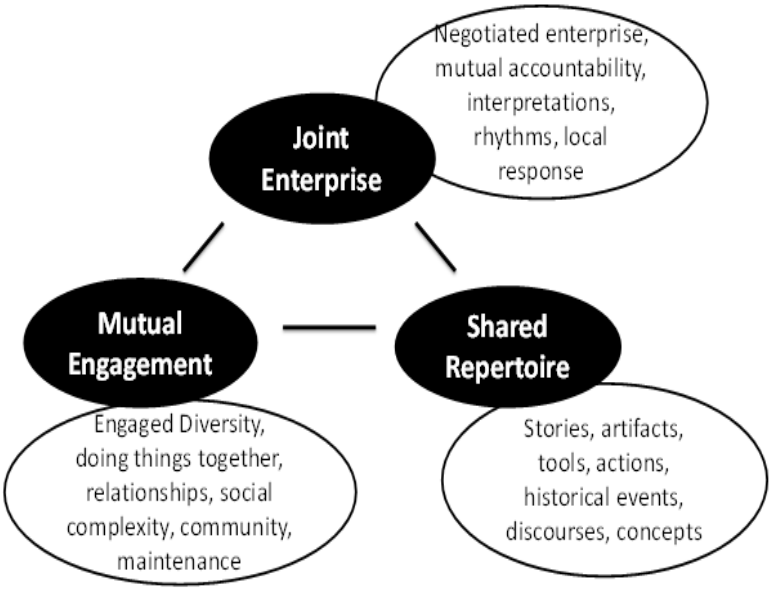

Fig2: Wenger's (1998) Dimensions of Practice as the Property of a Community

While there are many different teacher professional development initiatives for "in-service" or practising teachers in South Africa (Bertram, 2011; Jita and Mokhele, 2012; Taylor et al. 2013), few are focused on developing teacher's environmental content knowledge, pedagogy or developing teacher's environment and sustainability (ESD) competencies. Jita and Mokhele (2012) in their research into professional learning communities (PLC's) in support of mathematics education, found that PLC's developed as "policy implementation" rather than a "peer learning" focus as was the intention of the ISFPTPD (South Africa, DBE and DHET, 2011). Jita and Mokhele (*ibid*) also found the presence of "alternative clusters", often coordinated by non-governmental organisations (NGO's) which pre-existed the DBE formed Professional Learning Communities and where teachers were, "self-directed, and (able) to focus on the core issues of teacher development and classroom improvement," (2012, p. 9). They (*ibid*) also found that in these alternative clusters, "the collaborative

teaching experiences and the collective reflection of the teachers supported and enriched each one of them in terms of their own classroom practices," (2012, p.8).

2.3.4 "Alternative Clusters" for CPTD: Eco-Schools and Fundisa for Change

It is argued here that schools which are registered as Eco-Schools, and which receive support in a "coordinator supported" model of Eco-Schools implementation, are examples of "alternative clusters" for environment and sustainability-focused CPD. Eco-Schools is an environmental programme implemented by the NGO, the Wildlife and Environment Society of South Africa (WESSA), which aims to support environmental learning and action taking in schools across South Africa. The programme provides support through a toolkit and "whole school development" framework as well as through direct support to schools which are clustered into nodes based on proximity to one another and availability of support from a local Eco-Schools coordinator. As such, the programme has an established network of schools and teachers with a long history of collaboration and which exhibit the dimensions of a community of practice as defined by Wenger (1998) (see Chapter 5). Schools and teachers have a shared repertoire in the form of environment and sustainability practices which all schools are required to report on annually, are involved in joint enterprises (such as clean-up campaigns) and demonstrate mutual engagement, in that schools often call upon one another for support of programmes being implemented. Reed-Johnson (2009), reports that the Eco-schools programme supports teacher learning in a number of ways, including supporting a situated or contextualized learning model that allows practices to be shared between members in a community of practice (p.63).

Key features of whole school development approaches are that they "adopt a participatory approach to learning for sustainability… And call for the entire school, including students, educators, and administrators, to be actively engaged in working towards a sustainable school with ESD fully integrated into the curriculum as the driving factor," (Hargreaves, 2008, p. 69). Hargreaves (*ibid*) also cites that:

> *Studies show gaps in appropriate pedagogy and curriculum development in teacher training, the absence of a positive vision, and a general lack of conviction that individual teacher efforts will really make a difference. Teachers also require the greater capacity to undertake the immense and challenging task of implementing a whole-school approach to education. Enhanced pre-service and in-service teacher training are urgently required for educators to be able to act as effective facilitators in the ESD process (p.70).*

Shallcross, Loubser, Le Roux, O'Donoghue, & Lupele (2006), comment that professional development strategies that develop agency within a school and its local community for change are a particular priority in both pre-service and in-service teacher environmental education (p.298). The Eco-Schools programme seeks to develop teacher and learner agency by engaging them in practices that connect environmental content in the curriculum to everyday learning and which supports the school in implementing environmental practices through inquiry-based learning activities.

Reed-Johnson (2009) describes an Eco-School Community of Practice where teachers, students, community members and others participate in shared practices in a whole school development context of learning. She (*ibid*) describes the Eco-schools framework as having set themes or focus areas (similar to Dewey's concept of milestones) for engaging collective actions that have developed through the structures and processes put into place, which set out the motives for carrying out actions through shared practice.

Learning through shared practices also occurs between Eco-Schools where environment and sustainability practices are facilitated by a senior teacher or by an Eco-Schools coordinator. Lave and Wenger (1991) refer to this as "legitimate peripheral participation", describing participation in practices learned within a community of practice, where members of the community usually begin engagement on the "periphery" and learn these practices from a more experienced member of the community. In this way, environment and sustainability practices are shared by more experienced "lead" teachers who have been part of the Eco-

Schools programme over a long period of time, or led by an environment and sustainability "coordinator" either from Eco-Schools or from a partner organisation.

In Rosenberg's (2008) evaluation of the Eco-Schools programme, a DBE official commented that, "Eco-Schools is potentially a tool to fill the voids of teacher competence" (p.35). As alternative clusters, Eco-Schools supports the objectives of the ISFPTED (South Africa, 2011) and although not formally acknowledged as such by the Department of Basic Education (DBE), the programme has been working with local DBE district and provincial officials as well as other key stakeholders to support teacher learning and environment and sustainability practice. Support is provided through environment and sustainability-themed workshops, support for curriculum implementation, access to accredited short course qualifications, and the provision of learning support materials through WESSA Sharenet. Ridley (1996, in Le Roux, Loubser, and O'Donoghue) state that:

> *the continuity of social relationships in whole school approaches is indispensable in reducing defection from sustainable actions and increasing the mutual trust that leads to cooperation….. a whole school ethos would promote action through a collaborative culture of communication and decision-making between adults, children and young people based on mutual recognition and respect. (p.288)*

Key features of collaborative cultures (Nias et al., 1989), or active school cultures (Smyth & Hattam, 2002), are their beliefs, values, understandings, attitudes, meanings, norms, symbols, rituals and ceremonies. Rosenberg (2008) also comments that the Eco-Schools programme:

> *has significant potential to improve conditions for teaching and learning… including through its emphasis on linking practical environmental projects with curriculum learning, providing teachers with opportunities to bridge between the everyday*

knowledge or experiences of learners and the formal knowledge required by the curriculum. (p.39)

A curriculum review undertaken by the Eco-School's programme (Eco-Schools Handbook, 2012) found that key environmental content and concepts form part of the foundational knowledge needed across most subject disciplines. The programme supports teachers to work with environmental concepts in the curriculum, mostly through lesson planning and through inquiry based teaching methods such as the "Active Learning Framework" (O' Donoghue, 2007). Schudel (2012) found in her research that situated learning pedagogical process models (eg. an active learning framework) assisted teachers (in rural Eastern Cape schools) to support learners in foundation phase classrooms to access and make sense of complex new environmental content knowledge when they allowed for a strategy that builds on situated knowledge and experience, and seek to expand this knowledge through encounters with new disciplinary knowledge that provides for a zone of proximal development. Furthermore, Lotz Sisitka (2011, p.33) states that "Eco-Schools has useful tools for reviewing current practices in schools, and it provides a practical and useful set of resources and tools for teachers to integrate environment and sustainability concerns into curriculum and teaching practices, however, the programme has not been able to provide a sustainable system of teacher professional development for environment and sustainability education in South Africa. In order to address this, the WESSA Eco-Schools programme joined as a partner to the "Fundisa for Change" Teacher Education Network in 2011.

2.3.5 Partnerships for Environment and Sustainability focused CPTD: the Fundisa for Change Programme

Teachers are key to improving learner performance (Desimone et. al, 2006) and improving teacher knowledge is one of the key ways in which we can achieve educational quality in South Africa (Taylor et al., 2013). Improving learner performance and teacher knowledge are key objectives of the "Fundisa (Teaching) for Change" programme. "Fundisa for Change"

is implemented by a network of partners across various government departments, parastatals, Higher Education Institutions and NGO's. This network of partners are committed to making a systemic impact to improve environment and sustainability-focused teacher education, as well as providing a curriculum framework and resources for environment and sustainability focused teacher education (Lotz- Sistika, 2011).

Many of the partners of the Fundisa network share a rich history of working to support environment and sustainability CPTD, however, this was largely uncoordinated and involved different teacher education methodologies. The Fundisa for Change network, coordinated through Rhodes University (at the time the research was conducted), marked the first attempt to coordinate the various role-players in the sector and to work collaboratively to support environmental learning. The development of the training methodology, curriculum and materials involved all partners and was developed through a participatory and reflective process and peer reviewed through a 2-year long piloting and research phase from which the current model emerged. The Fundisa for Change stakeholders aim to foster a national system of engagement, to reduce fragmentation and offer a more sustainable pathway for teacher's environment and sustainability professional development. The programme offers a more sustainable pathway for environment and sustainability teacher development and supports the DBE and DHET's policy intent with regard to support for CPTD. Shallcross et al, (2006) comment that:

> *A CPD model that links with new formal curriculum developments in environmental education in South Africa is going to offer a more promising design in fostering central government and teacher support. (p.296)*

The WESSA Eco-Schools programme joined the network as an NGO partner, contributing to the development and piloting of the Fundisa CPTD model (Eco-School teachers were selected to participate in the Fundisa pilot training course). The model was developed to enhance support for CPTD at a local level through support for the development of environment and sustainability-focused Professional Learning Communities and support for

teachers in understanding and implementing the CAPS. As mentioned earlier, CAPS signalled a change to an explicitly content-referenced curriculum, requiring support for teacher knowledge where gaps existed (teachers would identify their own development needs based on a contextual analysis of learner performance and through reflective practice, supported by content-referenced Fundisa materials).

The Fundisa for Change CPTD model also aims to address the "triple knowledge challenge" in teacher education (F4C Introductory Core Text, p. 7), which is explained as:

1. The need for subject foundational knowledge (e.g. core biodiversity concepts);
2. Learning to teach environmental knowledge that is "contested and uncertain" (also referred to as new environmental knowledge); and
3. Supporting teachers to understand knowledge progression in CAPS

The Presidents Education Initiative (JET, 2007) identified the limited conceptual knowledge of many teachers as the most critical challenge for teacher education in South Africa (p. 4), made more complex in the case of teacher's conceptual understanding of "new and contested" environmental knowledge, for example, in the case of teacher's conceptual understanding of climate change and its impacts. Furthermore, little is known regarding the link between curriculum content and teacher practice, with Lotz- Sisitka (2013) commenting that little is known of how new environmental knowledge enters disciplines, how it translates into pedagogical practice and how it is learned in South African schools. These are some of the areas which the Fundisa for Change programme aims to address, namely:

1. the quality of teacher's knowledge and teacher's abilities to teach 'new' environmental knowledge; and
2. the curriculum content necessary for building national capacity for biodiversity management, sustainable use of natural resources, resilience to climate change

challenges, and building a green economy (Fundisa for Change Implementation Plan, 2013).

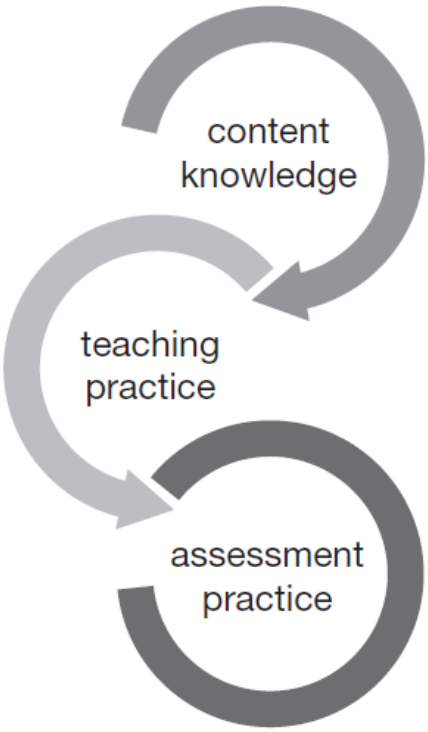

Fig.3 Fundisa for Change CPTD methodology (adapted from Core Text, 2014)

For effective teaching and learning, teachers are required to understand key foundational environmental concepts in the curriculum. Teacher development programmes such as Fundisa for Change have an important role to play in supporting teacher knowledge. Teachers could avoid teaching environment and sustainability content knowledge if they do not have adequate knowledge, skills, and understanding to teach it (Lotz-Sisitka & Janse van Rensburg, 2000; Lotz-Sisitka, 2002). Lotz- Sisitka (2009) also notes that:

> *There is a link between teacher's content knowledge and what they choose to teach; what they can teach well and how their learners perform. Research on environmental learning in South African schools showed that many teachers- across the socio-economic spectrum- have limited knowledge of environmental content and concepts, partly*

> *because environmental knowledge is "new" in the South African education system, and is also changing rapidly. As a result, they tend to "skip" required environmental content in the curriculum, teach environmental content and concepts at too low a level for the grade, or fail to correct the misconceptions of learners. (p.2)*

The Fundisa for Change programme supports teacher knowledge through participatory learning processes, and knowledge resources such as: an orientating introductory text; a teaching methods and processes handbook; an orientating text on teaching and learning in CAPS and subject-specific topic units. The model of delivery requires teachers to "work together and work-away", with 3-day contact sessions and applied learning tasks which require teachers to develop a lesson suitable for the contextual needs of their learners and to reflect and report on this through an assignment based task. This model of participatory learning supported by knowledge resources and reflection aims to develop and consolidate teacher learning. As Pallas (2001, in Wals and Dillon, 2006) argue, "meaning arises from two complementary purposes, participation and reification" (p.554). In essence, participation is the process that communities (social, cultural or geographical) use to share and develop ideas and meaning and reification is the social consolidation of that meaning (Lave &Wenger, 1991). Wenger (1998), states that "a learner can reproduce reified knowledge without attempting to gain some ownership of its meaning," (p. 265). Reified knowledge refers to knowledge that has been "de-contextualized" and lifted into a form of text or other fixed curriculum. Wenger (1998) refers to this as "reifying knowledge for educational purposes" (p. 264) such as in the case when knowledge is codified into textbooks, and other learning resource materials which serve as the "curriculum" for the educational programme. Wenger (*ibid*) cautions that the reification of knowledge should be balanced with participation, or creating opportunities for learners to engage in meaning-making.

2.4 Theoretical Framework: Learning Processes in a Community of Practice

The teachers who participated in the Fundisa for Change CPTD programme in this study identified themselves as belonging to an Eco-Schools cluster and sharing common practice. In order to understand how teachers learn in an Eco-Schools Community of Practice, it is useful to refer to the work of socio-cultural and situated-learning theorists, as the Eco-Schools programme emphasises contextualised learning through local problem solving and action taking. Authors whose work will be drawn on include Lave and Wenger (1991), Wenger (1998), Rogoff (1997), and Borko (2004).

In Wenger's Community of Practice theory (1998) he emphasises the value of participatory learning, learning through practice, a shared identity as an important aspect of collaborative learning and that learning occurs when members of the Community of Practice are engaged in meaningful practices which are valued and contextually relevant. Similarly, Lave and Wenger (1991) refer to situated learning which "emphasises the relational interdependency of agent and world, activity, meaning, cognition, learning and knowing" (p.67).

Situated learning is also identified in teacher education policy as an important aspect of teaching and learning (South Africa, DHET, 2015). The Minimum Requirements for Teacher Education Qualifications (ibid) describes situational learning as:

> *(Having) knowledge of the varied learning situations, contexts, and environments of education (classrooms, schools, communities, districts, regions, countries and globally), as well as to the prevailing policy, political and organisational contexts. Naturally, all learning - including disciplinary learning, pedagogical learning, practical learning and fundamental learning - should involve learning in context, but situational learning refers*

specifically to learning about context. This includes an understanding of the complex and differentiated nature of the South African society, learning to work in nuanced ways in confronting the diverse challenges faced by children in schools and the communities they serve, for example HIV and AIDS, poverty and the lingering effects of apartheid, dealing with diversity, promoting inclusivity and environmental sustainability. (p.13)

Borko (2004) comments that teachers learn in a variety of contexts and to better understand how teachers learn, it is useful to study this in multiple contexts, including in Professional Learning Communities. In order to better understand the learning process evident in this Eco-School's/ Fundisa for Change Professional Learning Community, it is useful to explore the literature on how teachers learn in a Community of Practice and the value of situated learning theory in understanding these processes. Greeno (1997) states that "the situative perspective is not an argument against (knowledge) transfer, however, but an attempt to recast the relationship between what people know and the settings in which they know-between the knower and the known."

Borko (*ibid*) explains that situative theorists conceptualize learning as changes in participation in socially organized activities, and individuals' use of knowledge as an aspect of their participation in social practices (e.g. Greeno, 2003; Lave & Wenger, 1991). Daniels (2008) describes this as "the unit of analysis is situated social practice rather than the bounded individual in traditional psychology," (p. 52). Jean Lave (1988 in Daniels, 2008, p. 91) describes a Community of Practice as "concerned with the everyday activity of person's acting in a setting….emphasis being on the study of the emergent, contingent nature of human activity, the way activity grows directly out of the particularities of the given situation," and with the contexts and activities in which people learn become(ing) a fundamental part of what they learn (Greeno, Collins, & Resnick, 1996). Hanks, in Lave and Wenger (1991, p. 14) states that "rather than asking what kind of cognitive processes and conceptual processes are involved, they ask, "what kind of social engagements provide the context for learning to take place." Professional Learning Communities (PLC) such as those

in the Eco-Schools programme could provide the context for social engagement and learning which could benefit teacher knowledge through this social engagement.

Wenger (1998) describes Communities of Practice Theory (CoP) as a "conceptual framework from which to derive a set of general principles and recommendations for understanding and enabling learning… (learning) is emergent through participation and is expressed as a way of talking about practice, community, identity and meaningful experience," (p.5). In this study, data will be analysed using these categories and explored in how teachers talk about their practice, community, identity and meaningful experience. Meaningful experience relates to how teachers express what they value in participation in this Eco-Schools Professional Learning Community. Wenger, Traynor and de Laat (2011) refer to this as value creation, that is, the value of the learning which is enabled by community involvement and networking (p. 7). The general principles of a Community of Practice are described by Wenger (*ibid*) as:

> *We are social beings;*
> *Knowledge is a matter of competence with respect to valued enterprises;*
> *Knowing is a matter of participating in the pursuit of such enterprises;*
> *Meaning and our ability to experience the world and our engagement with the world as meaningful is ultimately what learning is to produce. (p. 4)*

In Community of Practice theory, "what people learn is their practice…learning is not reified as an extraneous goal," (Wenger, 1998, p. 95). Learning is emergent through participation and is expressed as a way of talking about practice, community, identity and meaningful experience (*ibid*, p.5).

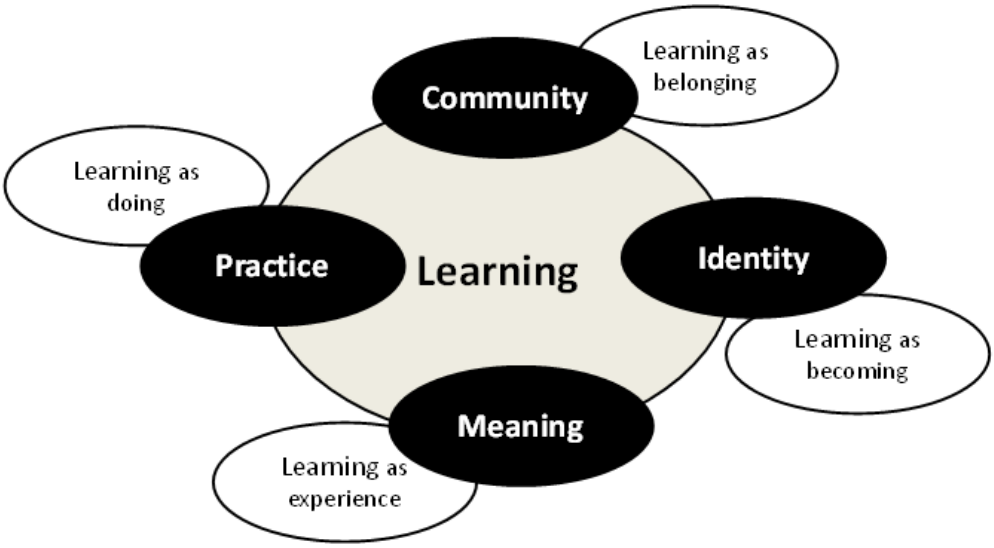

Figure 4: Wenger's (1998) Components of a Social Theory of Learning

2.4.1 Identity: Learning as Becoming

Eco-School's teachers are "mutually engaged" in common activities and through this process, share a common identity, bound together in a shared environment and practicing shared sustainability practices. Wenger (1998) describes identity formation as part of the learning process as identity is "an on-going process of evolving forms of mutual engagement, understanding and tuning their enterprise, developing their repertoire, styles, and discourses," (p. 95). Wenger (2009), comments that "the practice of a community is dynamic and involves learning on the part of everyone," (p. 4). For the individual, learning is a way of talking about how learning changes who we are and creates personal histories of becoming in the context of communities (*ibid*, p.7). Learning shapes one's personal identity as "learning transforms who we are and what we can do," (*ibid*, p. 215). This suggests a growing level of skill or ability as the newer members of the Community of Practice develop and negotiate this identity.

2.4.2 Meaning: Learning as Experience

Wenger (*ibid*) states that the components of a Community of Practice are all interconnected and mutually defining (p.05) and that, "learning has to do with the development of our practices and our ability to negotiate meaning. It is not just the acquisition of memories, habits, and skills, but the formation of an identity," (p. 96). Learning as experience is the development of meaning (value) through a way of talking about our (changing) ability, individually and collectively, to experience our life and the world as meaningful (p. 5). A learning community is described by Wenger et al., (2002, in Dooner, Mandzuk, & Clifton, 2008, p. 564) as, "a group of people that act on an on-going basis to develop their knowledge of a common interest or passion by sharing individual resources and by engaging in critical dialogue." He further comments that, "thus, if members' relationships are built on trust, the forthright nature of the group's practice can generate honest interactions, challenging questions, and constructive feedback all of which are essential for intellectual growth to occur (de Lima, 2001; Grossman, Wineburg, & Woolworth, 2001 in Wenger et al., 2002)." Wenger (*ibid*, p. 214) also states that "mutual engagement in a shared practice can thus be an intricate process of constant fine-tuning between experience and competence." In terms of the duality between experience and competence Wenger (*ibid)* describes a Community of Practice as "a context for new insights to be transformed into knowledge". A Community of Practice can create the conditions for a newcomer to gain access to competence and through a personal experience of engagement, incorporate that competence into an identity of participation. In so doing a Community of Practice can become, "a locus for the acquisition of knowledge," (Wenger, 1998, p. 214). Also, in a well-functioning Community of Practice, "the Community of Practice can explore radically new insights without becoming unstuck, thereby providing a locus for the creation of knowledge" (*ibid*).

Learning also occurs through the process of meaning-making. The emphasis on meaning-making is key to Community of Practice and relevant for approaches which seek to address gaps in teacher's content knowledge, particularly with respect to "new science knowledge"

in the curriculum. While teachers may be able to memorise key concepts and content, this would not be of any benefit to them or to their students if they are not engaged in a process of meaning-making where these concepts can become personally meaningful, for example when applied to their own contexts.

2.4.3 Practice: Learning as Doing (Practice)

Wenger (1998) emphasises "social participation as a process of learning and knowing" (p. 4). Social participation thus entails collective learning which results in practices, where practices become "the property of a kind of community created over time" (*ibid*, p. 45). Similarly, Adler (2000) describes teacher learning as "usefully understood as a process of increasing participation in the practice of teaching, and through this participation, a process of becoming knowledgeable in and about teaching" (p. 37). He (*ibid*) further states that "for teachers, learning occurs in many different aspects of practice, including their classrooms, their school communities, and professional development courses or workshops. To understand teacher learning, we must study it within these multiple contexts, taking into account both the individual teacher-learners and the social systems in which they are participants."

Working with disciplinary knowledge and being able to apply this in context is critical for teacher education as the CAPS (South Africa, DBE, 2011) requires that the teacher should be a "knowledge worker and to be able to work with knowledge in a systemic way, working with knowledge that can be applied (in context) and working with knowledge that comes out of practice," (O' Donoghue, M.Ed coursework notes, 2014). The Revised Minimum Requirements for Teacher Education Qualifications (South Africa. DHET, 2015)also refers to integrated and applied knowledge which should be understood as being both the condition for and the effect of scrutinising, fusing together and expressing different types of knowledge in the moment of practice (p.09).

2.4.4 Community: Learning as Belonging

Learning in a community is enabled through what Wenger et al. (2002) describes as a self-organizing system comprising of a community of people "who share the same interest, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (p. 4). The Eco-Schools programme provides a context for this ongoing engagement, as teachers share a common “domain of interest”. Wenger, Trayner and De Laat (2011) also describe the value of learning in a community and through networks, as learning occurs through a shared domain and shared practices.

Thomas et al., (1998, in Borko and Putnam, 2000) state that teachers also bring different pedagogical understandings and expertise to group discussions (p.23). By drawing on each individual's private understandings, which represent these different degrees of pedagogical and disciplinary expertise, the collective understanding of the group is thus advanced. Borko and Putnam (*ibid*) also state that interactions with the people in one's environment are major determinants of both what is learned and how learning takes place. This socio-centric view (Soltis, 1981) of knowledge and learning holds that what we take as knowledge and how we think and express ideas are the products of the interactions of groups of people over time. To begin, individuals, motivated by their personal expectations, unite on a common interest or a shared passion; in fact, meaningful collaboration stems from this initial overlapping of values (Weick, 1979, in Dooner, Mandzuk, & Clifton, 2008, p. 564). At this time, people converge to find out whether they share enough common ground to potentially work together, although their individual expectations or diverse ends, such as developing leadership skills or expanding social networks, remain private. If then, a shared group interest can be identified (Wenger et al., 2002), members’ interdependence centered on the development of their common means or their practice, such as assigned readings and meeting agendas, to achieve the group’s goals (Weick, 1979).

2. 5 Conclusion

The chapter outlined the perspectives informing the Eco-Schools and Fundisa for Change programmes. It situated them within teacher development policy in South Africa and more

broadly within the Education 2030 and Sustainable Development Goals on a global level. Professional Learning Communities as a model of support for teacher development was informed by Wenger's (1998) Communities of Practice theory, which provided a theoretical and conceptual framework for understanding the learning processes in a Professional Learning Community. The review of literature is intended to help the reader to understand how teachers in an Eco-Schools Professional Learning Community develop a set of shared practices, a common identity and are able to make meaning through participation in valued enterprises.

CHAPTER 3: RESEARCH METHODOLOGY

> *There is a place at which research and evaluation intersect, when research provides information about the need for, improvement of, or effects of programs and policies*
>
> *(Mertens, 2009, p.2)*

3.1 Introduction

This chapter discusses evaluation research and explains the methodology used in data generation in the 2 parts of the study. The first was in the form of a survey with interviews to document and probe the patterns of support in Eco-Schools so as to explore how this is contributing to teacher learning and environment and sustainability practice. The second was developed as a case study using appreciative inquiry and interviews to generate data on teacher's perspectives of value creation in an Eco-School's Professional Learning Community, which includes a professional development qualification through the Fundisa for Change programme. The research strategy is explained, beginning with a description of the evaluative survey of teacher support in the context of schools and teachers working together in the Professional Learning Community at 11 sites. This was followed by an in-depth case study of an expanded support model involving a teacher professional development programme. The approach to the evaluation used across both phased of evaluative review is explained as developmental evaluation, that is, an evaluation where the data analysis and research findings are used to make recommendations to support the teacher development strategy of the Eco-Schools programme. The chapter concludes with a discussion on the research ethics and validity of the data.

3.2 Research Methodology

3.2.1 Evaluation Research

While programme evaluations have been common since the 1990's, evaluation research is a relatively new approach to academic research. Mertens (2015) discusses evaluation research as a form of academic research and comments that in the social sciences there is still some confusion regarding whether evaluative review constitutes academic research (2015, p. 52). She argues that both evaluation and evaluation research utilise systematic inquiry methods but that these are generally used for different purposes. She (*ibid*) states that:

> *Typically evaluations are associated with the need for information in a specific setting whereas academic research is typically associated with generating new knowledge which can be applied in other settings. (p.03)*

The choice to conduct this study as an evaluation research process was in order to review Eco-Schools and to generate new knowledge on value creation derived through the current patterns of Eco-School support. The study thus aims to do both: an evaluation and to generate new knowledge about the programme of Eco-School support to teachers and schools. It thus set out to gather data on the patterns of support in Eco-Schools (specific setting) and to assess the outcomes of the coordinator supported Eco-Schools model on the functioning of Eco-Schools as Professional Learning Communities as well as the value that is being created for participating teachers. Here the intention was to generate new knowledge on the programme that could be used to reflect on similar supported settings of school-based environmental education programmes. This evaluation has thus been approached as a process of applied research, which Karberg and Davis (2005) in their guide to ethics in human subject research explained as:

> *Programme evaluation is an example of applied social science research. Beneficial and valuable programme evaluations require knowing the principles of social science, experimental design, and data collection methods. Successful programme evaluations*

> *frequently demonstrate an understanding of the relationship between theoretical concepts of human behaviour or social structure and pragmatic interventions.*

The research and data presented seek to generate a deeper understanding of the relationship between the pragmatic patterns of the supported intervention of Eco-School coordinators and stakeholders by applying the theoretical concepts described by Wenger's (1998) Communities of Practice theory. While evaluation research may not be common in academic research, Scott (2009) in his keynote address at the South African Environmental Education Association conference entitled, "Environmental Education Research: 30 years on from Tbilisi", he called for researchers to "be open to new or unfamiliar ways of doing… research, whilst constructively engaging with work already archived" (p.162).

Patton (2008) also makes a distinction between the intrinsic and extrinsic value of evaluations in terms of merit (intrinsic) and worth (extrinsic). He (*ibid*) states that:

> *merit refers to the intrinsic value of a programme, for example, how effective it is in meeting the needs of those it is intended to help and worth, which refers to the extrinsic value to those outside the programme, e. g. the larger community or society.*

By exploring what teachers come to value through participation in an Eco-Schools Community of Practice, the intrinsic value of the programme will be explored. Similarly, by applying Community of Practice theory to understanding the learning interactions and learning processes evident through data gathering and analysis, it is hoped that patterns will emerge that can be applied to understanding the learning processes in the settings examined. The developing insights will be used in the wider Eco-Schools programmes in similar settings (transferable), and hence the research has extrinsic value which can be applied to supporting teacher professional development in environment and sustainability education more broadly. This study is an example of theory-driven empirical research.

Coldwell and Simkins (2010) refer to theory-driven evaluation research designs as, “approaches which have a strong focus on learning from evaluation about why and how programmes work and not just ‘what works’ ” (p.151).

3.2.2 Developmental Evaluation Research

There are a plethora of approaches to conducting evaluations and Pawson and Tilley (1997), describe evaluation as a mantra of modernity in which all programmes, particularly social programmes are required to be evaluated (p.02). Usually, the driver for conducting an evaluation is external, for example, a requirement of funders who want to record impacts and outcomes from investments made and are based on a theory of causation which may have underlying positivist assumptions. Pawson and Tilley (*ibid*) also comment that “by and large, evaluation research is reformist; its basic goal is to develop initiatives which help to solve social problems” (p. 12). Patton (2012) comments that developmental evaluations differ from formative or summative evaluation approaches in that this approach deals with conditions of complexity and supports social innovation and adaptive management (p. 1). The aim of developmental evaluations is not to draw judgements, but to contribute to a “review, reflect and adjust” methodology of programme development (*ibid*). The approach used in this study is developmental in its approach and was chosen as this will be the most appropriate for probing how patterns of teacher support practices in Eco-School PLCs are creating value.

The Eco-Schools programme in South Africa has been implemented for over a decade, and as such is not in its formative stage, thus a formative evaluation approach would not be suitable. Neither would a summative evaluation approach as the programme is on-going. In conducting an evaluation of the programme, this can neither be formative nor summative as the objectives of these models of evaluation are not congruent with the goals of this research evaluation study. Patton (2011) advises that developmental evaluation is applied to programmes that continue to evolve and as such is more suited to the needs of the Eco-

Schools programme as the programme is adaptable to changing needs of Eco-School participants and to the local and national context, and has a track record of adjusting to these needs. Patton (2011) also comments that developmental evaluation supports social innovation and adaptive management and it is hoped that the insights and evidence generated through this study can be used for adaptive management of the Eco-Schools programme. He (*ibid*) adds that developmental evaluation, "tracks and attempts to make sense of what emerges under conditions of complexity, documenting and interpreting the dynamics, interactions and inter-dependencies that occur as innovations unfold" (p. 7).

Developmental evaluation supports co-learning enabled through an Appreciative Inquiry process of data generation. Wals and Dillon (2006) differentiate between 3 broad representations of Environmental Education research, namely, research as evidence, research as co-learning and research as activism (e.g. to have a transformative objective). The methodology in the study supports co-learning through teacher participation and reflection on practice and value derived from participation.

Table 1: Three Simplified Representations of Environmental Education Research

	Research as Evidence	**Research as Co-Learning**	**Research as Activism**
Modus of understanding	Empirical analytical	Hermeneutic-interpretive, holistic-descriptive	Socially critical
Locus of Impact	Universal	Trans contextual	Contextual-transformative
Key Research Competencies	Good tester, designer and modeller	Good listener, interpreter and storyteller	Good ally, critical friend, advocate
Main research modes	Passively detached, neutral expert, objective	Actively-detached, passively engaged, explicitly biased	Actively committed, explicitly partisan
Role of the researched	Source of data	Active informant, co-learner	Change agent, co-learner
Desired outcomes include	Test of hypotheses, definitive answers	Improved understandings, thick descriptions, Increased (self) awareness	Transformation (systemic) change

3.2.3 Appreciative Inquiry

The Appreciative Inquiry (AI) (Cooperrider and Srivastva, 1987) method of data collection was chosen as this supports co-learning and is used to gather teacher's perspectives of value (appreciation) through a process of deep reflection and discussion in a social interaction which should explore and make explicit, the value of collaboration and sharing enabled through participation in an Eco-Schools Professional Learning Community. Clarke & Hollingsworth (2002, in Stevenson, 2013) comment that:

> *…there also has been an important shift in the last decade or so in thinking about teacher professional development in terms of teacher agency from programs that attempt to change teachers, to teachers as active learners shaping their professional growth through reflection in practice and reflective participation in professional development programs (p.276)*

O'Donoghue and Brouwers (2012) describe the process of using an Appreciative Inquiry approach as it:

> *implies that the evaluating team sees its role as that of an informed facilitator providing the structure for a process of common [everyday] sense making. Appreciative inquiry (AI) approaches evaluation as a learning experience using dialogue, reflection and challenge to distil learning opportunities, to create a learning environment and to develop inquiry skills. (p. 4)*

Appreciative inquiry also develops teachers' reflective competence and supports their professional development by stimulating discussion and reflection which could lead to teacher's identifying opportunities for their own continued professional development. Teachers are expected to be knowledgeable in their subject discipline, to have the pedagogical content knowledge required, and to be able to work with knowledge in situated

ways. These are outlined in the Minimum Requirements for Teacher Education Qualifications (South Africa. DHET, 2011, revised, 2015), and the ISFPTED (South Africa. DBE and DHET, 2011) which outlines the policy on the CPD of teachers, and the need for the "professionalization" of teaching in South Africa. This includes the vision of teachers who, as professionals, take responsibility for their own development and learning pathways and are able to describe and identify their own professional needs. In order to be able to do this, the teacher's own perspective on the development, acquisition and application of knowledge are important and an appreciative enquiry approach is a useful tool for enabling and determining this. Through this approach to data generation, the teacher is the knowledgeable professional who is able to describe and identify his or her own knowledge and development needs and the emerging descriptions and perspectives are useful for developing insights on the functioning and outcomes of the process.

3.2.4 An Evaluative Case Study Research Design

Phase 2 of the study is an interpretative case study of an Eco-Schools Professional Learning Community. This is explored as an example of a coordinator supported environment and sustainability Community of Practice with extended support for teacher professional development through the Fundisa for Change programme where teachers can be awarded a professional development qualification. Stenhouse, (in Wals, 2004) states that an educational case study should seek to enrich an understanding of educational action, therefore, use of a case study approach was chosen as this will aid understanding of the learning processes in this Professional Learning Community, with recommendations applied to support other Eco-School Professional Learning Communities and to contribute to the developmental evaluation of the programme (p.07).

The case study will present the perspective of teachers who belong to an Eco-Schools Community of Practice and who participated in the Fundisa for Change "Teaching Biodiversity" course in the Mpumalanga Province. Yin (1989 in Wals, 2004), states that case

studies allow a researcher to reveal the multiplicity of factors [which] have interacted to produce the unique character of the entity that is the subject of study (p.05). The case study presented in this research will be used to determine what the teachers find valuable in the support which they receive through participating in this environment and sustainability-focused teacher professional development programme. In the literature review, the Fundisa for Change expansion of teacher professional development support is reflected as "alternative clusters" by Jita and Mokhele (2012).

3.3 Data Generation and Management

Data were generated in two phases as per the main goals of the research. The reader is reminded of these as:

- Phase 1 aims to generate data which explores and describes the patterns of support in a "coordinator supported" Eco-Schools node/cluster;

- Phase 2 aims to generate evidence in relation to what teachers derive value from in the support that they receive in the Eco-Schools Professional Learning Community examined; and to assess evidence on how teaching, learning, and practice are being supported and developed through participation in the Eco-Schools Professional Learning Community examined

The data from both of these phases of the study were used inform patterns of Eco-School support going forward.

3.3.1 Survey Data Generation Tools and Methods- Phase 1

The first phase was designed to help identify the key contextual data for Eco-School clusters included in the review (for example, the size of clusters, history of formation, context of support and mapping of stakeholders) and to describe the patterns of support in this model of Eco-Schools implementation where schools receive support from an Eco-Schools coordinator. The survey was conducted through a semi-structured questionnaire and guided

questioning through interviews with coordinators. The survey research was conducted with 30 Eco-School "clusters" across 9 provinces. 15 responses were received from 6 provinces, representing 50% of the national Eco-School clusters. The survey questions were designed to extract quantitative data, as well as descriptions of the cluster history, stakeholders involved and key activities which were undertaken by the coordinators. An example of the survey can be found in Appendix 1. The data were tabulated and categorised using the categories in Wenger's (1998) Communities of Practice theory. This was done to determine the key dimensions of the clusters in order to get an initial broad understanding of how the clusters are situated and may come to function as emergent Professional Learning Communities. Data were reviewed using the key dimensions of a Community of Practice as described by Wenger (*ibid*), that is, data was evaluated for:

- evidence of joint enterprise,
- examples of mutual engagement and
- the development of a shared repertoire.

This enabled an analysis of the extent to which Eco-School clusters are supporting teacher learning through collaboration in environment and sustainability learning activities. In this way, the patterns of support in each cluster were reviewed as a Community of Practice. The study also examined how in Eco-Schools each emerging Community of Practice was connected within a landscape of practice with Eco-Schools Nationally and with the International Eco-Schools network. The data generation also enabled a mapping of patterns of stakeholder engagement, further contributing to broadening understanding of the landscape of environment and sustainability practice and support provided by other environment and sustainability knowledge organisations.

3.3.2 Data Generation Tools and Methods- Phase 2 Case Study

Phase 2 followed the initial evaluation research work. It builds on the evaluation and description of support patterns in Eco-School clusters reviewed as a Community of Practice.

The case study examines an emerging Eco-Schools support model developed to include a Fundisa for Change professional qualification. This part of the study was developed as a case study of teacher learning and value creation.

Data were generated using the following methods:

1. A focus group discussion with 6 out of the 12 teachers using an appreciative inquiry (Cooperrider and Srivastva, 1987) methodology to elicit deeper understandings of knowledge acquisition, development and application as a result of their participation in an Eco-Schools Community of Practice. The seventh interviewee had to unexpectedly leave the group due to receiving the unfortunate news of the death of his brother in a motor vehicle accident. 4 participants declined to participate as they had other commitments on the day of the group interview.

2. Semi-structured interviews- interviews were conducted with 4 out the 12 teachers who participated in the Fundisa for Change biodiversity course

3. Document analysis of teachers' Fundisa for Change portfolio assignments. This was used to verify evidence from interviews and the focus group discussion and to derive further insights on applied learning and teacher reflections of their own practice.

One teacher was common to both individual and group interviews, which means that in total data was gathered from 9 out of the 12 teachers who participated in the F4C course on Biodiversity.

Table 2: An inventory of the data sources used, how these were coded. A brief explanation is provided for ease of reference.

Index Code	Explanation	Appendix
Q1	Questionnaire 1: Eco-Schools coordinator survey instrument to explore patterns of support	1
ESC1-11	Eco-School Coordinator 1 to 11	
Int1	Interview Schedule 1: Elizabeth Lambert (Hazyview) Eco-School coordinator interview schedule to explore patterns of support	2
Int 2	Interview Schedule 2: Victoria Burnett (Western Cape) Eco-School coordinator interview schedule to explore patterns of support	
AI	Appreciative Inquiry focus group discussion	3
Int 3	Value Creation- Interview with Teacher 1	4
Int 4	Value Creation- Interview with Teacher 2	
Int 5	Value Creation- Interview with Teacher 3	
Int 6	Value Creation- Interview with Teacher 4	
T1-T11	Teacher 1 to teacher 11	
Port 1-9	Portfolio 1 to 9	
	Nvivo screenshot of coding categories used for data analysis	5
	Nvivo screenshot of data sources and references	6
	Nvivo screenshot of coding and analysis of teacher portfolios	7
	Nvivo screenshot of source: appreciative inquiry group interview	8
	Nvivo screenshot of source: teacher interviews	9
	Permission to conduct the study	
	Teacher Consent Forms	

3.4 Overview of Case Study Sample and Site

Twelve high school teachers from three clusters in the Mpumalanga Province were involved in the case study. They were selected because they had participated in a Fundisa for Change "Teaching Biodiversity" course for Life Sciences (FET) teachers in October 2013. The

teachers involved were from Eco-Schools clusters which represent a range of deeply rural schools in the Hazyview and Malelane areas to peri-urban schools in the Witbank (eMahlaleni) area. Each cluster has its own Eco-Schools (ES) coordinator who has been working with them, through school visits, for 2 or more years and the size of the clusters range from between 5 to 20 Eco-Schools in each cluster. Despite the size of the clusters, only 12 teachers were selected as only 15 places were available on the Fundisa for Change course and completion of the course is an important aspect of the case study (11 teachers completed the course requirements). Typically, ES coordinators are employed by WESSA (local NGO) and are given guidelines for the support they should provide which should include curriculum-linked lesson support, resource materials, and support for school action projects. Coordinators can also support the implementation of lessons through practical or fieldwork-based teaching methods and are expected to visit schools and provide face to face support for the implementation of the Eco-Schools framework. The ES coordinator should also conduct school workshops which could be held with a group of teachers teaching various subjects in one school or working with the same subject teachers from various schools in this cluster. As the Eco-Schools coordinator is not employed by the Department of Basic Education, permission is required to work with schools and all activities should take place outside of lesson time so as not to disrupt teaching and learning.

As part of the Fundisa for Change CPTD programme, teachers attended 3 contact training sessions, implemented and reported on a life sciences lesson on biodiversity and completed a workplace-based assignment. The assignment focused on key biodiversity concepts, life sciences pedagogy (teaching methods) and assessment practices. Teachers then applied this learning in context and reported on this through a “portfolio of learning”.

The selection of teachers from each of the schools in the cluster who were chosen to attend the course was based on whether these teachers were active members of the Eco-Schools committee at their schools and whether they were teaching Life Sciences in Grades 10 and 11 (FET). Teachers selected were also from schools which had been registered on the Eco-Schools Programme for more than 2 years and which were in close proximity to one

another, that is, part of a cluster of Eco-Schools. Each of these clusters is supported by an Eco-Schools coordinator who visits their schools regularly and supports them with implementing the Eco-Schools framework for whole school development and also provided additional support and learning resources for the Fundisa teachers to complete their workplace-based assignments. The table which follows below lists the school names and location of schools.

Table 3: Description of Study Area and Participants

***note that permission was sought from teachers regarding the use of their data and whether they preferred to remain anonymous. Permission was obtained to use names of some teachers and location of schools, however, in the coding and analysis, the identity of teachers has been replaced with numerical identifiers. Permission was also obtained from the Mpumalanga Department of Education to conduct the research study. See Appendix 9 and 10.**

Name of School	Area and Municipal District/ Education district	GPS coordinates
Madlala High School	Justicia, Hazyview, Bohlabela District	24°52'25,23"S 31°24'46,19"E
Ian Mackenzie High School	Ireagh, Hazyview, Bohlabela District	24°50'39,80"S 31°20'15,81"E
Phillip Ndaminda	Nkangala District	S25° 50.582' E29° 06.284'
Mabanda High School	Nkangala District	S26° 00.262' E29° 01.900'
Leonard Ntshutshe High School	Nkangala District	S25° 51.582' E29° 07.052'
Vulindlela High School	Kabokweni, Nelspruit, Ehlanzeni District	25°20'59,16"S 31°07'53,60"E
Mthombo High School	Newscom, Kabokweni, Ehlanzeni District	25°22'43,90"S 31°09'13,09"E
Guduza High School	Kabokweni, Nelspruit, Ehlanzeni District	25°21'22,56"S 31°07'28,16"E
Mdzili Secondary School	Schulzendal, Nkomazi Circuit, Ehlanzeni District	25°44'49,93"S 31°33'2,07"E
Lovunywa High School	Langeloop, Nkomazi Circuit, Ehlanzeni District	25°41'18,23"S 31°38'10,56"E
Camalaza High School	Middleplaas, Nkomazi Circuit, Ehlanzeni District	25°43'26,68"S 31°33'19,52"E

Participating teachers were from the Hazyview area (2 teachers) and Kabokweni (3 teachers), located approximately 100km outside of Nelspruit. These teachers have been supported since 2012 by an Eco-Schools coordinator who visits them on a regular basis to provide support for projects and learning. The Hazyview schools are in a remote rural community (Ian Mckenzie High and Madlala High) with Vulindlela, Guduza and Mthombo high schools being "township" schools located in the Kabokweni area. These schools support many poor and orphaned learners (child-headed households) and as such most of these schools have a school feeding scheme. Learners get little parental support and the teachers spend most holidays assisting the learners, especially the Grade 12 students. In addition, these schools are generally under-resourced and most of them have no piped water access (some now have boreholes and pumps which have been donated, others rely on municipal water tankers that fill up their water storage tanks on a periodic basis). Due to the remote location of these schools, the learner to teacher ratio is not very high and ranges from 1:22 at Ian Mackenzie High to 1:35 at Mthombo high. The language of instruction is English and Seswati.

The second geographic area of the study is a cluster of 3 schools in the Witbank/ eMahlaleni (Ogies) /Nkangala District areas (3 teachers). Leonard Ntshunthse and Phillip Ndaminde High Schools are located in a high density, rapidly developing township area. As such the community is a mix of middle-class housing and squatter camps. Mabande Comprehensive High School is situated in the Phola township of Ogies. This area is known for being very volatile, due to service delivery protests. Schools are closed on a regular basis due to strikes and demonstrations, which hampers the schools environmental learning efforts.

The third geographical area is in the Nkomazi Circuit in the Schulzendal, Middleplaas, and Langeloop communities, with 3 participating teachers coming from this area. These schools are situated in small poor rural communities approximately 10km from the South African/ Swaziland border, and about 60km from Malelane. The number of students in these schools ranges from 650 (Mdzili), 1228 (Lovunywa) to 900 (Camalaza). All these high schools have severe water shortages even though they are close to the Driekoppies Dam. Water gets

delivered to the schools by the municipality but this is not enough. Often the water is "stolen" along the way. The schools may go for a week without water where the learners are asked to bring water from home. There is a high level of teenage pregnancies in the schools and many child-headed households due to the death of parents and caregivers from HIV Aids. Many of these learners are beneficiaries of the nutrition programmes at school, with the school meal possibly being their only proper meal for the day. Langeloop, in particular, is an area known for unrest and strikes, affecting Lovunywa High School. Despite all these challenges, the educators remain positive and make an extra effort to support learners to pass. During school holidays the Grade 12 learners "camp" at the schools so that they can attend extra lessons. These schools have been with the Eco-Schools programme since 2013 and they have taken on vegetable gardening, recycling, growing Moringa trees, and composting as part of their environmental projects.

3.5 Data Analysis

3.5.1 Data Analysis- Phase One

In phase one data were coded and analysed manually as the source of the data was from a survey (more quantitative) and interviews which could be coded manually using Wenger's (1998) Dimensions of Practice. This enabled the identification of the key features or Dimensions of Practice in Eco-School clusters, as emergent professional learning communities. The questionnaire (see appendix 1) was designed to capture quantitative and qualitative data. Quantitative data were collected regarding the size, location, frequency of visits, profile of teachers and number of stakeholders in each supported Eco-School cluster. Qualitative data were collected as descriptions of the nature of the support provided to schools, and cross- referenced with descriptions provided by teachers. Descriptions were broadly categorised as:

- History of the formation of the cluster (how did the cluster develop?)

- Coordinator perspectives of activities conducted and education policy links

- Description of main activities of the cluster, the support provided and teacher development needs/ activities

- Examples of collaborative activities involving teachers from schools across the cluster

- Coordinator perspectives of the value which teachers derive from the support provided to them in the cluster

- Coordinator insights into any other environment and sustainability professional qualifications which the teachers may be pursuing/ have completed or other professional development opportunities provided by stakeholders

These data were extracted from the questionnaire responses using excel to organise and code the data using Wenger's Dimensions of a Community of Practice (Wenger, 1998) as analytical categories for deriving insights into the functioning of teacher support practices to support learning and to produce value for the teachers involved.

3.5.2 Data Analysis- Phase Two

Nvivo is a software-based data analysis tool and aids the process of coding and analysing qualitative data. Basit (2003) refers to the advantages of coding using Nvivo, particularly the flexibility of working with data and being able to import data from various sources and being able to code a reference to more than one sub-theme (p.151). For these reasons, Nvivo was used to help order the categories evident in teacher interviews, the teacher portfolios and the focus group interviews (Appreciative Inquiry). Responses were coded into categories or nodes as per the screenshot in Appendix 5 (p. 177). Coding was done using Wenger's (1998) Dimensions of a Community of Practice and Components of a Social Theory of Learning as main categories for coding (p.05). Other themes which emerged were coded inductively, captured as teacher's perspectives of value creation.

3.6. Ethical Issues

Permission to conduct the study was granted by the Mpumalanga Department of Education and all teachers who participated in the study completed permission slips indicating that their data can be used for purposes of research. High school students were not included in the study and were not interviewed, therefore protocols with respect to interviewing persons under the age of 18 did not have to be followed. Although teachers opted to have their names used, the researcher has used a system of categorising the respondents as T1 to T11 to ensure confidentiality as some of the responses provided to questions may place teachers at risk of unfair treatment or prejudice, where school management is critiqued. The data is collected and analysed from the perspective of teachers and does not involve an analysis of teacher content gaps or an assessment of teacher learning or competence related to this. The study seeks to explore the social learning processes which contribute to creating value and meaning for teachers, from their perspective of their own learning and participation in an Eco-Schools professional learning community. Teacher's environmental knowledge or teaching methods will not be assessed. Rather, this study will collate teacher representations of value derived from participation in an Eco-Schools community of practice in terms of their professional development and their perceived experience of this.

3. 7 Research Rigour

The rigour of research results or "completeness" will be ensured through a process of triangulation that is, by using more than one method to generate data (Tobin, et. al., 2004, p.6). A mixed methods approach ensures that any weaknesses which may result from using only one method of data collection will be avoided (Cohen, et al., 2011). Samples of interview transcripts, field notes and matrices will be provided in appendices. I will also record my observations using field notes which will ensure reflexivity (Krefting, 1991 in Janse Van Rensberg, 2001, p. 9). In phase 2 of the research, by taking the results of the questionnaires back to the teachers and discussing this with them in a focus group discussion, credibility and dependability of data will be ensured through a process of "member checking" (Krefting, 1991 in Janse Van Rensberg, 2001, p. 9). Wals (2004) states

that “case studies tend to be introspective and grounded within one specific institutional reality. If the purpose of a case study is to improve one’s own or institutional practice, this may be sufficient” (p.14). Steps will be taken by the researcher to ensure that the recommendations from this study are not extrapolated, but remain valid for this case study only.

3.8 Conclusion

This chapter provides a detailed description of the design and methodology for data collection and analysis which follows. The description also provides a rationale for the use of an evaluation research design and justifies this as applied research. The sample design and a site description provide a framing context of the socio-ecological and development issues facing schools in the sample area and helps the reader to understand the local context and teaching and learning challenges faced by schools in resource-constrained environments. Issues of validity of research and the research ethics have also been dealt with and a table provided to enable the reader to follow the order of data sources and referencing in the data presentation in Chapter 4 which follows.

CHAPTER 4: DATA PRESENTATION

4.1 Introduction

This chapter presents data generated through an Appreciative Inquiry using Wenger's (1998) Communities of Practice Theory as an analytical lens. Data are presented in 2 phases, each related to the goals of this evaluation research. Phase 1, which relates to goal 1, provides a broad overview of the support provided to Eco-Schools that have an Eco-Schools coordinator supporting the environment and sustainability activities of the school. These data generated through an appreciative process allowed the study to broadly describe the nature of support. This provided a grasp of the support context for phase 2 which presents the data collected from teachers in a single case study of Eco-Schools in the Hazyview Professional Learning Community. Phase 2 relates to Goal 2 of the research which is to generate and assess evidence of value creation by presenting data on teacher's perspectives developed through their participation in an Eco-Schools Professional Learning Community.

Data generated in phase one and phase two of the study are both presented in this chapter. They were categorised for interpretative presentation using a Communities of Practice theoretical framework. This provides a useful lens which can be applied to both phases of the data presentation, Firstly, to assess the nature of the support as elements of an emerging Community of Practice, namely:

- Joint Enterprise,
- Mutual Engagement and
- Shared Repertoire

Secondly, to deepen a sense of teacher's perspectives on value creation through the learning processes of:

- identity formation,

- meaning making,
- shared practices and
- the development of a learning community.

The descriptions also include teacher's perspectives on the impacts and benefits the support has had on their teaching and learning, described through changes in their content knowledge, teaching methods and assessment practices.

The data is thus presented and interpreted through an iterative process of evaluative review that builds a picture of teacher learning in relation to the patterns of support, and how these are assisting teachers to strengthen their content knowledge, teaching and assessment practices. The outcomes of the developing assessments are used to make recommendations for the strengthening of mediating support in the Eco-School programmes in the region.

4.2 Data Presentation: Introduction to Phase One

Goal 1 is to explore the support provided to teachers who identify themselves as belonging to an Eco-School's node intended to function as a Community of Practice, intent on enhancing environmental learning.

Phase one of the study was developed with a convenience sample of coordinators working with supported Eco-Schools in 6 provinces, namely: Kwa-Zulu Natal; Limpopo; North-West Province; Mpumalanga; Free State; and the W. Cape (no questionnaire returns were received from coordinators in the E. Cape). Eco-Schools coordination in the Free State and the Northern Cape provinces differ substantially from other provinces as this support is provided by the provincial departments of environmental affairs in the respective provinces, with support from a WESSA staff member responsible for coordination of provincial activities (only in the Free State, in the N. Cape this is implemented without a WESSA provincial coordinator). For the 6 provinces represented here, support is either provided by

locally appointed WESSA staff, partner implementing organisations or by volunteers (ESC02 assisted by volunteer associations and youth exchange students). Data were collected from 10 Eco-school coordinators, representing 15 Eco-School nodes. In Part 2 of the study, the questionnaire and interview data from coordinators was also member checked through interviews with teachers in a representative Professional Learning Community.

The data were read as support to emerging Communities of Practice so as to assess how the identified patterns of support were enabling the participants in a joint enterprise (See 4.1.2) through patterns of mutual engagement (See 4.1.3) that enabled them to develop a shared repertoire (See 4.1.4) of perspectives and practices that strengthened the environment and sustainability programmes in the respective schools.

The Eco-schools programme offers different models of support to registered Eco-Schools with some schools receiving support visits from coordinators of the programme and others receiving support in the form of the Eco-Schools toolkit, online resources via the WESSA Sharenet website portal and workshop sessions held at annual, provincial Eco-School's "mini-conferences" (ESC10 refers to the involvement of Department of Basic Education (DBE) officials at these conferences). 8 of the 9 provinces also has a provincial manager, responsible for the overall coordination of node and cluster coordinators within the province, and who acts as the main point of contact for queries and requests from schools operating without a contact support person as well as responsible for developing and maintaining stakeholder relationships at a provincial level (including fundraising). Cluster or node coordinators are unevenly spread across the country and are tasked with working directly with schools to support them to complete the "7 step" process involved in completing and submitting an Eco-Schools portfolio, in order to progress to the stage of being awarded an Eco-School's flag (ESC01-12 all describe this as integral to their school support visits).

Table 4: Eco-School Nodes/ Clusters in the study by Province, number of participating teachers and frequency of school support visits

	Province	Node/ Cluster	Number of Participating Teachers	Frequency of Support Visits
1	Free State	Fezile Dabi District, Free State	50 teachers from 25 schools	thrice a year
2	Free State	Lejweleputswa District, Free State	Approx. 120 teachers from 60 schools	thrice a year
3	Free State	Motheo District, Free State	Approx. 120 teachers from 70 schools	thrice a year
4	Free State	Thabo Mafutsunyane District, Free State	60 teachers from 30 schools	thrice a year
5	Free State	Xhariep District, Free State	Approx.. 10 teachers from 5 schools	thrice a year
6	KwaZulu Natal	Midlands	10	Quarterly
7	KwaZulu Natal	Northern Berg	15-20	Quarterly
8	KwaZulu Natal	South Durban (Bluff)	between 5 -15 teachers	Monthly
9	KwaZulu Natal	Pietermaritzburg	20	Quarterly
10	Limpopo	Blouberg	10-50	Quarterly
11	Mpumalanga	Ermelo	15-20	Approx. 6 times a year
12	Mpumalanga	Nkomazi	40	Quarterly
13	Mpumalanga	Hazyview	11	Response unclear
13	North West	Rustenburg	20-30	Quarterly
14	W. Cape	Hermanus	40	Approx. 6 times a year
15	W. Cape	Cape Town	N/A	Provincial coordinator- ad-hoc support

The number of participating teachers is indicated as an approximation as attendance at workshops and meetings tended to fluctuate.

Survey responses (Q1) from coordinators (ESC1-ESC10) indicate that the average number of support visits provided to each school varies between 3-6 times annually and takes place either at the school or through convening groups of teachers from a number of schools in the "node" at a single venue. The node is described as the number of schools allocated to each coordinator, determined by the proximity of schools to one another as well as the funding available to support activities. The government partner supported nodes tended to

be much larger, and coordinated through district workshops held less frequently than those coordinated through WESSA coordinators. The table below indicates how the nodes are supported:

Table 5: Primary Funders of Eco-School nodes/ clusters

	Province	Node/ Cluster	Primary Support Provider	Funded By
1	Free State	Fezile Dabi District, Free State	Government	WESSA provincial manager funded through National Lotteries, district workshops and additional resources funded through DETEA
2	Free State	Lejweleputswa District, Free State	Government	As above
3	Free State	Motheo District, Free State	Government	As above
4	Free State	Thabo Mafutsunyane District, Free State	Government	As above
5	Free State	Xhariep District, Free State	Government	As above
6	KwaZulu Natal	Midlands	WESSA	CSI funding
7	KwaZulu Natal	Northern Berg	WESSA	CSI funding
8	KwaZulu Natal	South Durban (Bluff)	WESSA	CSI funding
9	KwaZulu Natal	Pietermaritzburg	WESSA (part-funded through NGO DUCT)	CSI funding
10	Limpopo	Blouberg	WESSA	CSI funding
11	Mpumalanga	Ermelo	WESSA (part-funded through NGO Birdlife Africa)	CSI funding
12	Mpumalanga	Nkomazi	WESSA	CSI funding
13	Mpumalanga	Hazyview	WESSA	CSI funding
13	North West	Rustenburg	WESSA	CSI funding
14	W. Cape	Hermanus	Partner NGO	Partner NGO and CSI funding
15	W. Cape	Cape Town	WESSA (waste-wise node funded by Municipality/ Provincial Government)	CSI funding

9 of the 15 nodes are supported by a WESSA Eco-School coordinator, with funding for support enabled through corporate social investment (CSI) funding. ESC04 (Q1) reported that her node had developed as, “Xstrata had a mine close to Ermelo and I was asked, due to my placing in Wakkerstroom (Birdlife Environmental Education Centre), to coordinate this cluster.” Support was also enabled through public funding (government funding) to support school environmental programmes, with some provinces taking an active role in implementation, including through the use of provincial (Q1; ESC08) and municipal (Int2; ESC12) human resources to support Eco-Schools implementation. In the Free State resources are described as being used to support schools across 5 districts, involving approximately 480 teachers. The City of Cape Town was mentioned as a supporter of the “waste-wise” node (Int2; ESC12), with the division for environmental capacity building, training and education being actively involved. ESC11 (Int 1; lines 349-354) commented that:

> *Yes, ja we give them quite a lot of stuff from the city, the city are our big supporters, the City of Cape Town, so if they want like smart living handbooks we can give that to them, to the teachers, fynbos posters, baboon safety posters, what else? There’s not so much lesson plans any more, well the Eco-centres are involved in that, like the Eco-centres give worksheets, so that’s obviously city-driven. They give worksheets to all the schools that come, I mean the majority of the schools that go to the Eco-centres are Eco-Schools.*

The Department of Environment, Tourism and Economic Affairs (DETEA) in the Free State and the N. Cape (Department: Environment and Nature Conservation) and the local municipality in Rustenburg, North-West province also received similar support with resources and in most cases Eco-School support is integrated into the environmental education programmes and support provided by partners (Q1; ESC05) working together with WESSA coordinators.

Table 5: Stakeholder involvement in cluster/node support

	Node/ Cluster	Model of Support	Other Stakeholder Involvement
1	Fezile Dabi District, Free State	DETEA- working together with a WESSA provincial manager	N/A
2	Lejweleputswa District, Free State	DETEA- working together with a WESSA provincial manager	N/A
3	Motheo District, Free State	DETEA- working together with a WESSA provincial manager	N/A
4	Thabo Mafutsunyane District, Free State	DETEA- working together with a WESSA provincial manager	SanParks
5	Xhariep District, Free State	DETEA- working together with a WESSA provincial manager	SanParks
6	Midlands	WESSA	N/A
7	Northern Berg	WESSA	DAEA Empowerment and Advisory Services , Proud Schools, Duzi uMngeni Conservation Trust (DUCT)
8	South Durban (Bluff)	WESSA	Engen (funder)
9	Pietermaritzburg	WESSA (part-funded through NGO DUCT)	WESSA Umgeni Valley Nature Reserve, SANBI, DUCT (Duzi uMngeni Conservation Trust DAEA Empowerment and Advisory Services, Natal Museum,The Lawrance Anthony Earth Organization, Wildlands Conservation Trust, Singakwenza Education & Health KZN Midlands Sustainability Forum Green Office, Working for Fire UKZN, Durban University of Technology (DUT), Ezemvelo S'fundimvelo, Ezemvelo Kid's Club Community Service KZN Wildlife PMMBT P.E.A.C.E. Project (Galago Centre for P.E.A.C.E.) MATHUBA Project MIDI (Msunduzi Institute for Development & Innovation RAS (Royal Agricultural Society) Keep Pietermaritzburg Clean Association Botanical Society (KZN BotSoc) School Trade
10	Blouberg	WESSA	Assistance by German/SA Youth Association, Canisius College & Lajuma volunteers
11	Ermelo	WESSA (part-funded through NGO	Department of Education, EWT

		Birdlife Africa)	
12	Nkomazi	WESSA	DBE, SANParks, DEDET, SANBI, Tsembaletfu Nursery, TRAC, Imagine Scholar, Nkomazi Community Development Fund, Youth Zones, Chris Daniel
13	Hazyview	WESSA	DEA, DWA, SANBI, BirdlifeSA
13	Rustenburg	WESSA	Rustenburg Local Municipality
14	Hermanus	Partner NGO (Whale Coast Conservation) with coordination support from WESSA Provincial Manager	Rotarians, Dyer Island Conservation Trust (DICT), SANBI
15	Cape Town	WESSA (waste-wise node funded by Municipality/ Provincial Government)	City of Cape Town

The Eco-Schools framework requires (as one of the 7 steps) that environmental content is linked to the curriculum and that all activities (projects, celebrations of special environmental days, etc.) support teaching and learning. While the programme is endorsed by the Department of Basic Education, no formal MoU has been established at national or provincial levels. Coordinators report varying levels of involvement from officials from the Department of Basic Education (DBE) with ESC1 (Q1) reporting no involvement and ESC7 (Q1) reporting that her parent organisation (partner implementer) had a "Memorandum of Understanding" with the Provincial Department of Education and that curriculum advisors were very involved with Eco-School activities "Curriculum advisors are very involved with Eco-school events and make use of WCC (Whale Coast Conservation) to train teachers in EE (Environmental Education)". ESC2 (Q1) commented that:

> *Many of the workshops include a wide variety of aspects as I have to make the most of my time with teachers. Generally the workshops would not only focus on the curriculum and would therefore not be relevant to them (DBE subject advisors). They are invited to the lesson planning workshops, but not to start-up and other workshops. They don't attend very often as they are occupied with own workshops & responsibilities.*

Whale Coast Conservation is an NGO with very strong local relationships and in this way was able to add value to the Eco-Schools programme through its broader MoU with the Provincial Department of Education in the Western Cape.

ESC03 described a reciprocal relationship with the DBE in terms of helping to keep the coordinator "up to date" with respect to curriculum changes and with her assisting the DBE with lesson plans:

> *They (DBE) are invited to the workshops, I sometimes meet up with them for one on one meetings to keep updated about developments in the curriculum and occasionally help them out by providing environmental lesson plans.*

ESC04 (Q1) described the relationship more in terms of compliance rather than as mutually supportive. She says:

> *As I sit on the Gert Sibande Environmental Education Forum committee, we ensure that all projects/programmes are supported by the Department before going into the schools as well as ensuring that there is a strong link to CAPS. On a quarterly basis, these programmes are reported on at our forum and committee meetings and forwarded to the Department. Although there is no direct contact with subject specialists, they do receive our reports on a quarterly basis.*

ESC10 (Q1) noted that under the National Environmental Education Programme (NEEP), there was more opportunity for collaboration and engagement with DBE subject advisors. She commented that:

> *The cluster has not directly engaged with DBE Subject Specialists recently although this did take place when the National Environmental Education Programme provided an opportunity for this to happen. This has also taken place during Eco-Schools Annual Conferences where on occasion there have been presenters.*

Low levels of engagement with the DBE were reported with ESC05 indicating that she kept DBE officials informed, but that they seldom gave feedback or attended workshops. Conversely, the provincial Departments of Environmental Affairs were reported to be

actively engaged, with ESC03 indicating that she is “constant contact” with DEA officials. Reasons for higher levels of engagement with DEA officials have been anecdotally reported as a result of the Eco-Schools 7 step framework which can be adapted to support provincial objectives for their school environmental education and outreach programmes. In stakeholder and government supported nodes, provincial departments and municipalities are doing so with examples including the “Schools Environmental Education Programme” (SEEP), in Kwa-Zulu Natal, environmental education programmes of the Rustenburg local municipality and the City of Cape Town and the alignment of the Eco-Schools framework with departmental objectives in the Free State and the Northern Cape.

The number of teachers in each node who received support also varied from between 5 teachers in a node (Q1; ESC09) to 120 teachers (Q1; ESC08), in larger government supported nodes involving larger numbers of schools. The format of support visits were primarily through school-based visits with lead Eco-School teachers and Eco-Committee members and through workshops which involved bringing together teachers from various schools in the node to a common venue.

4.2.1 Support for Joint Enterprises

Wenger (1998) describes a joint enterprise as a practice which involves mutual engagement, and accountability and which is negotiated and interpreted by members of the Community of Practice. Eco-School coordinators describe some of the supported joint enterprises conducted by schools as linked to the celebration of “special environmental days” in the calendar as well as school-based projects such as the development of food gardens and joint hosting of permaculture gardening workshops. (Q1; ESC11) lists clean-up campaigns as an example of a joint enterprise and also mentions that the school and local community do get together to celebrate, for example, Arbor Day, but that this is less a joint enterprise and more an example of “learning as community”. Alternatively, ESC09 (Q1) describes Arbor Day activities as being an opportunity for teachers to work together on joint lesson plans and activities to engage learners. She comments:

Arbor week celebrations are very established in the Engen cluster and educators always work together to organise teaching and learning activities around the importance of trees (and saving resources) during this week.

T4 describes the inputs made by teachers in joint enterprises as important for mutual learning. He commented that " ...you learn from one another because you need to make inputs, so everything that we are doing we used to make inputs, now as an individual how do you see it, how do you think it is going to happen. So the grouping thing is of importance, high importance."

(Q1; ESC4) describes, teachers working together to solve a local problem:

For many of the schools in the node I support, they have worked together to find a recycling company that will collect waste from all the schools. The teachers have shared ideas and methods of how to encourage recycling in their schools. They have also, at workshops shared lessons ideas and activities. The same has happened with the vegetable gardens. Teachers love sharing their high points with each other.

Eco-Schools coordinators also support joint enterprises through "project focused" workshops. Common workshops held are practice-oriented creative waste workshops (ways to re-use waste) where each teacher shared an activity with the group ESC1 (Q1) and demonstration workshops to support projects such as developing a school food garden (Q1; ESC04; ESC05; ESC06; ESC08; ESC09; ESC10).

Q1; ESC 12 describes an example of a joint enterprise initiated by the Eco-Schools coordinator as demonstrating experiential learning teaching methods, for example, conducting a wetland study (linked to World Wetlands Day) or (Q1; ESC08), or "teachers being guided in doing a water study to find out what the status of the water is and then discussed the possible causes of the findings." ESC11 (Int1 lines 272-275) added that these teaching methods also supported the use of technology and aided participation. She commented that "Oh ja, that's why we held the Mini-SASS [stream assessment scoring system] workshop because we realized the kids want to be involved in technology, and

they've all got phones, and we want them to be involved with citizen science and development."

"Citizen science" investigations as illustrative of joint enterprises were evident across several themes, with ESC08 (Q1) describing an ecosystem study in which "teachers did a grassland study to determine the status of the veld and then discussed the possible causes, eg. fire, overgrazing, disturbances," in order to collectively respond to a local environmental issue. In addition, ESC4 (Q1) described her Eco-schools as being involved in a global joint enterprise involving her 10 schools as part of an international exchange programme initiated through the Birdlife "Spring Alive Campaign" which monitors and tracks the migration of 5 bird species from Europe to Southern Africa. These schools are twinned with schools in Bulgaria, Montenegro and Poland.

4.2.2 Support for Mutual Engagement

Wenger describes mutual engagement as doing things together, demonstrating engaged relationships and involving social complexity (1998, p.73). Mutual engagement differs from joint enterprise in that teachers do not have to organise or collaborate on a joint practice or activity (e.g in organising a clean-up campaign) but are rather engaged in supportive practices which are conducive to networking and sharing. T4 is able to describe this rich engagement in his comments that:

We were involved in this last year, me and Joyce, at Makudu (school), she invited Eco-Schools, that we should go there, to show us how she does a project at Eco-School, and we were very much pleased by that, because that's where we came to know these things of making, you know, having (broader?) at school, because she does have it, where they have chickens. So when we went there she taught us a lot of things, we could now share as educators because we were there, invited by Liz [Eco-Schools coordinator] to a school, so we could see how she manages her project.

T1 also commented that “one time they invited some of the schools to come to our schools. So that they can demonstrate how to make that one (recycled desktop from paper mache) that, I remember it’s only that time, that they came here. It was Department schools, coming to our place.”

Opportunities for mutual engagement are also provided through workshops where teachers collaborate on lesson plan development and network with one another to share ideas for Eco-School projects related to the “themes” under study. Eco-School coordinators report that one of the primary purposes of the meetings and workshops held with teachers is to support understanding of the Eco-Schools Framework (the seven steps) and for more experienced teachers to share ideas for projects with newcomers. Coordinators also describe these visits as being supportive and motivating for teachers, as this relates to completing the Eco-Schools portfolio reporting. ESC12 (Int1; Line 141-148) comments that:

> *Also, I think it does help the fact that I keep, I communicate with them often and I check on them, and I think that also motivates them because they know say I’m coming out the following week and I’m going to ask them how it’s going. And they want to be able to give me feedback, and I think they enjoy the fact that I will travel out two hours to see them, that someone, a complete outsider is actually interested in what they’re doing and is concerned for them as a school and for them as a teacher. So I think that motivates them. And I think they see how that’s benefiting the school as a whole.*

ESC04 (Q1) also reflects on the value of this mutual engagement and sharing:

> *the teachers are enjoying sharing their successes and brainstorming their low points. I ensure that through the year I have a workshop on each of the themes, and rotate the venue to the best-suited school for that theme. This allows the host teachers to show the rest of the cluster around their school. This encourages both the host school and the visiting teachers to interact with each other and the project they are seeing.*

The Eco-Schools framework also supports parent and community member involvement with (ESC4) commenting that, “I do also encourage the schools to be more active in community events/programmes to bridge the gap between the school and community.

Mutual engagement through the involvement of stakeholders and partners was reported through a rich history of how their “nodes” were established. ESC08 (Q1) mentions that the schools within some of her districts were SanParks supported schools which were incorporated into the Eco-Schools programme. Likewise, ESC10 (Q1) describes schools in her node as being part of the “Keep Pietermaritzburg Clean Association”, working with schools in the area and where she was a teacher at one of these schools. Later, an environmental education forum (Eco-forum) was established, with 23 participating organisations, and with Eco-schools forming part of the activities of the forum. She increasingly became involved in these activities and joined the Eco-Schools programme as a node coordinator. The significance of Eco-School support being integrated into the activities of locally based environmental education fora is quite significant as it seems that this provides a mechanism for coordination of support activities and a calendar of events supported by various partners. ESC06 (Q1) believes that:

> *Networking and curriculum support are the two main benefits [for teachers who participate in Eco-Schools]. These educators get to share ideas, work with other partners, and form a close community for helping each other and improving their curriculum knowledge.*

Other coordinators also describe how the history of their node formation is interwoven with the number of stakeholders who are involved in Eco-Schools implementation and support of registered Eco-Schools. ESC03 (Q1) refers to “SEEP” Eco-Schools (the school’s environmental education programme of the provincial department of environmental affairs in KwaZulu Natal) and refers to them as a stakeholder as they are also involved in supporting projects

and other activities at these schools. Resources are provided to Eco-Schools, e.g school gardening tools, which augments the resources provided by WESSA Eco-School coordinators for food gardening and other project implementation (coordinators do not usually have their own funding for additional resources).

On partnerships, ESC11 (Int 1; lines 441-446) comments that:

> *And the partnerships I think that's formed through us [coordinators] is amazing, because a lot of them are able to do training, like our seed workshop, a lot of them came to our seed workshop because of Eco-schools, they are to now go to other courses through us and because of us, because of Eco-schools, same for Fundisa, and even competitions that we expose them to. So I think the networking that we connect them with has a huge benefit for them*

ESC10 (Q1) refers to other Non-Government Organisations (NGO') such as the Dusi-Umngeni Conservation Trust (DUCT) as involved in supporting local water action projects and investigations (situated learning). In remote areas in Mpumalanga (Q1; ESC04), Eco-School support is provided in partnership with the Endangered Wildlife Trust (EWT), another NGO with the capacity to support environmental education outreach activities in remote and ecologically sensitive areas.

4.2.3 Support for Developing a Shared Repertoire

The third dimension of a Community of Practice (Wenger, 1998) is the development of a shared repertoire which he explains as "resources for negotiating meaning," (1998, p. 82). Resources can be both reified objects or have participative aspects, that is a shared repertoire could develop through common tools, routines, ways of doing something or discourses "by which members create meaningful statements about the world, as well as the styles by which they express their forms of membership and their identities as members" (1998, p. 83).

There are strong examples of a developed shared repertoire in the Eco-Schools Community of Practice as demonstrated through mutual engagement in the joint enterprises described above. These could be described as the way in which both coordinators and teachers describe environmental practices and the common use of the term “hands-on” activities. Coordinators describe workshops on “creative waste”, upcycling, permaculture gardening and “mini-sass” water studies.

Schools and coordinators also referred to the use of similar resources to support environmental learning and practices at supported Eco-Schools and the co-development of lesson plans through a process of negotiating meaning and mutual engagement with teachers, stakeholders and partners. Resources that were produced by WESSA Sharenet and the Enviro-kids magazine were commonly used by schools and coordinators (ESC08; ESC03) to support field studies and investigations or “hands-on” activities, aiding in the identification of species and micro-organisms when conducting ecosystem studies (grassland, wetland and the mini-sass water quality tool).

Int1; ESC11 states

> *Well I think the resources that we take them, that we are given, our Enviro-kids, Birdlife SA has given us resources, so we’ve used posters, we’ve used practical stuff that we even make them and show them, like say with the recycling material, we make them and then show them how to make them at a workshop and then we encourage them to make it themselves, we try not to just make it and give it to them, but to actually go and make it themselves, resources … practically, “hands-on” ones.*

Similarly, ESC 12 (Int1) makes reference to partner resources which forms part of this shared repertoire, she says, “so if they want like smart living handbooks we can give that to them, to the teachers, fynbos posters, baboon safety posters, what else? There’s not so much lesson plans anymore, well the Eco-centres are involved in that, like the Eco-centres give worksheets.” ESC02 (Q1) refers to the “Food & Trees for Africa booklet” used to support

permaculture gardening; ESC06 (Q1) refers to Rand Water resources and ESC05 (Q1) Waste to Wealth booklet. ESC07 also mentioned the "Fundisa for Change" Resource manuals as supporting environmental learning.

A shared repertoire in terms of environmental practices generally responded to local environmental issues or supported local knowledge. T3 (Int5) refers to indigenous knowledge practices and situated learning, particularly in terms of learning about the medicinal value of local plants. He commented that the Eco-Schools coordinator was able to influence his choices [of projects] and provide additional teaching support materials:

> *Ah, when we look at the hand-out from internet, we had a hand-out, the Moringa is a plant that is healing, many diseases, so that's why when Liz [node coordinator] came with this Moringa project, we decided to also include many medicinal plants.*

A shared repertoire was also developed in terms of the teaching methods explored. Coordinators commonly provided support to teachers test out experiential learning methods and applied research through investigation and fieldwork. Some teachers commented that they had not considered taking their learners "out of the classroom" but that through support and encouragement from the Eco-Schools coordinator, they had experienced a shift in their teaching methods and realised that experiential learning could be very simply undertaken. ESC11 (Int1) reflected on this and commented that, "…And I think also the teachers have got in their textbook and they, for years and years, that's the only form of teaching they know, for example, the wetland or they've never known to go outside and look at it, but only known to teach it in a classroom."

This was also a key aspect of the 'Fundisa for Change" training which teachers in the Professional Learning Community in this study received. T2 (Int4) commented that:

> *I remember last year after coming back from the workshop I designed a worksheet for there, that I took my learners out, that is Kruger National Park, it's just a stone throw.*

That worksheet prepared for them it was to identify the type of soil that that biome consists of and also the different types of trees, and also the importance of the soil, and also to identify the big five, fortunately, an elephant was nearby so we could see. So, in other words, it assisted me in my teaching, you know, taking learners out, having a field excursion, you know, I had a problem before, 'what can I do if I take my learners out?'

(Int5) also commented that:

Ja, actually it was learning in disguise for me to get that (outdoor experiential learning), because sometimes learners they have different learning styles, some learners they learn better when they are doing this field trips, ja, they learn by touching, doing, observing, something (energy? – 33:03) so, after, that trip I also went there with my learners, while that information was still fresh in mind, ja."

These comments indicate that teachers are receiving support enabling them to explore various teaching methods and in so doing is contributing to their professional development.

4.2.4 Conclusion to Phase 1

Phase 1 of this chapter provides an interpretative description of the support received by teachers, intent on functioning as Communities of Practice to strengthen the environment and sustainability curriculum content and practical learning experiences. The various Eco-School nodes (clusters) were read as Communities of Practice or a network of nodes of environment and sustainability-focused Community of Practices in order to get insights on how teachers came to share common practices and repertoires. Evidence has also been presented which indicates that through the patterns of support identified teachers are able to network with other teachers, stakeholders and partners and in so doing are able to identify their own environment and sustainability professional development needs and to seek appropriate support to improve their teaching and learning practices. This illustrates how the patterns of support in Eco-Schools around the country, appear to be consistent

with the policy intent of developing Professional Learning Communities. As such, many Eco-Schools have developed as “alternative” Professional Learning Communities as described in the literature review by Jita and Mokhele (2012) referring to alternative clusters (p.9). Their wo refers to grassroots movements which are contributing to the support and professional development of teachers. In phase 2 of this chapter, a single Professional Learning Community in the Mpumalanga node of Eco-Schools is examined to delve deeper into the nature of support in this Professional Learning Community and to explore teacher perspectives of value in participating in a Professional Learning Community where the support is extended to training which includes a Fundisa for Change “in-service" qualification.

4.3 Data Presentation- Phase 2

4.3.1 Introduction

In phase one of the data presentation, the models of support provided by Eco-School coordinators was described. This illustrates the patterns of support provided through the 3 primary models of support, namely; support provided by:

- Government partners (provincial and local);
- WESSA trained and managed coordinators; and
- Partner institutions and stakeholders (often locally based NGO’s)

To develop a better understanding of how this support is experienced and valued by participating teachers and to probe how this has been extended with the development of formal in-service training support through Fundisa for Change, I undertook an evaluative review with a small sample of teachers. 12 teachers attended the same “Teaching Biodiversity” Fundisa for change course and worked together as a Professional Learning Community for the duration of the training as they came from the same local area. Of the 12 who undertook the course, 9 attended the concluding session, conducted as an

Appreciative Inquiry review, with data generated from their responses (see interview schedule in Appendix 3 (p.155). These data allowed the researcher to delve more deeply into how teachers valued the support received through the course and how this played out in their work. This was derived through a review of their Fundisa for Change coursework assignment (see Appendix 7, p.179) and through semi-structured interviews with 4 teachers (see interview schedule in Appendix 4, p. 163).

To read and interpret the data across the group interview process and the evidence in the teacher's coursework assignments (herein referred to as a portfolio), I used Wenger's (1998) Communities of Practice framework. This allowed me to get a sense of how Eco-School support is locally beneficial and how the Fundisa for Change course had enabled teachers to enhance their practice. This also allowed me to get insights into how the expansion of Eco-school support with the addition of the Fundisa for Change "Teaching Biodiversity" course created more value for the participants.

4.3.2 Overview of Data Collection Process and Sites

The teachers who responded, teach at schools which range from deeply rural schools in the Hazyview and Malelane areas to peri-urban schools in the Witbank (eMahlaleni) area. Schools have been engaged as Eco-Schools for 2 years and longer and receive support from WESSA Eco-School coordinators (3 coordinators work with these schools). Some of the teachers interviewed are new to the programme as they have either recently joined the school or are new to actively participating in the school's Eco-Committee (although their schools have consistently received support for two years). Teachers selected are all Life Sciences grade 10-12 (FET) teachers, who, in addition to being on the school's Eco-Committee have also received a professional development opportunity by participating in the Fundisa for Change "Teaching Biodiversity" course for from the beginning of July until the end of October 2013. In this Community of Practice, the Eco-Schools coordinators provided additional support and learning resources for the Fundisa teachers to complete their workplace-based assignments. Teachers attended 3 contact training sessions and completed a workplace-based assignment where they implemented and reported on a life

sciences lesson on biodiversity. The assignment focused on key biodiversity concepts, life sciences pedagogy (teaching methods) and assessment practices. Teachers then applied this learning in context and reported on this through a "portfolio of evidence". This form of support is not a common model in the Eco-Schools programme and has only been piloted with a few selected Eco-Schools nodes in the Eastern, Western and Northern Cape, Gauteng and in KwaZulu Natal and the Mpumalanga province. The data presented will help to inform the programme's teacher development work as it will be informative to gather teacher's perspectives of value created through this model of support and to examine whether this added to the learning processes and models of support identified in part 1 of the research.

For the Appreciative Inquiry group interview, teachers gathered at a local venue in Mpumalanga to receive their Fundisa for Change certificates as part of an informal "graduation". While together, the researcher convened a group interview where the 9 teachers spent part of the day reflecting on their participation and on the value of the training and the support received from the Eco-Schools programme. The data which follows represents the perspective of 6 teachers who participated in the group interview and 4 teachers who were interviewed (1 teacher was common to both groups of interviewees). The perspective of the teacher who is common to both will not be recorded twice as the questions posed in the focus group discussion were different to the questions posed in the interviews and the teacher did not always provide a response in the focus group discussion (questions were posed to the group). The interview schedules are in Appendices 3 and 4 (p. 155; and 163). The data were read and coded for value creation expressed through meaning-making as identity formation (4.2.3), meaning making through shared practices, and teacher perspectives on developing a community of environment and sustainability practice.

4.3.3 A Valued Identity: Learning as Becoming

As part of an appreciative process, all of the teachers interviewed in this study expressed a strong sense of identity, personal meaning, and value which they derived from the environmental practices they are engaged in. T4 commented that:

When it comes to environment, I'm an environmental person, I like the environmental studies at first, so I did my environmental studies, environmental sciences, so when it comes to the environment, those are things that I am aware of and I have dealt with before, but not to the fullest.

He further explained that initially he was not directly involved in Eco-Schools, but had the opportunity to join the Fundisa training as his school is an active Eco-School. He said:

I saw this, I don't know, Liz the co-ordinator that used to come here, that is not part of this thing [Fundisa training], used to come talking to those guys who are also doing agriculture in the garden there so used to be there full time and then now, they suddenly, they come up with this training, this training for Fundisa. Then as our Principal, they told us we as life sciences teachers we need to go and acquire skills in terms of these Eco-schools things, so that is how I got informed about it.

He (T4) clarified that, 'For me eish, it means a lot, since I am a nature person, I like nature myself, so for the school to be part of the Eco-school, I think, with me, I like it very much, because that will give us the opportunity to make even the learners aware of nature with the environment as a whole. So it helped me a lot."

T1 expressed that value she attaches to participating in Eco-Schools as:

I like green, green, green. Ja? I just usually go to the garden, when I am in front or in the middle of the greenish part I like it, I really like it. Isn't it that sometimes they do say if

you have got a garden next to your house, sometimes when you are angry you go there and you look at the garden, the green will make your mind to be fresh again. So I usually go there, see how the garden, even though I don't dictate, do this and do this, but to look at the garden as a whole, makes me feel better. That's why I (word indistinct, 13:41), how can I go to the environment so that I can be closer to the environment, rather than to be, ai (exclaims) I like green.

T2 expressed that he found being part of Eco-Schools as personally meaningful and linked to his long-term aspirations, "Well, as a teacher I see myself one day being a farmer. Because it assisted me in developing love for vegetables, love for farming, and also to assist other people when I see them, you know, struggling with food."

T3 expressed that he is "passionate about the Eco" and commented that he valued being included in the cohort who received training and said:

Ah, it was nice to be part of the group because Mr xxxx omitted me from the list, so I argued a lot with Mr xxxxx, I fought him [REALLY?] Ja, that 'Why are you...?', because there was a form that was supposed to be filled and sent somewhere, so through internet if I'm not mistaken they got that form from internet. So Mr xxxx didn't give me that form so I said 'why are you not giving me because you know that I am, I like nature.

These expressions of identity relate to meaning-making and experiencing participation in Eco-Schools as meaningful. As participation in Eco-Schools is voluntary and entails additional responsibility and time demands, meaning making through identity formation is an important aspect of continued participation and functioning as a Professional Learning Community.

4.3.4. Valued Environmental Practices: Learning as Doing

Wenger (1998, p. 5) describes a practice as, "a way of talking about the shared historical and social resources, frameworks and perspectives that can sustain mutual engagement in action." Evidence from the data indicates that this mutual engagement is supported through environment and sustainability practices which are part of the shared repertoire of Eco-Schools Community of Practice's which will be examined further below.

4.3.4.1 Water Conservation Practices

Teachers reported that the area, where their schools are located, is a water scarce area, with most schools relying on municipal water tank deliveries (no piped water) or relying on boreholes/ water pumps. T1 commented that "Even the water tanks, tjoe there was no proper supply but no we are fine just because we have got the engine (water pump for borehole) there, now it's fine right here in school, but in the community, there is still a challenge. T2 also commented on the sustainability of their school's food garden due to the instability of their water supply:

> *ja, it was running well, we had a problem of water, that's where the project came to a standstill, even now as we're just having a piece of food garden it's because of water, we are depending on the municipality, [THEY COME AND DELIVER THE WATER?] For now we are getting the water from the tanks but it's a problem because if they don't pay, Eskom disconnects electricity so, and it runs for a month without water and that way the vegetables, it becomes dry and wilting and, so that's the problem.*

T1 (who lives in the community) commented that Eco-Schools had helped her personally to change her water use behaviour and to adopt water conservation practices. She commented that, " Like in my place we don't have water at all, but the water that we use to

bath, to clean dishes, we take them [to school for use as greywater for the garden], and it's through the encouragement of the what? Of the Eco-School"

She also commented that the Fundisa for Change training had also benefitted her teaching methods related to water conservation and use as she states that usually this was treated as a subject which learners were taught only so that they could pass, however, that she was now self-aware that the objective of teaching about water would be so that learners (and teachers) would now practice.

T2 described his approach to teaching about water, through personal water audits, "Ja, with water we have given them a project just to go home and do research, how much water are they using per day and to calculate the percentage, so when opening a tap, they should not just open it and waste-water, there are ways in which you can use water because water is a source of life." He further described a project his school had introduced as an Eco-School's project, namely, making "tippy taps" from re-used cold drink bottles to promote water conservation and sanitary habits (handwashing) when using school toilets, saying that," only now that we did not put it so that they could wash their hands instead of coming to the tap, just to open it and wash their hands because washing without soap it's not healthy." In this case, the tippy taps contain soapy water, whereas previously learners would use a running tap without soap (disinfectant).

4.3.4.2 Poverty Alleviation, Food and Nutrition and Skills Development

Unemployment, lack of opportunities, illiteracy and learners coming from single-headed households were also described as prevalent social issues. T1 commented, " ...that leads us to after matriculating, there is nowhere to go just because they don't have parents, they don't have materials to help them, even though as a school we are trying by all means so that they get some bursaries and so on, but, but it's still a challenging factor." T2 also mentions that "Although socially, when I look at it, it comprises of many young people that are not employed, they are just passing matric and nothing to do". T3 further added that "There factories, around, there is place for factories, and they are closed. The recent one is

closed last year that one I think it was, more than 100 people were under that factory, they lost their job."

The problem of self-sufficiency or teaching of skills which could lead to learners being able to provide for their basic needs was an area which teachers valued participating in the Eco-Schools programme. T2 describes how his school came to be an Eco-School, in that in their Community of Practice, a teacher from another school had pondered what to do to address the issue of the learners coming from child-headed households and not having their food and nutrition needs met. T2 narrates that:

> *she (the teacher from Hlomani primary) was assisting vulnerable learners, because as I've said most of these kids they are heading homes, so you find that they don't have food, so she came up with this idea, why can't we have a food garden that will assist us in giving these learners food, something to eat, at least if they have something from the garden it will assist them.*

T1 also comments that at her school,

> *I can see that our learners they do benefit because there are times wherein they pick up the spinach, they cook for the learners, so they are able to get some of the vegetables which they can't get it at home. And sometimes, they can see that it doesn't mean if you are a human being that you have to focus on going to work so that you can have something to eat at the end of the day. You can do something that you can get like I said there is poverty, unemployment is high, and we need to eat in our daily lives, and it doesn't mean that we have to go to the butchery and buy meat and so on, having some vegetables here at school, they can able to see even to work on their own, because there are times wherein these learners are taken to the garden, so they know, even educators they earn something but they do have vegetables that they can, are able to eat*

T2 commented:

> *many children here at school they are heading the families, because most parents are no longer there, and we'll find that it's a single parent that's somewhere far away, so it's a problem because dealing with a learner, education needs support from both parents and also the government getting in, so if you need a parent to assist you in late-coming it's a problem because the parent is not there, to assist us as a school. If a learner fails to write or maybe having a problem with a certain subject because they are illiterate so it's one of the factors that will affect us as a school.*

T4 commented that "They are important for the school, at first I can say they are important because this garden they are food resources for us, in here, school as well as giving the learners information knowledge even when they leave school, they can still practice gardening at home. [OK, SO LIKE A SKILL] Ja! giving them skills." In the AI group interview, one of the teachers commented that "Before we didn't have a garden, but now when we are teaching about plants it helps to have our own garden, and then we teach them.T2 also explained how he is involved in food gardening:

> *You know I, in building a garden I invite these learners and show them how do we make a garden, how do we prepare a garden, before we plant we have to dig it, I do it myself so that they could see that it's not a, sometimes these learners that are late, to see that I'm not punishing them, I'm just imparting skills….the grade 11 and 12 they are always involved in curriculum so that during afternoon, the grade 8 and 9 learners, those of them, we were inviting them to participate, in other words, to have skills how a food garden is being made.*

4.3.4.3 Language across the Curriculum

Illiteracy also contributes to lower learner attainment with T4 commenting that, “(when) it comes to understand the questions asked in English, which means they have got a language barrier in most cases. So if you don’t understand the language, then it will be difficult to understand the content.” This was an area of the training which was viewed to have an added benefit in supporting language and vocabulary development across the curriculum. It was raised in the Appreciative Inquiry group as a benefit where, ”the linking of various learning areas, like that through life science learners can be able to acquire English concepts” and that through experiential learning teaching methods and the use of case studies, learners were also able to expand their vocabularies. It was stated that ”then the learning teaching methods that I use, especially of learning that is outside, not inside in the classroom, is field trips and excursions. Whereby they can link various learning areas, we do case studies where they would use dictionaries to look for the meaning of various words.” T4 commented that he had developed new skills through the Fundisa training and through the facilitation of the training and the Fundisa materials, he had expanded his own vocabulary and knowledge of various concepts. He described this as “getting more vocab.”

4.3.4.4 Biodiversity and Indigenous Knowledge Systems

T2 also mentioned the issue of loss of biodiversity, through poaching and through the spread of Alien Invasive species. He comments, “I’ve mentioned the trees that have been destroyed and this alien plants. Because we do have, although the Kruger National Park, they are playing that role, coming to educate our kids [SanParks Environmental Education].” The school is close to the Kruger National Park and the teacher felt that the school and the learners had an important part to play in combatting poaching through awareness of the importance of biodiversity in the community. He also felt that community members needed to be more aware of the value of biodiversity and the link between tourism and local livelihoods. He commented that:

And it's a problem because it affects our biodiversity because most of them when they are doing nothing, they are going to this environment where we are saying economically we are benefiting, to poach rhinos and it's a problem. Also as they are not working you are finding nature is being destroyed because they go there to fetch firewood and cutting, you know, and you see there are some of the trees that we have in the past like the paperbark, we no longer have it because they have destroyed and also because they need firewood, they don't know the importance of these because paperbark was one of the trees that were being used by our forefathers to treat many diseases.

T3 was enthused and excited about the inclusion of Indigenous Knowledge in the Life Sciences training materials and mentioned that when he had returned from the Fundisa course, he had shared the materials with one of his colleagues who also teaches Life Sciences and commented to him, "now there is this programme of Professors who are trying to search, to get indigenous knowledge that is in our country, our community!"

With regard to biodiversity loss, T1 commented that the Fundisa training had "revived" her and in so doing had translated to her learners, such that when she got back from the training, "we are able to take the information to the learners, so that they can be more interested in the environment itself, like previously they used to cut trees and so on. Now they know, you have to plant trees instead of cutting them." T3 related this to the beautification/ cleaning of the school and surrounds and noted that, "we organize twice if I'm not mistaken, the cleaning campaign and we also try to green our school with plants, and, ah, now we have started with the Moringa [local, indigenous, and medicinal plant], we have planted them somewhere there in the gardens, so after growing we will able to place them, at strategic points [he refers to starting a Moringa plant nursery]. Likewise at T4's school he comments about the change in practices at his school wherein he, "notice a change in terms of how we do things in the gardening, the planting of trees around the school, the last [time] she [the Eco-Schools coordinator] recently gave us seeds to plant, I forgot the name of the particular plant to. So it has got an impact.'

4.3.4.5 Self- Sufficiency, Pride and Sense of Accomplishment

This developing self- sufficiency was also mentioned in relation to the school's recycling initiatives, with T1 commenting that "We are teaching them how to recycle, making the desks, they know that they can recycle, out of something that is previously left, they can do something that they can use it at home. I think they can able to sustain things, I don't know how to explain it but we are trying to…" Her explanation implies that there is value to the pupils and to the school to be able to use waste to make useful items such as desks and other items. Another teacher also referred to this in the AI group interview, that is:

> *…recycling, so before I came to the Eco-Schools, we didn't bother. What we knew was that we collect this rubbish, we burn it, full stop. But now we know that we have to collect this, and then we select it like we get cardboard where we can make these desks. Plastics, we can make plastic mats, ok, there are so many things that we can do with this.*

T1 commented that "let me say it's a blessing (to be an Eco-School), even though it's quite challenging. It needs a lot of work, but it's a blessing we know how to take care of our environment." She expressed a sense of pride related to participating in Eco-Schools, especially in terms of the Eco-School awards. She said, "When they giving awards, and sometimes a nearby school they usually support, they come. There are times when our garden has got a lot of spinach and so-on, so people when they came there to admire that 'hey, your garden is so beautiful'.

T2 also expressed pride in the changes at his school. He commented, "Ja the way the school looks because now you can see we are having a lot of trees that have been planted by these kids, and sometimes they come to you and say 'these trees, we want to water them' then that shows they understand the importance of these trees to them, so these are some of the changes that we see to our school."

4.3.5 Situated Learning

T2 commented that previous to the Fundisa for Change training, he had experienced a disconnect between the environmental practices at his school and environmental learning in the CAPS (curriculum), although T3 commented that "through Liz (ES coordinator), she is always trying to open, to show us where the different projects fit in our work schedule [with reference to when environmental topics are to be covered in CAPS]. (T2) explained that:

> *Because CAPS has seven principles, so those seven principles they highlighted something to me that they, it was developed in order to come up in order to produce the three ESD that is Economy and Social and Environment ESD. So that's why I came to understand that if they learn about biodiversity, it's not only about learning, it's all about knowing the impact of the environment to the society. So now I came to realise that it's only now I'm applying what I've learned last year (in F4C training) because I was just taking it as the food garden not related to teaching.*

T1 also emphasized the link between teaching (CAPS) and environmental practices at school when she said, "Like the sustainability of the water, they used to teach us, but they don't teach us in, they didn't dwell much so that we were taught only to pass. But now we, we have to teach them so that they can practice."

4.3.6 Professional Development and Meaning Making: Learning as Experience

Teachers also commented on the skills which both they and their students had developed. T1 commented on the planning involved in Eco-Schools which although was a lot of work, also helped her to develop. She said:

Because there are a lot of planning when it comes to Eco-School. Planning some lessons. Doing some, research. Like on the 22nd of May it was what?! [WORLD BIODIVERSITY DAY]. World Biodiversity yoh, yoh, yoh, yoh (exclaims). So, but, if I dwell much, let me be honest, if I dwell much I will learn more. How to do things. How to prepare. How to be in line with the environment in itself.

T3 also commented about learning how to plan and prepare, "Ja, so far, what I've gained from the workshop, under Fundisa for Change, and also the Eco-School, under the tutorship of Liz, I've gained a lot. How to plan [HOW TO PLAN?] Ja, how to plan a lesson under Environment Studies, so ja, ok."

T2 commented further that:

You know in teaching let me just say I was not aware it was only last year when I went to Fundisa, Ja, but you know, It opened my eyes I could not see the importance of this in applying it to teaching. I saw it as a different aspect, not related to teaching. The environment on its own. But when I look at the principle of CAPS now because in Fundisa that's where I got the, these principles of CAPS

During the AI group interview, teachers commented that another benefit of the Fundisa training was being able to explore "environment across the curriculum". One of the group members commented that:

I think that learning to like Science more, and then also learn that there are also some other learning areas which integrate with our subject, Life sciences like geography, is like if you are doing other projects you need to consult other teachers, especially in the

Eco-Schools, that's why we work with the geography teachers, the technology teachers. Yes, so we integrate life sciences or natural sciences with other learning areas.

This could also be applied to Art and Drama with another teacher mentioning that:

… the human impact on the environment, like this global warming and what can I say, how do they affect the people? I remember we had one project in the Eco-Schools last year, in the global warming, where learners were supposed to do poems, and some dramas, in order to teach others about the effect of the, like, pollution, and ja, I think it's a new concept that was not there before.

T1 reflected on her own teaching methods and style of classroom management and commented that she aspired to model herself on the facilitation methods used by the Fundisa for Change trainer:

She (F4C trainer) was so (com)passionate to us, and even when it comes to the presentation, like, the planning of the lessons. She was so kind. So I asked myself why I have to be rude to the learners if they didn't write their work meanwhile even myself sometimes I forget or sometimes I say 'ai (exclaims), I'm tired'. Even learners are people, so we have to be (com)passionate, so I pick up some of the things that are there, I said ja, I need to change…..look at this, an adult, so I said I'm an adult I didn't do my work, but this lady she's still giving herself more time, that if we are not sure what is it that you have to do, call for help. So but mina [me] I'm rude to the learners, so I have to change. I have to change (laughs).

She also commented that "the learning environment must be conducive. Now I know. I didn't know, just go to class 'let's open page 20!' you don't care. Now I do have that caring

heart, in actual way, And you can able to pick up whether these learners, they have eaten or, ai, previously yoh (exclaims)." She further commented that this had also affected how she prepared for lessons, now being more aware of and considering learner's needs. She provide an example where previously she might have mocked her learners if they did not know what a "lake" is, if she was dealing with this in her lessons, but that she had now developed a sensitivity and awareness of methods which she could use to aid learners in understanding concepts which they may have had no experience or understanding of.

T1 was very inspired by the facilitation and patience displayed by the lead trainer and went onto add, "After going together with us, with the questions, we can able to realize that we can try this, we can do this, it is only the issue of negligent, saying that 'hayi (exclaims)'. So I said, I was a learner to Shanu [lead Fundisa trainer], why don't I do the same for my own, for my learners, taking them up until they reach the point of where I needed them to be. [1:00:00].

Teachers also felt that the training had improved their confidence to teach sections of the curriculum linked to Biodiversity and felt empowered to assist others and to try our new teaching methods. T1 commented, "But it (F4C) has developed me a lot. It has opened my eyes. As I've said that most of the content, biodiversity, biomes etc. is in the third term. I am really willing to be in that term so that I can practice what I have learned in the Fundisa for Change." T3 also commented that "Ja, it was fresh, [WHAT DO YOU MEAN] that section was also in my syllabus, so it made me easy to treat that topic, biodiversity."

Teachers also commented on the impact which the Fundisa training had on their planning and preparation. T1 commented:

> *Yoh, yoh (exclaims). Teaching method. Ja, we are still, the encouragement of planning. Let me say, not planning but preparation. To prepare on how to go, how are you going to present your lesson. Previously we used to take a textbook (demonstrates) 'ah*

(exclaims), let me go' open, just open page 15. Now I know that when you go to class you have to prepare, and again, you prepare, if you prepare, as far as Life Sciences, let me, I know that it has to be, more familiar in a practical way. Rather than in a theoretical way. Even though I don't take them to the rivers but you can show the nearby, you have time, when you go through using the road you can look at something that you can able to teach about. Previously yoh (whispers) it was a disaster (laughs).

T1 further emphasised that:

Yes, I'm more, more, more, prepared. So that my learners can explore what I have seen. They have to know, what I have been taught. Going outside, or to, into the field, you feel the fresh, fresh what? Learning and feel free. Rather than 'Hey! You are making noise' and so on, Aai (exclaims). It is more interesting than to be in the classroom situation, that's why I said, if I can take them, even when they're outside to be right here in the field, I think they will be more open-minded. They will learn more.

In the AI group interview teachers commented that they had learned to use a variety of teaching methods, use more practical activities and to undertake some research. They commented that learners should, "apply what they are learning in class, not just use it for tests, but also apply it." and that it was important for teachers to, 'look for various sources of information [not relying on single source, e.g. only 1 textbook as a source of information], so that it will assist me [the teacher] to impart knowledge in class." T3 reflected on what he had gained by saying, "So the programme is, I have gained a lot, that when you teach you must always concentrate on local issues. By teaching local issues they can operate as an example to other issues that are taking place outside." Another teacher in the AI group interview shared what she had learned in the Fundisa course on scaffolding learning and how she planned to share this with other teachers at her school:

I'm thinking I must really, I must try to show him or her that every time he or she goes to class, she must consider the level of complexity. That if she has to teach a certain concept in grade 10. she must check for whether the information she is given is for grade 10, if she has to teach it for grade 12 maybe, she must link what the learners have learnt in grade 10, to what they've learned in grade 11, and then again get more deeper into what they are learning now in grade 12 so that they easily understand.

Teachers felt empowered by the training and could support fellow teachers. A teacher noted in the AI group interview, "... Also to refer him or her to relevant sources of information, where to get sources or books, where to get new updated information." Another teacher (AI group interview) also commented, "using the materials we were given so it's easy to update my colleagues that are teaching (indistinct) there is new information that is coming and we must also use it."

T2 commented that the Fundisa trainers had introduced, "five methodologies that I did not know before, that these are some of the methodologies." He also commented that "So when they take us from that point I start to realise that when we talk about biodiversity, learners should understand biodiversity but also the know importance of the environment. What the role being played by biodiversity to our lives." T1 added that:

They used to teach for the sake of learners to pass, so but now we need to be more practical in most of the things...Like now I know that I owe my learners to take them to, it's either to the Botanical Gardens so that they know when they talk about the river they feel it, when we talk about the leaf they feel the Sisal and so on like that, like what they did. The only change is that our learners need to do it in a practical way, like we, we didn't have that opportunity before.

T2 reflected on an aspiration he had:

I was thinking if I can organise a field trip to Nelspruit the Botanical Garden, there, they've developed the environment which consists of different biomes. At least they can assist us, because learning by seeing, it's also very important in the life of a learner, because you learn by experiencing, or in other words that learner won't forget to talk about these biomes, I think it's the experience I want to expose these learners, that when they go on they have to see, to experience that when you talk about biomes, this is what they mean.

This was also emphasised in the AI group interview where one teacher said:

because if you theorize in class it's easy to forget the concepts like the biomes, but if you take them for instance to the botanical gardens, where all the biomes are there, so it's not easy because isn't it in class you just tell them the biomes are like this and this and that but when they go there they see the biome so it's not easy to forget it.

Another teacher in the AI group interview added, "Similar to what they are saying, not to keep the learners in class always, to take them out like to take them to Kruger National Park, if not Kruger National Park we just go to the garden with the kids. So they do more practical methods." This was further emphasised and added to by another teacher who raised the point that fieldwork and investigative methods were beneficial to students who had different learning styles.

Teachers reported that since the training they had started to implement these changes in their teaching methods and practices. T4 reported the following changes:

Now I, what I do, is to first get what the learners know about what I want to teach, [OK, SO YOU LOOK AT THEIR PRIOR KNOWLEDGE?] their prior knowledge, ja and then that is

where I can evaluate their level of understanding, [OK] ok, by the answers they give, I'll first ask them questions based on what I want to teach about, ask them questions, listen to their responses, and then that's where I get the fact that oh they do have a clue of what is happening, or they don't have a clue of what I want to talk about [OK] and then that is where I get into it and then I assist the learners.

He added that "Ja since we are trained, we used to get resources from, we used to get relevant textbooks, or we used to go to the encyclopaedia and we get information and we searched and we get information, based on what you want to know about," and that:

Like when in my teaching I normally, before I didn't use these worksheets things, these worksheets preparing worksheets that learners can just do, I used to come to the class and I present my lesson, as well as the introduction of a lesson, because you introduce a lesson to learners you need to make them the inside make them feel like carrying more of what you are about to say...

He also proudly stated that "I took my learners out, I took my learners out, we were doing the classification of organism, we took them out, we go to the nearby bush there within the school premises. We were there identifying small organisms, plants and animals species."

Another teacher (T3) commented about practicing a different teaching method for teaching about IKS and medicinal plants:

No, some of the things were new to me. Because you cannot know the role of each plant in making medicines, something like that. We know the general things about plants that plants are doing this and that but when it comes to medicines, the knowledge of our parents or grandparents were not open enough to everyone. So they only give certain people that knowledge, so if you ask the learners to ask their grandparents sometimes

their grandparents they tell them that ok, we only want, one or two types of plants that are used for making medicine. So the grandparents can give that learner what is the role of that particular plant. So when we come back to the class to do that discussion so it was fantastic, everyone was coming with his or her plant and telling a story about that plant. [OK] So we benefitted.

T3 commented that he appreciated the approach that had been taken with the Fundisa training, "The way they treated it, I was nice to be there, it was nice. So I can assess, I can able to choose any methodology." T2 also felt well prepared and commented:

It should assist you as an educator, and that CAPS assess learners in three ways, in the form of a test, examination, a project, in a test it's just questions, then in a project it's like an investigative type of assignment. Then so, I start to understand, in setting a test, what is it that is expected, what kind of questions are these learners supposed to sit on. High order, low order, middle order. And the percentage of it, how can you set these questions you know, it's all about Fundisa that I start to, in other words it make things easier for me, for surely I've gained knowledge with that workshop that we had last year, and also the assignment! That assignment it was you know designed in such a way that as a teacher you have to come up with ways of testing, forming you know investigative project. So that when you sit down and do that, in other words I developed some skills in making a project so I think I've gained a lot.

T1 also commented that the training she had received led her to consider getting a further professional qualification. She said, "You I, last year I was once, after the Fundisa for Change, I was tempted to do a Bachelor [44:21] through Unisa, it's just unfortunate, they said I had to write a letter [A MOTIVATION] a motivational letter. After Fundisa I went to Unisa and then I, I, I failed to do that. I learn to be more, to love the environment more than

it was before. Just because I have seen to be in the environment, to be outside, it's so nice, it's so nice. "

4.3.7 Community: Learning as Belonging

4.3.7.1 Support from Eco-Schools and Fundisa for Change

Teachers were also very appreciative of the support they received in participation in an Eco-Schools Professional Learning Community. T1 commented, "if ever you have got some challenges, you can tell her [Liz, Eco-Schools Coordinator], then she will if she's not familiar with it she can take it up to (Shanu F4C trainer) and so on, the Fundisa for Change. She further emphasised, "Especially Liz, time and again, in two weeks time she's here to ask 'What is your problem?' and so on. She's more assisting, more." She also expressed that she really valued the "face to face" support, "because doing things part time Anisa [interviewer], to be honest, you don't learn, facing a paper and a book only without people, we need people that can, who has got more knowledge, to teach you, like when it comes to the issue of the biomes, even if I was taught grade 10, I know about the biomes but, we usually do it in a theoretical way.

T2 reported that he felt inspired and motivated following the Fundisa training. He said:

> *You know as I've mentioned before, that before Fundisa I went to CAPS training. Let me say I was, I did not understand anything that they [DBE] delivered for us, I could not understand what's going on, 'what is this?', I thought of, you know, 'teaching, these days it's boring man', sometimes if I was 55 years I would take a package and resign because I could not understand anything about what's going on here. When I went for Fundisa, you know it opened my eyes that this thing is not very, it's not difficult, it's a matter of understanding what is required in this CAPS thing...When I went for Fundisa, you know it opened my eyes that this thing is not very, it's not difficult, it's a matter of understanding what is required in this CAPS thing. What are you supposed to teach as*

an educator. You know even the methodology...I could not understand what was going on there [CAPS training], but with Fundisa they tried to highlight the principles of CAPS, and that when we teach this subject, what is it that learners are expected to know? And the training that I went before they could not explain it was, just movie, they said you know this thing you know this thing meanwhile we know nothing, so they [Fundisa trainers] assisted us (with) that, also knowing the specific aims.

4.3.7.2 Developing Networks

T4 reflected that through the training, he felt that he had grown and changed, likewise it was expressed during the AI group interview that the Fundisa for Change conference to which teachers had also been invited, had also been a learning and growth experience. T3 also valued being invited to the conference and mentioned that he had made contacts with Life Sciences teachers in the Western Cape who he had met at the conference. This was linked to an aspiration he had to take his learners on a field visit to Cape Town and commented:

(I wish to take) maybe few learners who are, who can able to afford. Because around Capetown there is a lot of, the biomes they are not like [HERE] ja. So we were also thinking of taking, maybe in the form of a group, learners who are under the Eco-School Environmental Club, to that place

Another teacher also reflected on the value of developing stronger networks through participating in an Eco-Schools Professional Learning Community. In the AI group interview, she said:

I value the contacts [CONTACTS? SO THE NETWORKING?] it's very useful. I know that as a teacher I will never suffer again, as an ecologist I will never suffer again, as an

environmentalist, I will never suffer again, I've got everything I need because of all the people I'm working with

T2 also felt supported and commented that "Liz [Eco-Schools coordinator] is providing us with resources, ja, she's the one who's providing us with resources. So that we can assist these learners to understand in some of the projects, or learning content we are delivering in class."

4.3.7.3 Collaborative Environment

Patterns of support included schools and teachers providing support to one another for implementation of their Eco-School projects. T1 reported that she would sometimes be invited to another local school to attend Eco-School workshops. T2 commented that:

We were involved in this last year, me and Joyce at Makudu, she invited Eco-Schools, that we should go there, to show us how she does a project at Eco-School, and we were very much pleased by that, because that's where we came to know these things of making, you know, having broader at school, because she do have it, where they have chickens. So when we went there she taught us a lot of things, we could know share as educators because we were there, invited by Liz [Eco-School coordinator] to a school, so we could see how she manages her project....so there are different things that the (other) school is doing, that is why it is one of the schools that is being recognized here in Mpumalanga as a best school in Eco, you know.

T2 also mentioned that it was a colleague who had introduced him to Eco-Schools, after having attended a workshop organised by the Eco-Schools coordinator, but which was conducted by a partner organisation, "Food and Trees for Africa". Following the workshop,

this teacher had cascaded what she had learned to her colleagues. In the AI group interview, one of the teachers, who is also a DBE cluster leader, commented that:

> *...And again when we compare the workshops that we have done by Fundisa for Change compared to the ones that they have done by the department I believe, when I check at school I have gained a lot, more than what they have. And then again if we have got each others contact at times it might happen that I might still maybe invite one to come so that we have those types of workshops at ?cluster base? Like myself it was me, Dudu and Daphne we are belonging to one cluster and where we met challenges like we are given maybe one task to do. I would still say, Daphne, can you come and assist Dudu can you come and assist. Unlike somebody who is alone somewhere, if you've got contact you can still invite we are educators we are there to assist each other.*

Teachers also expressed that they had good systems of support at school (Q8; AI) with one teacher saying, "The facilitators who are facilitating the process, the workshops, they are giving us a lot of information and our colleagues, my colleagues, are also giving me a lot of information. This was echoed in comments made by other teachers too, who had developed over time, a support network. T1 commented that:

> *so even some educators around our school we use, if you've got a problem we call them, they come and assist you, they teach your learners...Even the cluster leaders, they are so, even my senior right here, at school. [VERY HELPFUL]. Hmm, she once attended a workshop, it was in America, I'm not quite sure, she came with the materials like the last part, the human impact, so you see it's more, I won't lie, its more helpful.*

She also commented about getting help in other curriculum areas:

I go to my nearest, there is a school a school nearby, there is a teacher who is teaching chemistry of life. (Word indistinct? – 31:55) next week he promised to come and do the revision just because my learners are preparing [FOR EXAMS], and Liz was willing to take it to you guys, so I said 'haai, no, I'm ok'. Because maybe she realize that these people they are for environment, not for the chemistry of life (laughter).

T4 also commented, "Ja! We used to! You learn from one another because you need to make inputs, so everything that we are doing we used to make inputs, now as an individual how do you see it, how do you think it is going to happen. So the grouping thing is of importance, high importance." T4 also commented that the process of bringing teachers together during the Fundisa training also contributed to sharing of information. T1 raised this as an area she would have liked more insight into, that is, to have attended sessions at the other teacher's schools when they delivered their lessons as part of the Fundisa workplace based assignment. She said, "But we prepare a lesson, we presented, but we didn't hear the other colleagues when they were busy preparing their own lessons. But to be in that project I felt, it was so privilege to me." She also wished to have more interaction with the teachers she had met on the course. She said," Ja, I think it is better that, like, here around Bushbuck Ridge, it's myself, Tx and Ty, ne? We are three. Time and again you have to keep us, active, to be more active, like we did it last year, now it's amen [commenting that interaction had quietened down]."

4.3.8 Potential School-Community Links and Benefits

T1 also felt that what she had learned could have benefits for the community and required more community engagement. She said:

To be, to be honest, I think we, as Fundisa for Change or the Eco-School people, you guys need to take us through, so we can be able to go to the, to the community. We stand in

bold, to tell them, 'instead of cutting those trees, you need to plant more trees'. We teach our community, that they have to conserve nature. We teach our community to love the environment more than, If they see an animal they mustn't see the meat. They have to see something that they have to take care of it. So, I think our knowledge or our strength is so limited but if they know that this, they are working for, even if we are not working but they are closely associated with the Eco-Schools, or let me not say Eco-Schools, with the Eco. They will be more welcome, more people will come. And the issue of teaching for the environment it will be limited right here at school, they will be able, even in the community during their committees and so on, they will talk about it. They will talk about conserve the nature, as a whole. How to save water, how to recycle, instead of throwing bottles where-ever they feel. So, this programme mustn't for some few days. It must be continuous, that's what I'm pleading from you.

4.3.9 Document Analysis: Fundisa for Change Portfolios

A document analysis was conducted of the portfolios (assignments) which the teachers completed as part of the Fundisa for Change "Teaching Biodiversity" course. This was to triangulate and assess the validity of the evidence gathered on value creation, collected through the Appreciative Inquiry group interview and semi-structured teacher interviews. Teachers had to apply the Fundisa training and report on their teaching practice by completing a workplace- based assignment. This was one of the requirements for successful completion and certification of the course. The assignment was structured to enable teacher planning and reflection through tasks such as understanding learner context and performance, progression and how to identify and respond to learners needs. This process was designed to help teachers in identifying content gaps and areas of the curriculum and assessment which learners may require additional support. In so doing, teachers could their teaching and assessment methods to improve learner performance.

T1 (port1) was able to analyse learner assessment scores from the previous year and reported a poor pass rate with 19 learners having failed out of a class of 40. T1 attributed this to students struggling with the interpretation of graphs and higher order questions, but

performing better at practical tasks. In terms of environment and sustainability learning as part of the wider school context, she mentioned that learners were engaged in Eco-Schools projects and listed recycling as the primary activity. The document analysis of her portfolio, T1 did not mention any connection between the Eco-School projects and the Teaching Biodiversity course. T1 implemented a lesson which she modelled on the Fundisa for Change course, that is, teachers modelled a lesson using fieldwork and experiential learning and visited the Nelspruit Botanical Gardens as part of a lesson on biomes and biodiversity (the Fundisa for Change course was supported by SANBI). T1 conducted a similar lesson with her learners, based on her earlier observation in the section on context, that learners performed better at practical tasks. T1 used a questionnaire and worksheet to support the lesson but reported that she had not achieved her objectives for the lesson as she had not prepared sufficiently. She commented that she needed to source additional resources (sources of information) and plan the questionnaire such that there is a good spread of higher order questions. In her reflections she noted that she had found the resources which she received during the course as useful, and that she valued being introduced to the fieldwork teaching method, but that she needed more time to plan and prepare lessons from multiple sources.

T2 did not provide an adequate overview of the context of his learners and reported on a lesson which he also modelled on the fieldwork teaching method introduced during the course. His school is located very close to the Kruger National Park, and for his lesson, he took learners to an area adjacent to the park (but not inside) to explore characteristics of the Savanna Biome. He used guided questioning and a worksheet to support the lesson. Similar to T1, he reported that he had not planned adequately, and on reflection found that the worksheet contained errors. He also reported that in future he would prefer to organise a field trip to the park, however, that this required additional planning and resources.

T3 provided an in-depth analysis of learner context and pass rates. This was reported to be comparatively high (76% pass rate as compared to some of the other schools which reported pass rates as low as 20%). T3 also provided a detailed synopsis of how the Specific Aims of the Biodiversity course was linked, reflecting a detailed understanding of conceptual

progression and being able to respond to learner needs (conceptual understanding and potential gaps). T3 reported an active environmental club, as part of Eco-School activity, with learners attending weekly meetings and being engaged in project activities. These activities were not reported as being related to the biodiversity lesson which the teacher implemented as part of his coursework assignment. T3 reported on one component of a much longer lesson and which incorporated several teaching methods. For his assignment he reported on a biodiversity audit which the learners conducted on the school grounds, the audit was supported by a worksheet and a participatory discussion held in class. Learning was assessed through a formal test. T3 applied his knowledge of the specific aims of the biodiversity curriculum to plan his activities and applied this successfully. In his reflections on the lesson (what worked and areas he could improve on), he noted that ending the lesson with a case study may have been valuable in helping learners apply their knowledge (higher order questioning).

T4 did not provide adequate evidence of the lesson he conducted but did include reflections in which he noted that the assessment task he had set did not incorporate sufficient higher order questions.

T5 provided an analysis of learner's performance in level 1- 5 questions and noted that learners battle to explain processes, and struggled with data analysis and collection, with performance in essay response questions being the weakest. T5 also provided insights regarding progression from grade 9 to 10 and an over-reliance on the teacher's notes (learners not having well-developed reading skills and over-reliance on group work rather than developing individual problem solving). Learner involvement in Eco-Schools was mentioned as beneficial to students due to an emphasis on the practical, however, no link was made to the biodiversity lesson conducted (T5 did mention that learners in grades 8-9 actively involved and that Arbor Day had been celebrated in terms of a link to biodiversity education). The lesson which was presented was of biotic and abiotic factors, including a practical investigation of soil types and erosion. The assessment was based on the practical investigation and an essay on human impacts on biodiversity. T5 had a good understanding

of the Life Sciences curriculum specific aims. In her reflections, she commented that Specific Aim 3 had not been covered in the assessment. The moderator's comments on the assessment task were that T5 needed to structure levels of questioning from low to higher order and include more higher-order questions. She also commented that in her preparation, she needed to find more source information.

T6 provided an analysis of areas in the curriculum where learners performed well and other areas in which they performed poorly. This reflected a good understanding of context but not of identifying areas where performance could be improved through changes in teaching and assessment methods. Eco-Schools were mentioned as linked to Environmental Studies through practical projects e.g. understanding carbon and ecological footprints. T6 felt that Eco-Schools benefitted the learners as they both learned and applied knowledge through practices done as part of their Eco-schools projects. For the lesson, T6 covered concepts on population, carrying capacity, mark-recapture sampling, and human impacts on the environment. She conducted a practical simulation in class of the mark-recapture method for population sampling. The assessment task was a formal test and an assessment of data handling and analysis in the practical task. In her reflections, she noted that they performed well on the task but that learning could have been extended with a case study as her learner's battle with essay type questions.

T7 did not seem to understand the requirements of the assignment task and only briefly reported on a lesson on biomes. No reflections were included. T8 understood the task and reported on the learner's context, but did so broadly (average of 50% pass rate). T8 identified higher order questions and working with graphs as a challenge for her students. In terms of Eco-Schools, T8 felt that only a few learners benefit from eco-club activities as it is limited to a few students (capacity). Language was listed as a barrier to learning in the analysis of context and learner performance. T8 implemented a lesson on energy flows, the trophic pyramid, ecosystems, food chains, and the human impact on the environment. T8 used the Fundisa for Change resources in her lesson and designed a worksheet to support the lesson in which she introduced the concepts and used guided questioning to deepen the

discussion. The assessment task was a formal test. In her reflections, T8 mentioned that learners battled with questions which asked them to "discuss or analyze". She also noted that she needed to use more case studies to support vocabulary development and understanding.

T9 provided an insightful analysis of learner context and needs, noting a high failure rate in Life Sciences. She attributed this to poor data handling and analysis skills. T9 conducted a lesson on human settlements, water availability and food security. T9 used visual stimulus and response (pictures were taken from the neighbourhood) to get learners to discuss the challenges faced in terms of human settlements and population growth, as well as the implications in terms of food security. Learners conducted personal waste audits (with a focus on food waste), in order to improve their data handling skills. The assessment was based on data handling. T9 did not include any reflection on the lesson conducted.

4.3.10 Conclusion

This chapter presented the findings from phase one and two of the research, describing the patterns of support within Eco-School Community of Practice's (Wenger, 1998) and expanding this to teacher narrations and perspectives of learning through meaning-making and value creation in a Community of Practice. The methodology which guided data collection was an appreciative inquiry process (Cooperrider and Srivastva, 1987). The chapter presented data gathered from teacher's perspectives of meaning-making which enabled their participation and acquisition of environment and sustainability knowledge in Eco-School Professional Learning Communities. This was examined using Wenger's (1998) Communities of Practice theory to understand how teacher knowledge is supported through social learning processes in the Professional Learning Community and to reflect on value creation through the "Fundisa for Change" expanded model of support for Eco-School teacher development. Data were presented as collected through teacher interviews, a focus group appreciative inquiry interview and cross-referenced through document analysis of teacher's Fundisa for Change portfolios (assignments). Data was also described from the perspective of teachers regarding the context of environment and sustainability issues and

challenges which the school and community faces, and how participation in an Eco-School Professional Learning Community is adding value and experienced as meaningful practice. This will be expanded on in Chapter 5 which follows.

CHAPTER 5: DATA ANALYSIS

5.1 Introduction

This chapter reviews the preliminary reading of the data presented in Chapter 4 in order to provide insights which can be used to develop recommendations for strengthening the models of support in the Eco-Schools programme in South Africa. Narrations of teacher's perspectives on value creation are examined and discussed to explore how supported learning interactions in an Eco-schools Community of Practice are valued and create value. Also examined is the expanded model of support for environmental learning which included a professional qualification through the Fundisa for Change programme. The discussion will be guided by the research questions, namely:

- How does a "coordinator supported" model in Eco-Schools enable Professional Learning Communities and teacher learning?

- What value do teachers derive from participation in an Eco-Schools Professional Learning Community?

- How is an expanded model of support enhancing value in an Eco-Schools Professional Learning Community?

Analytical statements are used as a mechanism to synthesise the evidence presented in Chapter 4 and read across the practices which were noted. Community of Practice theory is used to interpret these and to make recommendations that are developed in Chapter 6 of the study.

5.2 The patterns of support in an Eco-Schools Professional Learning Community support teacher learning through participatory processes of Social Learning

5.2.1 Clusters of Eco-Schools as Communities of Practice

In introducing Community of Practice theory, Wenger (1998) explains that in this social theory of learning the basic assumptions are that, "we are all social beings, knowledge is a matter of competence with respect to valued enterprises, knowing is a matter of pursuit of such enterprises, and meaning is what learning should ultimately produce (meaning-making)" (p.4). The analysis presented here will apply these concepts to understand and synthesise the data gathered from teacher's perspectives of valued enterprises and meaning-making as expressions of how participation in an Eco-Schools Professional Learning Community contribute to teacher knowledge.

As Eco-Schools, environment and sustainability learning and practice is the shared domain of interest for teachers in Eco-School clusters. Community of Practice as a theoretical framework is evident in Eco-school narratives and Eco-Schools are envisioned to function together as Communities of Practice. This was introduced in Chapter 4 which identified the dimensions of practice in this community, notably, evidence of joint enterprises, mutual engagement, and shared repertoire (Wenger, 1998, p. 73). These dimensions were evident in the patterns of support provided by Eco-School coordinators and experienced by participants. The patterns of support provided presented as a network that interacts with environment and sustainability knowledge organisations. Read as a whole, the Eco-Schools nodes/ clusters currently appear to be functioning as environment and sustainability-focused communities of practice.

5.2.2 A Landscape of Practice

The Eco-Schools implementation model in South Africa relies on "lead teachers" to drive whole school development activities, with teacher learning supported in clusters of Eco-School teachers collaborating in a Professional Learning Community (4.2.7). The data

suggests that in “coordinator supported” Eco-Schools, the coordinator acts as an enabler of teacher collaboration, by facilitating and coordinating invitations to Eco-school teachers for joint workshops and planning these engagements as lesson sharing sessions where teacher engagement and learning is supported on an on-going basis. Eco-Schools in South Africa function as a Community of Practice both at the micro level (whole school development involving a Community of Practice at the school) and at a macro level as interlinked Communities of Practice through a network of supported Eco-Schools (connected Eco-Schools within a node or cluster). Wenger (1998) refers to constellations of interconnected practices (p.127) and of different levels of participation that coexist and shape each other in a Community of Practice (*ibid*, p.131). Data from “coordinator supported” models show similar patterns of support, enabling collaboration between teachers from groups of Eco-Schools, which could function as a network of connected schools, interacting with other Eco-Schools, creating a landscape of practice or interconnected Professional Learning Communities. The concept of constellations of practices is developed further in the work of Wenger-Trayner (2014) which refers to a complex system of Communities of Practice and the linkages between them as a landscape of practice.

5.2.3 Features of Eco-Schools as Professional Learning Communities

Evidence from the data collected (4.1.2; 4.7.2) suggests that Eco-School Community(ies) of Practice are representative of Professional Learning Communities as there is evidence of ongoing, continuous support for teacher learning (schools register and participate in the programme for a minimum of 3 years in order to achieve a green flag), and that the patterns of support (evident through joint workshops and other opportunities for teacher sharing and collaboration) provide a framework for teachers in an Eco-Schools cluster to regularly meet and share practice. These patterns of support and engagement are described in the literature on Professional Learning Communities which, although there is no globally agreed definition of a Professional Learning Community, what is common across definitions, is that Professional Learning Communities display sharing and critical interrogation of their practice in an ongoing, reflective, collaborative, inclusive, learning-oriented, and growth-promoting way (Stoll and Louis, 2007, p.2). Teachers describe the value they derive from working

collaboratively (4.2.7.3) and being able to seek out help and support from other teachers and the Eco-Schools coordinator when needed. T4 also described learning from one another and being able to make inputs to shape the learning (4.1.2). This influence on what is learned in the Professional Learning Community also means that teachers are able to shape the learning which takes place and to determine their own development needs. Being able to determine their own development needs is one of the aims of the policy on developing Professional Learning Communities. The ISFPTED (South Africa. DBE and DHET, 2011) defines Professional Learning Communities as, "communities that provide the setting and necessary support for groups of classroom teachers, school managers, and subject advisors to participate collectively in determining their own development trajectories, and to set up activities that will drive their development," (p. 14). The ISFPTED aims to professionalise the teaching profession through a number of interventions, with Professional Learning Communities supporting teachers to identify and take responsibility for determining their own development trajectories by choosing professional development opportunities which are appropriate to their needs.

This is part of the value proposition of Eco-Schools, with teachers able to access professional development opportunities. Peden (2008) and Rosenberg (2008) refer to Eco-Schools as a mechanism for teacher professional development. Teachers who are on the school's Eco-Committee or act as "lead" Eco-Schools teachers, share a common domain of interest in environment and sustainability learning and practice and are often selected to participate in training offered by partners and stakeholders. Evidence of Eco-Schools as a mechanism for teacher development have been documented by Schudel (2012), who reports working with Eco-Schools in the E. Cape as part of the Schools and Sustainability Professional Development course and similarly, Eco-Schools teachers were chosen as participants for the piloting of the Fundisa for Change programme, documented by Songqwaru (2012). Eco-School teachers are a natural choice for environment and sustainability professional development opportunities as they are generally motivated and interested in environment and sustainability learning and can apply their learning through workplace-based tasks and activities. Eco-Schools also function as a mechanism for professional development as Eco-

School coordinators are able to contribute to providing additional resources to support learning and other assistance with assignments or applied learning tasks which teachers need to complete for the qualification. Evidence of this was presented in 4.2.7.1 where T1 commented that after the Fundisa for Change course when faced with challenges, she was able to seek help from the Eco-Schools coordinator.

Drawing on the above analysis and discussion it was possible to make the following analytical statement:

Analytical Statement 1*: The patterns of support for the implementation of the Eco-School's framework in a Professional Learning Community, enabled teacher collaboration, learning and action taking*

Wenger (1998, p. 232) refers to the "conceptual architecture" which is needed for professional communities or the design architecture needed for learning. As both the Eco-Schools coordinators support patterns and the teacher's learning activities are guided by the Eco-Schools "seven-step" framework (see graphic below), the framework becomes the conceptual architecture for environment and sustainability learning. Wenger (1998) describes this as part of "design for learning" (*ibid*). Learning is then guided through this framework or conceptual architecture through processes of mutual engagement at workshops and collaboration in joint enterprises such as planning activities for environmental special days and action taking to solve local environmental challenges (the process of developing teacher agency). Eco-School coordinators actively support teachers to follow and complete the environment and sustainability activities which form part of the framework in order to receive their "Green Flag". The seven steps are represented in the graphic below:

Figure 5: Eco-Schools Framework

Data presented from Eco-school coordinators reported similar patterns of support for teachers in implementing these 7 steps. In the "coordinator supported" model of Eco-Schools, teachers belong to a community of practice which shares the same domain of interest in environment and sustainability learning and Eco-Schools implementation. In 4.12- 4.1.4 data was presented on Eco-Schools as Communities of Practice (Wenger, 1998) and teacher learning was described as enabled through processes of participation and engagement in joint planning activities for "environmental special days" (see 4.1.2) or key calendar events such as Arbor day/ week and World Wetlands Day. In the implementation of these enterprises, coordinators play an active role in coordinating mutual engagement between teachers in activities which support teacher learning through collaboration and negotiation of meaning. This engagement in practice is described by Wenger (1998) as learning in practice. He (*ibid*)) states that "what they learn is not a static subject matter but the very process of being engaged in, and participating in developing, an ongoing practice" (p.95). ES coordinator 09 described mutual engagement in workshops as an opportunity for

teachers to jointly develop lesson plans and to organise teaching and learning activities. This evidence of teacher collaboration in joint enterprises was confirmed by teachers in their narratives of value creation through “learning from one another” (interview with T4).

Action taking was also supported in Eco-School Professional Learning Communities. Evidence shows that teachers collaborated to take action on problems of waste and water scarcity. T1 described how previously her school used to dump and burn waste and was not actively recycling. This is a potentially harmful practice both for learners and for the environment. Eco-School coordinators are not external to these Community of Practice’s but integrate as part of the community (of practice) and engage Eco-club learners and teachers in the practices of the community, for example through active participation in waste sorting and recycling activities. These “hand on” on practical workshops help to build teacher confidence to take action. An example was provided in the data of action taken by teachers to collectively organise a waste recycling service for their schools. For school recycling programmes to function effectively, schools need regular recycling waste collection (some waste meant for recycling could pose a hazard to pupils if left uncollected for long periods of time e.g. glass and cans). As recycling companies only service areas where there is sufficient quantity of load to merit the cost of collection and transport of waste, this is an area of joint enterprise which had a direct benefit to the schools in this Professional Learning Community. By jointly working together they were able to take action to solve a local environmental issue. Similar patterns of support for action taking were reported in the data. Other Professional Learning Communities undertook to solve the problem of waste by “upcycling” waste into useful items such as school desks.

The data also provided evidence of similar patterns of support for practices such as training workshops in food gardening, workshops on how to compost organic waste and establish wormeries to produce organic fertilisers for school gardens, action taking for energy conservation and workshops on water conservation practices such as using “tippy taps” or recycling grey water. Workshops in support of environment and sustainability practice enable teacher collaboration, learning and action taking through practice- based learning of

skills and negotiation of meaning in joint enterprises. Teachers are invited by the Eco-Schools coordinator to attend workshops to learn and share skills which they can apply to their schools. This creates an opportunity for mutual engagement (4.1.3) and action taking in enterprises. Workshops are reported as sometimes taking place at one of the schools, with teachers from surrounding Eco-Schools being invited to the hosting school. These demonstration workshops which are hosted by "experienced" schools for teachers who wish to try out a new practice at their own schools are also an example of legitimate peripheral participation, as described by Lave and Wenger (1991), where newcomers to a practice are initiated into the practices of the community. In 4.2.7.3 T2 describes being invited by a more experienced teacher from a sister school in the cluster "which is the best in eco" to share practices and to help his school to learn how to start a permaculture garden (chicken tractor for food garden). This demonstrates that over time, teachers in the Professional Learning Community had developed a way to support one another with enterprises which were meaningful to them.

Wenger (1998, p. 82) describes enterprises as a resource for coordination, sense-making and of mutual engagement. This is evident in how Eco-Schools coordinator 4 describes workshops which she initiates as providing an opportunity for teachers to "share their successes and to brainstorm their low points" and to model their own school projects on the best practices which they observe at the hosting school. These patterns of support enable teachers to engage with one another and to make meaningful contributions to the development of enterprises. Wenger (1998) states that:

> *In order to support learning, engagement requires authentic access to both the participative and the reification aspects of practice in concert. In terms of participation, engagement requires access to and interaction with other participants in the course of their own engagement. Engagement also requires the ability and legitimacy to make contributions to the pursuit of an enterprise, to the negotiation of meaning, and to the development of a shared practice. (p.184)*

Through participation and reification (Eco-Schools handbook, learning resources and other tools), Eco-School coordinators are able to support teacher learning and professional development by supporting learning through engagement and participation in meaningful enterprises.

The above evidence on the expansion and strengthening of support over time points to evidence that:

Analytical Statement 2: ***The model of support included expanded support through the provision of additional resources and exemplars for curriculum implementation, and through collaboration and networking with other knowledge organisations***

Coordinators reported that expanded support was provided to schools when specialist knowledge was required to support their environmental teaching and learning activities. Examples of types of specialist knowledge were demonstrated in the Fundisa for Change course where teachers required support for biodiversity learning in order to extend learning when trying out new teaching methods for fieldwork (at the Botanical gardens) and practical lessons. This additional or expanded support was provided by partner organisations such as the South African National Biodiversity Initiative (SANBI), Sanparks and the Department of Environmental Affairs. Support also included the provision of learning resources (Table 3 and 4.1.3). Eco-School reporting (see graphic above on the seven steps) requires teachers to choose an environmental theme (after conducting an audit), plan learning activities and projects to address this theme and report on this (1 theme in year one, 2 themes in year and so on). While Eco-School coordinators are involved in providing support for themes, sometimes this does require specialist knowledge or additional resources. Other training, such as on food gardening, was supported by partners such as Food and Trees for Africa who are an NGO with specialist knowledge and resources to support school and community food gardening. They are also able to provide accredited training in permaculture food gardening. This additional support was enabled through the patterns of support provided by coordinators as teacher's sourced information on resources and opportunities for training

through their Eco-Schools coordinator. Coordinators reported that this was facilitated through their participation in local networks and coordinating structures such as environmental forums. These networks are part of the community of practice and share a common domain of interest in environmental learning and sustainability practices. Wenger (1998) describes how over time, practice becomes a shared history of learning and sustained relationships which support learning (p. 102).

Wenger (1998) also describes how teachers learn through the development of a shared repertoire. Over time, teachers collaborate to develop a shared repertoire of tools which are used to support environment and sustainability teaching and learning. This was evident in the data provided by coordinators (4.1.2) who listed joint collaboration in developing lesson plans as part of this shared repertoire. Teachers also benefit from the Eco-Schools programme and its coordinators being part of an expanded community of practice, participating and engaging in environment and sustainability learning and practice with other knowledge organisations. The Eco-Schools programme is part of the Fundisa for Change network, together with a range of government departments, higher education institutions and NGO partners. Through this expanded network, teachers were able to access learning support materials and training provided by partner organisations. Teachers reported using the exemplars provide in the "Teaching Biodiversity" training as knowledge resources to support teaching and learning (4.2.9; T1 and T8 reported using the Fundisa materials in their biodiversity lessons).

T1 also mentioned (4.2.7.1) that she could access additional support through the Eco-Schools coordinator, and if the coordinator was not able to assist directly, then this could be "upscaled" to the Fundisa for Change team. This reflects that teachers were able to access a network of expanded support, facilitated through the Eco-Schools coordinator. T4 mentions that his network of support had also expanded through the Fundisa for Change programme through networking opportunities where he had met teachers from schools in other provinces (at the Fundisa for Change conference).

Expanded support was also enabled through local networks through the Eco-School coordinator participating in local fora. Resources such as the "Smart Living handbook" developed by the City of Cape Town were sourced and distributed locally, and "human resource" support provided by the DBE in the Overstrand area, and by the DEA in the N. Cape, Free State and Kwa-Zulu Natal. A number of NGO partners were mentioned in the data as contributing to learning in these Professional Learning Communities. Some resources were sourced through WESSA, such as the Eco-Schools handbook, WESSA Share-net resources such as the "Hands-On Series" of booklets which are used to support fieldwork and investigations and the Enviro-Kids magazine.

5.3 Value Creation in an Eco-Schools Professional Learning Community

Analytical Statement 3: ***Participation in this Eco-Schools Professional Learning Community enabled teachers to identify concerns in their local context in ways that were personally meaningful and enabled them to take local action***

Participation in this Professional Learning Community enabled teachers to engage with environment and sustainability practices which contributed to identity formation and meaning-making through learning in practice. The data shows that participating teachers identify themselves as being "environmental people" or loving nature (4.2.3), expressing their identity as connected to nature and the environment. Wenger (1998) describes identity formation as one of the social learning processes in a Community of Practice, wherein the members of the community engage with one another, "negotiate this experience" (Wenger, 1998, p.149) and learn more about themselves through experience of what one does and does not yet know, and where one should develop. In this way, self-reflection becomes part of the process of identity formation and "learning as belonging" in a Community of Practice. Wenger (*ibid)* explains the connection between belonging in a

community of practice and the importance of experiencing meaning-making through this participation as “a community of practice acts as a locally negotiated regime of competence” (p.137) and that “for learning in practice to be possible, an experience of meaning must be in interaction with a regime of competence” (p138).

Teachers who implement the Eco-Schools framework have what Wenger (1998, p. 152) refers to as a “reified marker” of belonging to Eco-Schools (sign of membership to this Community of Practice), however, express this identity more broadly in terms of belonging to a community with a common domain of interest in nature and the environment, for example when T1 and T3 described themselves as “liking green” and “liking nature”. The connection between identity and practice was also expressed through narratives of identity as a learning trajectory (*ibid*, p. 149). Wenger (*ibid*) refers to learning trajectories and meaningful practice as when participants are able to “define who we are by where we have been and where we are going”. This was demonstrated in the data when T2 expressed that he aspired to become a farmer one day (when he retires), which suggests that practices such as food gardening are personally meaningful and that he could identify his learning trajectory towards being a farmer one day through the learning and Eco-School practices he is currently engaged in.

The way in which teachers expressed this identity is also linked to their experience of Eco-School practices as meaningful and pride which they feel in being identified with this “community”. T3 described a sense of belonging and identity with the Fundisa for Change course as the materials were personally meaningful. He expressed this as pride in being able to identify himself as belonging to the environment and sustainability community through his sharing of course materials with another teacher at his school and proudly declaring that the course materials included access and inclusion of indigenous knowledge (4.2.4.4) which is, “in our country, our community”. Vasniadou (2001) and Short (2009), mention that people learn best when they are able to participate in activities that are perceived to be useful to real life and are culturally relevant. This “pride” which manifests as the way teachers expressed their identity as part of a community of practice was also connected to

their level of experience and "regime of competence" in a practice (*ibid*, p. 137), for example, pride at being able to show that their "garden is so beautiful" (4.2.4.5) or to aspire to be like a school in the community which had been identified by T2 as being the "best school in eco" (4.2.7.3).

Meaning-making was also expressed in how teachers spoke about the relevance of the Eco-Schools programme to the context of environment and sustainability challenges they are facing and how this enabled local action. As the schools are located in rural and peri-urban areas, one of the challenges which the learner's face is the uncertain prospect of future unemployment, lack of opportunities and poverty. Relating and resulting from this cycle of poverty and lack of opportunities are other interconnected social problems which include the prevalence of child-headed households and a lack of proper nutrition. Teachers explained (4.2.4.2) that for many learners, the meal which they receive at school as part of the school nutrition/ feeding scheme is the only proper meal that these learners will have in a day. T2 and T1 expressed that the Eco-Schools programme added value in that indigent learners were given extra produce from the school food garden to take home and T1, T2 and T4 added that the practice of food gardening also provided hope to pupils who are equipped with skills which could assist them in being self-sufficient, at least, at a minimum to be able to grow some of their own food.

The contextual relevance of the Eco-School projects (one of the 7 steps in the Eco-Schools framework) was described by teachers as creating value and enabling them to take action. T1 and T2 (4.2.4.1) described how water conservation practices, supported by Eco-School coordinators, helped them personally and helped learners adapt to a context of water scarcity and to take action. T1 described how she had changed her own water use behaviours and T2 described how he had used one of the Eco-School steps (conduct a review) in his lessons by asking learners to conduct personal water audits. T1 and T2 also described recycling practices as responsive to issues of waste (littering) and not having safe ways of disposing of waste in areas where there are no waste collection services. T1 describes practices such as making desks from recycled materials, making plastic mats

(4.2.4.5) and that harmful practices such as the burning of waste for disposal were now less frequent as she was now more knowledgeable regarding waste sorting and recycling. Situated learning was also supported through Citizen Science projects and action-taking (4.1.2) with coordinators describing learning activities such as undertaking grassland, wetland and river water quality monitoring (mini-SASS) studies in order to respond to a local environmental issue.

5.4 Participation in the Fundisa for Change course enabled teacher learning

The "Teaching Biodiversity" Fundisa for Change training course consisted of 3 learning modules, focusing on content knowledge, teaching methods and assessment practices. Formal contact sessions provided teachers with knowledge resources and practice in trying out different teaching and assessment methods. The approach used in the training was pitched as CAPS ++, meaning that it aimed to expand on the basic knowledge requirements of CAPS and extend the learning to include understanding the principles of CAPS, the specific aims of the life sciences curriculum, the logic of knowledge progression in how CAPS is structured across the band levels (e.g from G.E.T to F.E.T) and how knowledge areas are interlinked. The model is based on a professional development model of contact sessions and workplace-based applied learning. Teachers were required to report on their workplace based assignment in a portfolio of evidence in order to receive a professional qualification. Evidence of value creation was gathered from teacher narrations of value derived and from document analysis of the Fundisa for Change portfolios.

Analytical Statement 4: ***The Fundisa for Change course improved teacher's capacity to work with CAPS and to relate environmental content in the curriculum to Eco-School sustainability practices***

T2 (4.2.7.1) expressed that he had experienced the DBE CAPS training as too abstract but that the Fundisa for Change approach of CAPS ++ training had given him new insights into what was required and deeper insights into the Specific Aims of the Life Sciences curriculum. He commented that he had realised that "this thing (CAPS) is not that difficult, it is a matter of understanding what is required." T2 explained that he had experienced a disconnect between the Eco-Schools practices at his school and curriculum content (4.2.5), but that the Fundisa for Change course had helped him to better understand the impact of environmental issues on society and as a result a link between practices at school such as the school food garden with the section in the curriculum on human impacts on the environment.

The evidence suggests that the Fundisa for Change course also reinforced the importance of situated learning and using local examples of issues to link the local and global (T3; 4.2.6). Lotz- Sisitka (2011, p.55), comments that environment and sustainability topics covered in the CAPS lend themselves to supporting the "knowledge mix" proposed by the DHET, namely, that this supports the development of disciplinary knowledge, subject knowledge, pedagogical knowledge, practice-based knowledge and situational knowledge. In the Fundisa for Change training, this was demonstrated as teachers gained epistemological access to the course content through the situated learning examples and methodology used. Lotz- Sisitka (2009, p.8) also commented on the value of environmental learning approaches and stated that "environmental learning makes socio-cultural links with learners existing repertoires and knowledge structures, thus creating starting points for extension of these through formal and systematic teaching and learning practices that are content and/ or concept based." This can be applied to understanding processes of teacher learning in the Fundisa for Change course as the course content extended teacher knowledge with the CAPS++ approach and the environmental learning approach to the training (participatory and experiential learning approach) helped teachers to make connections between the course content, e.g. the human impact on the environment and their local contexts.

<u>Analytical Statement 5:</u> ***The "Teaching Biodiversity" Fundisa for Change course improved teacher's confidence and grasp of the knowledge needed to expand their teaching methods and assessment practice***

Evidence from the appreciative inquiry interview showed that teachers believed that as a result of the training they had received, they were now able to use a variety of teaching methods. T2 mentioned "5 methodologies' they had been introduced to and T3 had tried out a new teaching method to teach about indigenous knowledge. T1 commented that she was no longer teaching simply for learners to pass but to aid their understanding and practical knowledge. Practical and fieldwork activities were common to the type of lessons which teachers reported on in the Fundisa assignment tasks/ portfolios (4.2.9). The emphasis on different kinds of learning strengthens the "knowledge mix" as listed in the Policy on Minimum Requirements for Teacher Education Qualifications (DHET, revised, 2015) which lists 5 kinds of learning, including practical and situational learning. Teachers also commented that their perspective on teaching and learning had also shifted in that they believed that learning was not only intended for the purposes of testing but that this was so that learners could apply what they had learned. Tan and Pendereti, in Stevenson (2007) comment that:

> *At a praxis level, (teacher's) personal curriculum ideologies and pedagogical currents translate to very different classroom practices and purposes…educators should be given the time and resources to consider their personal frameworks, available conceptualisations, and the implications of different approaches (to EE/ ESD)…what is clear is that educators need frameworks and training in these matters in order to unravel complex questions. (p.76)*

In some ways the Fundisa for Change training provides an opportunity for teachers to do this, re-considering their personal frameworks and assumptions about teaching and

learning. This was reflected in the change in perception regarding the function of assessment, the importance of experiential learning and applied learning in context.

Teachers also developed better insights into understanding how learning and knowledge are developed as a learner progresses from grade to higher grade. Teachers were able to demonstrate an understanding of progression and scaffolding learning, reflected in their responses to the assignment task. Teachers were asked to review the progression of knowledge and concepts across multiple grades. Some teachers were able to reflect on what they had learned, which was well answered in their assignments and was mentioned in the AI as part of teacher reflections. Teachers commented that they now viewed concepts that they were teaching as connected with concepts taught previously and now understood that as learners progress through the school system, the level of complexity of working with these concepts would increase. They understood and were able to apply this understanding to the setting of assessment tasks and on analysing areas of the curriculum where learners were performing poorly. Understanding progression meant that teachers understood that "gaps" in foundational knowledge could affect learner's ability to engage with knowledge which was an expansion on previously taught concepts. T4 reported that he know tested learner's prior knowledge and understanding before deciding on his teaching approach (4.2.6).

Teachers' preparation and planning processes were also impacted by the training, with teachers in the AI mentioning that they had learned to prepare lessons based on multiple sources of information as they had a better understanding of knowledge as contested and uncertain and that multiple sources were needed to expand learning and to synthesise understanding. In terms of preparations, T4 commented that he hadn't previously used worksheets to support his lessons but was now using these to introduce a new topic and to aid learners in "carrying more of what you are about to say."

<u>Analytical Statement 6:</u> There was preliminary evidence of "reflective practice" and increased professionalisation with the extension of support to include the Fundisa for Change professional qualification

In the definition of a Professional Learning Community, taken from the ISFPTED (South Africa. DBE and DHET, 2011), it was stated that one of the objectives of the strategy of supporting PLC's for teacher development is to contribute to the professionalization of teaching, by enabling teachers to determine their own development trajectories, and to set up activities that will drive their development (p. 14). In determining their own development trajectories, teachers need to identify gaps in knowledge or areas where they require further training. T1 mentioned that after the Fundisa training, she had reflected on her teaching practices, particularly her "professional practice" and had been inspired to try and further her education through another professional qualification (the type of degree was not specified). She had developed "reflective practice" or what Schon (1987) argues professional development should focus on, that is, "the practitioner's ability for reflection in action". T1 also described modelling her behaviours and approach to teaching and learning on her experience of being a learner in the Fundisa for Change course and trying new ways of assisting learners in gaining epistemological access to content. T1 cited the example of learners not knowing what a lake is, and that she could now approach this with sensitivity and relate the definition of a lake to something within the learners' context so that they could understand the term.

The "Teaching Biodiversity" training was designed using a constructivist methodology, with tasks designed to encourage teacher reflection. The workplace-based tasks and assignment questions required teachers to analyse contextual data, identify knowledge gaps and areas where learner performance was poor and then design a teaching programme to address this. At the end of the task, teachers were required to reflect on the task and report any lessons learned. Preliminary evidence from the portfolios suggests that teachers were able to identify areas where improvements were needed in terms of their own practice. Teachers reflected that they needed to pay more attention to planning lessons more carefully and to

take care when designing worksheets or assessment tasks, to include more high order or applied learning questions. Teachers also concluded in lessons which did not proceed as planned, that this was a result of insufficient planning and preparation of lessons. This suggests that teachers had developed competence in reflecting on their lessons and identifying areas of improvement.

5.5 Conclusion

This chapter provided an analysis of the data from coordinator and teacher reflections on the patterns of support in a "coordinator-supported" model of Eco-Schools and from gathering teacher perspectives of value from the appreciative process of inquiry into how teachers derived value from participation in Eco-Schools and from the expanded support provided through the Fundisa for Change professional development training. The analysis was presented as a series of analytical statements and discussed using Wenger's Communities of Practice theory to explain how teachers learn and develop their professional practice in a Professional Learning Community.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Overview of the Chapter

The rationale for the evaluation research reported in this study is to contribute to the development and strengthening of the Eco-Schools programme in South Africa and to aid understanding of the value of the programme from the perspective of teachers who participate in it. The insights on value creation in Eco-Schools Professional Learning Communities will also inform understanding of how learning processes in Professional Learning Communities contribute to meaning-making, meaningful learning and teacher collaboration which supports the aims of environment and sustainability learning and teacher education policies. The research reported and reviewed the patterns of support, in order to understand how the programme, through its structure of long-term, continuous engagement and support of teachers is supporting quality education through supported processes of collaborative teacher learning and professional development in Professional Learning Communities. This chapter reports and reviews the main findings of the research and makes recommendations for continuing work with Professional Learning Communities as a model for co-engaged teacher development. Patton (2008) says of evaluations that:

> *Conclusions made in evaluations encompass both an empirical aspect (that something is the case) and a normative aspect (judgement about the value of something). It is the value feature that distinguishes evaluation from other types of inquiry…"(p.140)*

Value has been a key theme throughout this evaluative inquiry and is a central epistemological lens used to evaluate the emerging processes of collaborative environmental learning that characterise Eco-Schools. Community of Practice theory was used as an analytical lens to review how the emerging patterns of co-engaged support were playing out in and as teacher professional development processes. In this way, the

evaluative dimension of the study used Community of Practice as both mirror for the intended Professional Learning Community process and analytical lens for reviewing the coherence of the Eco-Schools programme and its supported outputs in emerging teacher professional development activities. The intention of this reflexive evaluation process was to provide evaluative insights that might strengthen and expand our grasp of the Eco-School programme as a collaborative process of teacher engagement in environment and sustainability. Both the empirical and the normative aspects of the research are addressed in this concluding chapter and are intended to be applied to making developmental recommendations for strengthening the co-engaged patterns of support identified and reviewed in the current Eco-School programme. The chapter concludes with reflections on the limitations of the research, outlining possible weaknesses and suggesting ways in which future research on teacher professional development in environmental programmes can be strengthened.

6.2 Summary of the Research Findings

The main findings were discussed through analytical statements which were presented in Chapter 5 but will be presented here in summary, against the research goals which they address.

Goal 1: **To explore and describe the patterns of teacher support in an Eco-Schools node/cluster;**

The patterns of support were analysed and found to be similar across the WESSA "coordinator- supported" model of Eco-Schools. Similarities related to the support provided to teachers, guided by the requirements of the Eco-Schools "seven-step" framework. Support patterns explored illustrated how teacher collaboration in joint enterprises and mutual engagement in activities were evident. These patterns of support were evident in school visits, workshops to share and learn practices, joint lesson planning activities and teacher collaboration. This was evident in patterns of mutual support for Eco-School themes and in projects and joint enterprises to celebrate environmental special days. The patterns

of activating support also enabled a shared repertoire to develop, with practical tools for curriculum-based environmental learning being common to practices across Eco-School clusters. The patterns of support demonstrate that Eco-School clusters/ nodes function as environment and sustainability-focused Community of Practices. The practices of these Communities of Practice enabled teachers to develop confidence and skills in emerging Professional Learning Communities which are enabling them to initiate improved teaching and learning actions in response to local socio-economic and environmental challenges.

The patterns of support identified also demonstrated that there is a rich history to the establishment of these clusters/ nodes (Professional Learning Communities) and how these are developing to involve local partnerships with other environmental knowledge organisations who are able to add value to the programme through an expanded network of environmental practice and through the provision of additional resources (learning support materials and human resources). These networks also involve collaboration with the Department of Basic Education at a local level, which could help to support teacher understanding of the alignment between environment and sustainability learning and the CAPS requirements. Resources such as exemplars for environment and sustainability aligned curriculum implementation also expanded the repertoire of and the value offering of the Eco-Schools programme.

***Goal 2*:** To generate evidence in relation to what teachers derive value from through the support they receive in the Eco-Schools programme Teachers experienced Eco-School practices as personally meaningful and connected with their identity. Wenger (*ibid*) describes participation as both personal and social (p.56) and that in the social, through processes of mutuality, participation becomes a source of identity. Teachers experienced "learning as becoming" in the development of a strong sense of identity expressed through environment and sustainability learning in an Eco-Schools Professional Learning Community. Participation in the Professional Learning Community enabled teachers to identify concerns in their local environment and to take action. Wenger (*ibid*) describes this as an experience of meaningfulness (p.85) where membership in a community of practice translates into an

identity as a form of competence (*ibid*, p. 153). Teachers developed competence in practices for taking local action. Competence was also strengthened in relation to working with CAPS. Teachers expressed value in the training they had received through the Fundisa for Change programme which had deepened their understanding of the aims of CAPS and helped to make connections in understanding how knowledge concepts in the curriculum related to sustainability practices implemented as part of the Eco-Schools framework. Teachers reported having experienced a disconnection between the two and not seeing these as related. Teachers commented that they were now able to understand links between sections in CAPS on the human impacts on the environment and the sustainability practices they implemented at school. This also contributed to meaning-making and deepened understanding of how content knowledge relates to situated knowledge. The Revised Policy on the Minimum Requirements for Teacher Education Qualifications (South Africa. DHET, 2015) refers to integrated and applied knowledge which states that it "should be understood as being both the condition for and the effect of scrutinising, fusing together and expressing different types of knowledge in the moment of practice." It is suggested that expanding teacher learning in Eco-Schools' Professional Learning Communities, where teacher collaboration is supported with a professional qualification such as through the Fundisa for Change programme, foregrounds knowledge, reflection, connection, synthesis and research and helps develop teacher understanding of the link between content knowledge and situated knowledge. This is one of the knowledge requirements of the Revised Minimum Requirements for Teacher Education (*ibid*, pp.8-11).

***Goal 3*: To assess evidence on how teaching, learning, and practice are being supported and developed through participation in the Eco-Schools Professional Learning Community examined**

Teachers gained confidence in "Teaching Biodiversity" through the Fundisa for Change training they received as part of the expanded support in this Eco-Schools Professional Learning Community. Teachers were better able to understand the Specific Aims of the Biodiversity CAPS curriculum and to adapt their teaching methods to support the CAPS

content and assessment requirements. The analysis of the Fundisa for Change portfolios reflected that teachers had experimented with participatory teaching methods through fieldwork investigations and practical teaching methods and had consulted multiple sources of information to expand the content knowledge requirements of CAPS (CAPS++ approach).

The portfolios also showed evidence of teachers developing skills in analysis of learner performance and an awareness of the need to adjust their teaching and assessment strategies to address ”gaps” in learner understanding. This was demonstrated through the analysis of learner assessment scores and through the exercise where teachers demonstrated an understanding of knowledge progression in CAPS. Teachers also reflected an understanding of the context of learners and how this could affect learner performance e.g. in terms of language and understanding concepts. One teacher expressed a growing reflexivity and sensitivity in terms of her teaching approach in terms of how she engages with learners in the classroom.

Reflexive practice in assessment was also evident, with teachers reporting the use of worksheets for assessment of learning and to support learning, as well as an awareness of the need to give learners more practice in answering higher order questions and setting more data analysis tasks. These were seen to be areas where learners performed poorly.

6.3 Developmental Evaluation Recommendations

Based on the findings which suggest that teacher collaboration is enabled and supported in the “coordinator supported model” of Eco-Schools implementation the following recommendations can be made:

6.3.1 Recommendation 1: Recognise and strengthen the role of Eco-Schools coordinators as facilitators of environment and sustainability-focused Professional Learning Communities

The Eco-Schools framework and reporting requirements provide a structure (architecture) which produces patterns of support which enables participatory action taking and teacher collaboration. In this supported model, the Eco-Schools coordinator convenes and initiates

joint enterprises and opportunities for mutual engagement, thus acting as a facilitator of the Professional Learning Community. In the guide "Professional Learning Communities: A Model for South African Schools" (South Africa, DBE, 2015) the handbook outlines the importance and role of a Professional Learning Community Facilitator. The guide states that:

> *The facilitator has a crucial role to play in Professional Learning Communities. He or she needs to be able to motivate, build trust, understand group dynamics, facilitate discussion and guard outcomes. The facilitator participates in Professional Learning Community discussions, supports teachers by identifying gaps in their understanding and serves as a bridge to other Professional Learning Communities. In this way, the facilitator provides content to the Professional Learning Community, guides the process of inquiry and contributes to the community building process."*

Evidence suggests that Eco-School coordinators function as Facilitators of Professional Learning Communities, as Eco-School coordinators ensure that the Professional Learning Community activities are coordinated, that Professional Learning Community members meet regularly and that teacher collaboration is supported. The ongoing nature of support is also ensured through engagement of a minimum of 3 years as achieving Green flag Eco-School status requires that schools register and report on environment and sustainability activities over a minimum of 3 years, with some schools registering for more than 10 years. This provides a model for continuous engagement and facilitation support.

As the role of the Eco-School's coordinator aids environment and sustainability practice and supports Professional Learning Community strengthening, it is recommended that the Eco-Schools programme management consider aligning and strengthening the role of coordinators as part of the Eco-Schools teacher development strategy. This would help to align the Eco-Schools programme more closely with supporting Teacher Development Policy. It is suggested that the Eco-Schools coordination could be strengthened by:

- Developing a training or induction programme for Eco-School coordinators which would make explicit the minimum requirements for coordination of Eco-Schools and facilitation of Professional Learning Communities. This should include guidelines on Professional Learning Communities, understanding of aims of CAPS, understanding of content requirements of CAPS and teaching methodologies to support environment and sustainability learning of content in CAPS; strengthen conceptual links between practical activities at school and CAPS curriculum content requirements (understand link between sustainability practices and environmental learning, so that there is no disconnect between learning and practice) and on how to support teacher reflective practice which would aid teacher's in developing their own professional development plans;
- Develop a sustainability plan for environment and sustainability-focused Professional Learning Communities- this could support fundraising as the role of the Eco-Schools coordinator, and the time costs associated would be well justified as supporting Teacher Development policy;
- Strengthen engagement with the Department of Basic Education through the development of case studies which demonstrate how coordinator supported Eco-Schools support Professional Learning Communities;
- Strengthen engagement with the Department of Basic Education at a local level by working with stakeholders and partners who have strong local partnerships (e.g. ensure engagement with district education officials in Professional Learning Community meetings);
- Consider a change in terminology- consider changing node/ cluster terminology to align with teacher development policy on Professional Learning Communities;

6.3.2 Recommendation 2: Conduct a Stakeholder Mapping Study

The study also suggests that the Eco-Schools programme would benefit from a more detailed mapping at a local level, of the stakeholders and partners who are involved in supporting schools with environment and sustainability knowledge (activities, resources and

tools, etc.). These organisations and stakeholders provide additional resources to schools, and provide specialist knowledge, which the study suggests is valued by teachers and supports Eco-Schools implementation and reporting. Additional benefits of stakeholder relationships and partnerships with other CBO's and NGO's was also demonstrated through access which Eco-Schools gained through locally held partnerships with the Department of Basic Education and with the Department of Environmental Affairs. While the Eco-Schools programme management does engage with the DBE and DEA at a National level, evidence suggests that the level of engagement with these stakeholders at a local level varied across the programme. More engaged relationships were evident where Eco-Schools implementation is supported by a local NGO/ CBO. Understanding and recognition of these locally held links and contacts with the DBE and DEA may also help the programme management to better understand the co-creation value of these partnerships.

6.3.3 Recommendation 3: Include professional development opportunities, such as the Fundisa for Change Teaching Biodiversity course, as part of the value proposition to "coordinator supported" Eco-schools

Teachers expressed value in participating in the Fundisa for Change "Teaching Biodiversity" course which enabled them to develop confidence in applying environment and sustainability learning methodologies to teaching environmental content. Teachers expressed that they had experienced a change in their teaching practice as a result of the training and that previously, they had relied only on notes provided by the textbook, but now felt enabled to try out fieldwork and other practical methods to support environmental learning. This would support the Eco-Schools framework reporting requirements, where teachers are required to develop a learning programme and to provide evidence of lesson plans. While some teaching methods which support environment and sustainability learning are currently supported by the Eco-Schools coordinators (e.g wetland or water quality studies), evidence suggests that this is ad-hoc and curriculum links are not explicitly made or planned for. The Fundisa for Change training could provide this support for content as well as introducing teachers to teaching and assessment methods which can support environment and sustainability learning as required in CAPS.

The Fundisa for Change training would also strengthen the Professional Learning Community development as one of the aims of supporting Professional Learning Communities (as outlined in the Integrated Strategic Planning Framework for Teacher Education and Development) is to "professionalise" teaching by supporting teachers in Professional Learning Communities to determine their own development trajectories and to provide activities to set up activities that will drive this development (South Africa. DHET and DBE, 2011). The ISFPTED (*ibid*, p.14) also describes activities which Professional Learning Communities will enable, such as providing a mechanism where:

- Individual teachers will be able to highlight areas of weakness, and use expertise within the Professional Learning Communities to help address their difficulties
- Professional Learning Communities will assist teachers to integrate their own professional knowledge with the latest research-based knowledge about content and practice.
- Professional Learning Communities will allow groups of teachers to engage in a variety of activities including:
- Developing expertise in the analysis of learner results on evidence-based assessments such as Annual National Assessments (ANA's) and the National Senior Certificate, among others, in order to determine teachers' own development trajectories;
- Curriculum orientation activities e.g. activities to develop an understanding of, and the ability to use the Curriculum and Assessment Policy Statements more effectively;
- Learning how to interpret and use curriculum support materials such as the workbooks currently being developed and distributed to teachers and schools by the DBE; and
- Working together to learn from video records of practice and other learning materials.

The Fundisa for Change training can provide this additional support to environment and sustainability-focused Professional Learning Communities. The initial findings showed that

teachers were developing reflexive competence and a better understanding of learner needs and the assessment requirements of CAPS. The Fundisa for Change training also provided additional research-based knowledge resources and helped teachers to make the conceptual links between Eco-School practices and environmental content in the curriculum.

6.3.4 Recommendation 4: Provide more opportunities for teacher recognition and identity formation

Teacher identity also emerged as an important aspect of value which teachers derive from participation in Eco-Schools and should be an aspect of the programme which is nurtured. Teachers experience participation in Eco-Schools as meaningful, especially where Eco-Schools practices were connected with the socio-economic and environmental context of learners. The experience of meaning-making enabled action taking and contributes to the goals and aims of the programme. Coordinators should endeavour to develop an understanding of the context of schools and the "drivers for participation" which keep teachers engaged in Eco-School activities. Identity was also expressed in opportunities for teachers across the programme to share practice and ideas. By providing more opportunities for teachers to collaborate and share experiences (e.g through regular Professional Learning Community meetings or via sharing profiles in the Eco-Schools newsletter), this would support identity formation in the Eco-Schools Community of Practice/s. The Eco-Schools programme management could also consider an Eco-Schools teacher award to recognise excellence and to recognise teacher efforts. This would also contribute to identity formation.

6.3.5 Recommendation 5: Develop further case studies and evidence of environment and sustainability-focused Professional Learning Communities

In order to strengthen the case and argument that Eco-School clusters function as alternative Professional Learning Communities, it would be good to develop a number of different case studies. While the case study presented here could be used to demonstrate how the teacher education programmes of education sector partners (e.g. non-profit

organisations) help to support the implementation of the ISFPTED, this may be not be viewed as representative of all Eco-Schools clusters. It is advised the Eco-Schools programme management develop a better understanding of how clusters function as Professional Learning Communities and how clusters can be supported so that these can be presented as case studies of Professional Learning Communities to the DBE and DHET.

6.4 Critical Review of the Research Process

The teachers who participated in the Fundisa for Change training were part of the Eco-Schools committee but were not the lead teachers in all cases. Some of the teachers were new to the schools and only vaguely familiar with the Eco-Schools programme. This is due to the fact that the teachers who were selected were all biodiversity teachers, however, at a school level, it may be teachers of other subjects who are the lead Eco-School teachers. It is suggested that the Eco-Schools programme does a follow-up survey to determine whether teachers who participated in the Fundisa training become more actively engaged in Eco-Schools implementation following the completion of the Fundisa for Change training. From the lead Eco-School teachers, it would also be important to understand which subjects teachers teach and what their professional development needs are.

The sample of Eco-School coordinators who responded to the survey was relatively small, due to the nature and duration of the study. It is suggested that all coordinator activity should be mapped so that the patterns of support and number of stakeholders involved can be more comprehensively determined. The size of the sample in this study is sufficient to make general inferences, however, due to recent changes in the implementation of the programme, it would be good to review this for all coordinators involved.

At the time of starting the research, the researcher was engaged as part of the Eco-Schools programme management, with the research being integrated with the work of the researcher. Due to the integration of the study with the work of the researcher, the researcher was aware of her own biases and endeavoured to ensure that the research findings and recommendations were not influenced by anything other than the evidence

presented. The write-up of the research process was delayed as the researcher changed jobs soon after data collection and analysis and the Eco-Schools programme management likewise underwent changes in structure.

Throughout the study there was a close interplay between Wenger's (1998) Communities of Practice theory (CoP) and the framing and emergence of the DBE and DHET policy on the strengthening of Professional Learning Communities as outlined in the ISFPTED (South Africa. DBE and DHET, 2011). Care had to be taken not to conflate the two, the latter being policy informed by theory and the former being theory to illuminate and inform learning practices. To avoid these problems in the research design I tried to centre the data on patterns of collaborative support in the Eco-Schools programme and to categories in interview transcript comments using Community of Practice to illuminate how teachers were learning in and valuing the interactions in their Professional Learning Communities. The relational synergies across theory, policy and Eco-School support practices must have shaped a tendency towards conflating concepts within the data and its evaluative reading. To moderate this challenge in the topic and the research design, I used a combination of Appreciative Inquiry and case study, the former tending towards conflation and the latter moderating this tendency where policy, practice and theory closely coincide as in this study.

6.5 Conclusion

The coordinator-supported model of Eco-Schools implementation supports teacher professional development through participatory learning and engagement in joint activities and through a process of meaning-making, which helps teachers to develop a sense of identity and pride in belonging to a Community of Practice of Eco-School teachers. The Eco-School framework also provides the structure or framework which enables teacher collaboration, with coordinators functioning as facilitators of emergent environment and sustainability education Professional Learning Communities. An expanded model of Eco-Schools, which includes a professional learning qualification through the Fundisa for Change programme, is valued by teachers and supports teachers to develop reflexive competence and identify their own professional learning needs. The Fundisa for Change course also

helped teachers to develop the confidence to try out other teaching methods and assessment practices. Teachers also developed a better understanding of the Specific Aims of the Biodiversity (FET) Curriculum and Assessment Policy Statements (CAPS) and an improved understanding of knowledge progression, biodiversity content (including foundational knowledge requirements) and the assessment requirements of CAPS. An expanded model of Eco-Schools support also enables teachers to make links between environment and sustainability education in the curriculum with Eco-School practices at school.

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APPENDICES

Appendix 1: Survey Instrument- Patterns of Support

Good Day,

I am a Masters in Education student at Rhodes University, Environmental Learning Research Centre, who is focusing my research on the development of Teacher knowledge in the Eco-Schools programme in South Africa. Please can you help me to better understand the context of teacher support provided by the programme by completing the questionnaire that follows:

1. Please describe a cluster of teachers with whom you regularly meet, together as a group, as part of your Eco-Schools support of schools. Please describe the location of the cluster (where) , the size of the cluster (number of participants incl. you), any other partners/ supporters and how regularly you meet together). Please also describe/ define using your own description if these points do not apply to the cluster which you support

   Location……

   Size……

   Any other partners……

   Meeting regularity……

   Other……

   ……

   ……

   ……

2. Does this cluster belong to/ include a formal, district-based Department of Basic Education (DBE) "Cluster"? Yes/ No?

   …….

3. Does this cluster include any DBE cluster "lead teachers" or district DBE officials/ subject specialists? Yes/ No and please explain which applies

   …….

4. Are most of the teachers in this cluster, subject-specific teachers eg. Geography teachers or do they teach across multiple subjects?

   ……

   ……

   ……..

5. Which grades and phases do most of the teachers teach in this cluster?

……

……

6. Using the definition of a cluster you provided in 1 above, for how long has this cluster been meeting together (over how many months/ years has this cluster existed)?

……

……

…….

7. Please describe some of the main cluster activities that are conducted in this cluster

……

……

……

……

……..

8. Can you describe fully what participation is like in the cluster activities? Eg. is it led by you, a partner organisation, a teacher etc.?

……

……

…….

9. What support for learning is most needed/ most requested by the teachers?

……

……

……..

10. Are there any resources which you use to support teacher learning in the cluster? If yes, please list what these are

……

……

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……

……

11. Are there any other sources of content knowledge or teaching practices that you draw on in this cluster? Please explain

    .....

    .....

12. What are the main environmental topics/ themes/ key concepts from the various school subjects which your cluster focuses on? List the 5 most common topics/ themes/ key concepts

    .....

    .....

    .....

    .....

    .....

13. Is there any other support of teachers besides the meetings together? If yes, describe any other activities which involves participation in learning that occurs with this cluster of teachers outside of the opportunities to “meet together”

    .....

    .....

    .....

    .....

    .....

14. Do teachers collaborate together to share practical ideas and advice on how to teach or assess particular environmental content in the curriculum? Can you give an example of this?

    .....

    .....

    .....

    .....

    .....

15. What do you think is the main reason/s why these teachers participate in your cluster activities, that is, what motivates them to participate?

    .....

    .....

……

……

Appendix 2: Interview Schedule to Explore the Patterns of Support in Eco-School Nodes

Ethics of research explained- as well as permission to use the data for the purposes of research into the ES programme.

1. How long have you been supporting Eco-School teachers with their professional development?

2. How would you describe this support?

3. Reflecting on your experience of the programme, can you identify any clusters of educators who regularly meet together and who receive support from the ES programme?

4. In your opinion and based on your experience, what do you think is the common purpose which brings them together?

5. Are these teachers dealing with any specific subject content in terms of the subjects they teach or any particular grades?

5. What are the common environmental topics that these groups focus on?

6. What kind of support do you think is needed by these educators?

7. Are there any common resources that are used or developed in these clusters?

8. To your knowledge do they participate in any common activities? Or are you aware of any specific examples where teachers have worked together on a common task or helped each other with any particular issue relating to their teaching of environmental content?

9. Are you aware of any of these clusters including any Department of Education officials and what kind of support they provide?

10. Are there any other partners involved in these clusters?

11. To your knowledge, have any of the teachers participated in any in- service teacher training activities? Can you please list these.

12. Would you like to add anything else in terms of the support that is provided by Eco-School coordinators to teachers?

Thank you very much for your time and input. This will help me as a researcher to better understand how the Eco-Schools programme is providing support to teachers.

Appendix 3: Appreciative Inquiry Questions

Q1: Meaningful Learning (04:00)

WOULD ANYONE LIKE TO SHARE, OR WOULD YOU LIKE TO DISCUSS, WHAT DO YOU THINK IS THE MOST MEANINGFUL EXPERIENCE YOU'VE HAD, IN BEING PART OF ECO-SCHOOLS PROFESSIONAL LEARNING CLUSTER?
Tiny: A life-long learner, to seek more information. And again I learned that, as an educator, I need to be CAPS++ … look for various sources of information, so that it will assist me to impart knowledge in class, and I also gain more experience, and knowledge, to be a knowledgeable teacher.
OK, SO YOU THINK THAT IT HELPS YOU TO KEEP LEARNING ON THIS LEARNING JOURNEY OR LEARNING PATHWAY. WOULD THAT BE FAIR TO SAY THAT? AM I RIGHT IN SAYING IT IN MY WORDS I DON'T WANT TO SAY SOMETHING THAT YOU ARE NOT SAYING, SO I WANT TO MAKE SURE THAT I'M NOT SAYING SOMETHING THAT YOU DIDN'T MEAN. SO HOW DO YOU MEAN IT AS 'BEING A LIFE-LONG LEARNER'?
So… being a life-long learner meaning that learning does not stop, it only stops when one dies, so you learn, as long as you are still living you learn and you must, try to get more information.
OK. WOULD ANYONE ELSE LIKE TO SHARE THEIR'S? THE MOST MEANINGFUL LEARNING EXPERIENCE YOU'VE HAD, AS PART OF AN ECOSCHOOLS CLUSTER? LINDIWE? DO YOU WANT TO SHARE, WHAT YOU'VE WRITTEN?
Lindiwe: I think that learning to like Science more, and then also learn that there are also some other learning areas which integrate with our subject, Life sciences like geography, is like if you are doing other projects you need to consult other teachers, especially in the Eco-Schools, that's why we work with the geography teachers, the technology teachers. Yes so we integrate life sciences or natural sciences with other learning areas.
FANTASTIC, SO YOU'VE SEEN THE INTEGRATION AND THE WAY IT'S HELPING YOU TO DEAL WITH SPECIFIC CONTENT THAT GOES ACROSS THE DISCIPLINES, ACROSS THE SUBJECTS. WOULD ANYONE ELSE LIKE TO ADD THEIR EXPERIENCE?
Daphne: I wrote down it's been quite a great experience to be part of an Eco-team because it has taught us to appreciate our environment more, and actually how to sustain the natural resources that we have, because of appreciating them, and then it becomes easier to engage learners, and also teach them what you have learnt. Learners now know that they need to recycle, we do that in all our schools. They need to save water, and it's become a lifestyle.
OK, SO THESE, WE CALL THEM PRACTICES, THESE PRACTICES ARE BECOMING PART OF THEIR LIFESTYLES, THEY'RE LEARNING HOW TO CHANGE, OK WE'LL MOVE ONTO THE NEXT QUESTION.

Q2: Teaching Methods (04:00)

Tiny: As far as the method is concerned, I learned that learning does not end in the classroom, and then again once more, the linking of various learning areas, like that through life science learners can be able to acquire English concepts. Then the learning teaching methods that I use, especially of learning that is outside, not inside in the classroom, is fieldtrips and excursions. Whereby they can link various learning areas, we do case studies where they would use dictionaries to look for the meaning of various words.
SO VOCABULARY DEVELOPMENT. FANTASTIC, ANYONE ELSE WANT TO SHARE A POSITIVE CHANGE IN THEIR TEACHING METHODS? CINDY?
Cindy 1 : … (inaudible) Before we didn't have a garden, but now when we are teaching about plants it helps to have our own garden, and then we teach them.
OK, SO IT HELPS TO NOW DEVELOP A GARDEN AND ALSO TO TEACH FROM IT. OK, GREAT. ANYONE ELSE … ?

Lindiwe: Similar to what they are saying, not to keep the learners in class always, to take them out like to take them to Kruger National Park, if not Kruger National Park we just go to garden with the kids. So they do more practical methods.
SO MORE PRACTICAL METHODS, GREAT. SO DAPHNE? AND THEN ANDRIES?
Daphne: So basically to use a variety of teaching methods, they say practical activities a lot, and also some research. And also to apply what they are learning in class, not just use it for tests, but also apply it.
OK, SO APPLIED KNOWLEDGE IS VERY , VERY CRITICAL, OK THAT'S VERY GOOD. ANDRIES WOULD YOU LIKE TO ADD AS WELL?
Ja, also want to emphasise what they are saying. That what I have discovered is that learners are using different learning styles, and each learner benefits a lot when he is using his learning style, or her learning style. So under this topic it's important that teachers should take learners out. So that they can enable to be hands-on with what they are doing. So we can also use our environment as teaching aids.
AND DO YOU THINK THAT BEING ABLE TO LEARN OUTSIDE IS BETTER FOR SOME LEARNERS? THAT LEARNING OUTSIDE IS BETTER FOR LEARNERS, SOME OF THEM?
Ja, not all of them, some they learn better, some they prefer a different learning style, so some they are theoretical, some they are practical, so as a teacher you should mix the method of teaching, it's like field trip is good for learners who like practical, who are more investigative in their approach.
FANTASTIC. OK WE'LL MOVE ONTO THE THIRD QUESTION. IF YOU COULD TAKE AGAIN A NEW PAGE, AND AGAIN WRITE YOUR NAME AT THE TOP OF THE PAGE.

Q3: concepts local context (06:00)

Tiny: As far as concepts are concerned and the environment, firstly, it's better to acquire knowledge from the known to the unknown, the environment they live in is where they make most of their contact, then there are concepts that they know. And then mine is just to add more information, more especially on sustaining those things that they are getting in their environment. [OK, SO YOU'RE SAYING SUSTAINING THINGS IN THEIR ENVIRONMENT, SO GIVE ME AN EXAMPLE?] like they've got indigenous species, and then you teach them if you don't take care of their environment they will end up being extinct. And then they will start developing the love of nature, and also the sustaining, how they can be sustained, in order that they can be used, for future use, since maybe they did not know that at times they depend on those species, like for medicinal use, for food, but that at the same time they must utilize them but sustain them at the same time.
OK FANTASTIC, SO YOU'RE LOOKING AT WHAT THEY KNOW, YOU'RE EXTENDING THEIR KNOWLEDGE OF WHAT THEY ALREADY KNOW AROUND THEM. YOU ARE THEN TAKING THEM TO THE NEXT LEVEL OF UNDERSTANDING HOW THESE THINGS ACTUALLY ARE IMPORTANT TO THEM AND YOU'RE MAKING THOSE LINKS, IS THAT CORRECT? OK, ANYONE ELSE WANTS TO GIVE AN EXAMPLE OF HOW YOU'RE TAKING A CONCEPT IN THE CURRICULUM AND APPLYING IT TO THE LOCAL CONTEXT. LINDIWE, DO YOU WANT TO GO?
Lindiwe: … (inaudible) field trips, because if you theorize in class it's easy to forget the concepts like the biomes, but if you take them for instance to the botanical gardens, where all the biomes are there, so it's not easy because isn't it in class you just tell them the biomes are like this and this and that but when they go there they see the biome so it's not easy to forget it.
ANYONE ELSE WANTS TO GIVE AN EXAMPLE? CINDY? BOTH THE CINDY'S WANT TO TALK NOW (laughs) THAT'S GOOD.
Cindy (2): Ok, last year we were taken to Kruger National Park whereby we were told, animals, plants, they are so much important that each one of us, there's something that he or she must respect. And some, you find that someone is not eating a goat or a certain thing, whether it's her surname or what, so that will also help in the environment when you teach them those things.

SO, YOU'RE SAYING CONNECTING US TO THE ENVIRONMENT? Sindelwa?
Sindelwa?: I think it's relevant to what Cindy? said… (inaudible) when you're teaching about biodiversity, there are those people who used to come to our school, then our learners are able to go to Kruger National Park without paying, then they teach them about biodiversity, like our kids only know about the Big Five, but they also teach them about the small five and the types of biodiversity, the biomes, that they have and they do practically, they show them … (inaudible) in the Kruger National Park. [OK, SO THEY INCREASE THEIR KNOWLEDGE OF?] of what they learn and they see, practically.
OK, DAPHNE DO YOU WANT TO ALSO ADD?
Daphne: Just about indigenous knowledge system because kids already have some knowledge that they get at home and then in class you teach them about indigenous plants and also alien species and then they are able to make a connection from what they know at home and also the medicine that they are used at home, because that is the application of science.
SO THEY SEE IT APPLIED AT HOME? DID YOU WANT TO ADD SOMETHING AS WELL ANDRIES?
Ja, I can add something that the visit the botanical gardens as an environmental sector which is consisting of different biomes helped me to understand by that the different biomes that are found in Mpumalunga and also in South Africa, and even the types of animals and plants that are found in biomes. [SO YOU THINK IT HELPS YOU WITH YOU LOCAL KNOWLEDGE, BECAUSE YOU EVEN SAID ABOUT BIOMES IN SOUTH AFRICA?] Ja, ja, ja that are found in South Africa and also in our locality or in our region.
THANK YOU SO MUCH, WE'LL MOVE ONTO THE NEXT QUESTION.

Q4: Applied knowledge (10:00)

Lindiwe/ Cindy?: … (inaudible) Recycling, so before I came to the Eco-Schools, we didn't bother. What we knew was that we collect this rubbish, we burn it, full stop. But now we know that we have to collect this, and then we select it, like we get cardboard where we can make these desks. Plastics, we can make plastic mats, ok, there are so many things that we can do with this. [OK, SO WOULD YOU SAY THE NEW ENVIRONMENTAL KNOWLEDGE IS THAT LOOKING AT THE IMPORTANCE OF RECYCLING OR IS THAT SOLVING AN ENVIRONMENTAL ISSUE?] Solving an environmental issue.
OK, IS THE IDEA OF NEW ENVIRONMENTAL KNOWLEDGE IS IT CLEAR TO YOU? DO YOU UNDERSTAND WHAT I MEAN BY SAYING NEW ENVIRONMENTAL KNOWLEDGE? THINGS LIKE CLIMATE CHANGE, THINGS IN BIODIVERSITY THAT ARE NEW IT MIGHT BE ECOSYSTEMS SERVICES, WHICH WASN'T BEFORE IN THE CURRICULUM, EVEN INDIGENOUS KNOWLEDGE IT WAS IN NCS BUT IT'S ALSO RELATIVELY NEW. CAN YOU THINK OF ANY OTHER EXAMPLES OF NEW ENVIRONMENTAL KNOWLEDGE?
Lindiwe?: Eco-tourism.
ECO-TOURISM, OK. DID YOU COME UP WITH ANY OTHER IDEAS OF NEW ENVIRONMENTAL KNOWLEDGE OR THINGS THAT WE DIDN'T REALLY LEARN ABOUT BEFORE, LIKE WHEN I THINK ABOUT WHEN I WAS IN SCHOOL I DIDN'T REALLY, I DEFINITELY DIDN'T LEARN ABOUT CLIMATE CHANGE I MEAN THAT WASN'T HAPPENING AT THE TIME OR IT WAS HAPPENING AND WE DIDN'T KNOW ANYTHING ABOUT IT, WE DIDN'T LEARN ABOUT IT. ANYTHING THAT YOU THINK OF THAT'S NEW IN THE CURRICULUM THAT LEARNERS ARE LEARNING NOW THAT YOU HAVE TO TEACH THAT WASN'T THERE BEFORE. HAVE YOU COME ACROSS IT IN YOUR TEACHING, SOMETHING THAT'S NEW TO YOU, THAT'S CHANGING MAYBE.
Sindelwa: It's not that these things are new, it's not that they're new, it's just that they're being just, ignorant, especially when we talk about littering, any person can just throw but when you teach

learners that you shouldn't litter, it actually could be that he put dustbin in class or outside the school yard.
OK, SO IT'S NOT THAT THE CONTENT IS ACTUALLY NEW IT'S MORE THAT IT'S NEW TO THEM TO PRACTICE IT. ? TINY YOU DON'T LOOK HAPPY AT ALL.
Tiny: … (inaudible) Okay maybe I'm not that familiar with the new concepts that they are doing in CAPS
OK, WHEN YOU DID THE FUNDISA FOR CHANGE COURSE DID YOU SPEND TIME ON ECOSYSTEM SERVICES? PROVISIONING SERVICES AND CULTURAL SERVICES AND ALL THOSE THINGS, I THINK THEY'RE IN THE CURRICULUM NOW.
… (inaudible) **[04:03]** but we did not spend much time on them looking deeply into the content
OK, ALL RIGHT. I'M ALSO TRYING TO THINK IN THE BIODIVERSITY MATERIALS WHAT WAS THE NEW ENVIRONMENTAL CONTENT BESIDE THAT, BECAUSE THAT WAS THE NEW PART. THE REST WAS NOT REALLY NEW. WE USED TO LEARN ABOUT BIOMES AND BIODIVERSITY AND, BUT MAYBE.
?: We used to learn about sustainance, we did learn about, we used to learn about it in the NCS… (inaudible) **[04:36]**
JA, LINDIWE, HUMAN IMPACT ON THE ENVIRONMENT, THAT'S A BIT NEW ISN'T IT? THAT HAS C HANGED A BIT, SO IN TERMS OF THAT [NAME] CAN YOU MAYBE SHARE WHAT YOU WROTE FOR THIS EXAMPLE.
Lindiwe: I said … the human impact on the environment, like this global warming and what can I say, how do they affect the people? I remember we had one project in the Eco-Schools last year, in the global warming, where learners were supposed to do poems, and some dramas, in order to teach others about the effect of the, like, pollution, and ja, I think it's a new concept that was not there before **[05:30]** I think the first, the grade 12's will be writing, the human impact will start this year, I'm not sure because I'm not teaching grade 12, it will be the first group that it will be going to happen … (inaudible) CAPS… [IS THIS THE FIRST YEAR THAT IT'S GOING TO HAPPEN?] Yes. I think last year it was in grade 11, so this year it's not in the curriculum in grade 12. They are going to apply the knowledge from grade 11.
I THINK WHAT LINDIWE'S SAYING IS THAT IT'S NOT IN THE GRADE 12 SYLABUS IT'S IN THE GRADE 11 CURRICULUM. AND THAT THEY WILL HAVE TO STILL ANSWER IN GRADE 12 BUT THAT THEY WILL HAVE TO DRAW ON THEIR GRADE 11 WHAT THEY LEARNT ABOUT HUMAN IMPACTS ON THEIR ENVIRONMENT. SO THAT IS A GOOD EXAMPLE OF NEW ENVIRONMENTAL CONTENT.
Uh no, my worry is, are we looking at CAPS or are we looking at CAPS and NCS?
CAPS, WE'RE LOOKING AT CAPS NOW, NEW ENVIRONMENTAL CONTENT IN THE PRESENT CURRICULUM.
I don't know why we are saying it's new because, obviously CAPS is new? So I don't know when you are saying new concepts, I don't understand? [NEW CONTENT] Oh new content like they've never learned before **[07:08]** [JA, LIKE HUMAN IMPACT ON THE ENVIRONMENT LIKE MAYBE NOW THE LEVEL OF HOW DEEPLY LEARNERS ARE GOING INTO UNDERSTANDING HUMAN IMPACT ON THE ENVIRONMENT] Oh, maybe if you say deeply, because we used to do that in the NCS, so that's why I'm getting lost because in the NCS I mean the [CURRICULUM 2005?] yes, the grade 12 they were learning about sustainability and even that impact of whatever they have in their environment… the are supposed to start sustaining, but that syllabus was changed, was replaced by the new ?4CAPS, so that's why I was a bit lost.
Shanu Misser: So we're saying the concept of new is relative, what do we mean by new?
THIS IS WHAT WE'RE TRYING TO UNPACK NOW AT THE MOMENT IN THIS QUESTION BECAUSE WITH FUNDISA FOR CHANGE ONE OF THE AIMS IS TO HELP TEACHERS WITH *NEW* ENVIRONMENTAL KNOWLEDGE AS WELL, SO I WANTED TO UNPACK OR SEE HOW YOU VIEW NEW ENVIRONMENTAL KNOWLEDGE AND SO LIKE LINDIWE SAID ABOUT CLIMATE CHANGE OR HUMAN IMPACT ON THE ENVIRONMENT WE

WERE TRYING TO RELATE IT TO BIODIVERSITY, BESIDES ECOSYSTEMS SERVICES WE WERE TRYING TO THINK OF MAYBE ANY OTHER EXAMPLES AS WELL. BUT AS TINY'S SAYING SHE DOESN'T ACTUALLY THINK ITS NEW IN THE TERMS OF IT WAS IN THE SYLABUS BEFORE.
?: … (inaudible) they did not do anything as far as human impact on the environment is concerned. ANDRIES?
Andries: …(inaudible) the information that is in our work schedule is that they've restructured the information, the information was there but now they have to structure it [AND IS THERE ANY MORE DETAIL THAT IT GOES INTO?] and they've also expanded it. [HOW DO YOU THINK IT'S BEEN EXPANDED?] (pauses) that could be a question but I think that now they're, getting deeper.

Q5: resources and help (05:00)

Tiny: Shanu last year gave us names of various organisations that assist, maybe to work through the internet, check with them.
BUT LET'S JUST GIVE EVERYONE A CHANCE TO WRITE DOWN, SOME PEOPLE ARE STILL WRITING, PLEASE WOULD YOU WRITE DOWN WHERE, WOULD YOU FIND RESOURCES FROM? ANYONE WANTS TO SHARE? SINDY YOU'RE FINISHED SO DO YOU KNOW WHERE?
Sindelwa: I'm just waiting for the response that I can get because I'm having a competition with the learners about climate change so (…I can hear back about resources – indistinct)
OK, SO YOU'RE RAISING A VERY GOOD POINT ALSO ABOUT THIS PROCESS THAT WE'RE IN, BECAUSE WHILE YOU'RE LISTENING TO EACH OTHER, I HOPE YOU'RE ALSO LEARNING FROM EACH OTHER. YOU KNOW YOU SAID OUTSIDE THAT TEAM LEARNING IS SO IMPORTANT, THIS ACTIVITY THAT WE'RE IN IS A TEAM LEARNING ACTIVITY TOO, BECAUSE AS YOU'RE LISTENING TO EACH OTHER YOU'RE LEARNING 'THAT'S A NEW ENVIRONMENTAL THING', 'OK, THIS IS HOW YOU CAN TEACH OR WHATEVER AND SO NOW SINDELWA IS LOOKING FOR SOME HELP SO, AT THE END WE'RE GOING TO SEE IF WE CAN HELP YOU WITH THAT QUESTION. ANDRIES?
Andries: So, we know where to get help, from the internet or from a website, we're also supposed to scrutinise them, because some of the people they write their own information, but we find that the information is not the information we are looking for. IT MIGHT NOT BE RELIABLE? Yes, It might not be reliable. So, another problem for us as teachers is we know that we should have laptops or iPads but ?we don't use them? **[02:30]** [DO YOU HAVE THEM, DO YOU HAVE SUCH RESOURCES AVAILABLE FOR YOURSELF] No, for time being I'm still struggling to get one. But I think after a few months I'll get one, iPad or laptop. [SO THE DBE'S INITIATIVE OF LAPTOP ROLL-OUT FOR TEACHERS IS NOT WORKING?] Ja, and the government once said that it is prepared to give us laptop, so now we are still waiting.
SO IT'S A VALUABLE THING THAT YOU DON'T HAVE ACCESS TOO, BUT BESIDES THE INTERNET WHERE ELSE COULD YOU GET HELP, IS THERE ANY PEOPLE OR INDIVIDUALS THAT YOU KNOW OF, EVEN IT COULD BE OTHER SUBJECT ADVISORS OR CURRICULUM ADVISORS DO YOU KNOW WHERE YOU WOULD GET HELP FROM, OR ARE YOU LOST WITHOUT THE TECHNOLOGY AND NOBODY TO HELP YOU?
Tiny: Eco-Schools could still assist [SOME THINGS, JA MAYBE, ECOSCHOOLS] Eco-Schools Erena (*Eco-Schools coordinator*) is giving us a list books, on some of the other, where we have to get information.
OK, AND YOURSELF DAPHNE? YOU WERE ABOUT TO SAY SOMETHING AS WELL?
Daphne: I'm a technology child (laughs), I completely rely on technology. There's nothing that you can't find on Google.
ANYONE ELSE WANT TO ADD ANYTHING?

Cindy: The library.
OK, SO YOU'D GO TO THE LIBRARY IF YOU NEED ANYTHING.
Q6 personal strengths (04:30)

ALL OF YOU HAVE STRENGTHS, WOULD ANYONE LIKE TO SHARE WHAT YOUR STRENGTH IS? IF I CAME TO YOU FOR HELP, HOW COULD YOU HELP ME?
Daphne: I am very good in engaging learners when I teach them, I make sure they are all involved in the learning process, and the best way to do that, let's say for example you're teaching them about Rhino Poaching, instead of telling them about it if its possible you can take them to the zoo, show them these rhinos and how they live, and it would be even better if they could see a dead rhino. If you cannot take them there just show them a video, let them see this rhino suffering and why people are making them suffer so much, engage them make them see this thing, and the effect that it has, try to invoke their emotions. ?they're? even better like that.
OK. SO THAT'S ONE OF YOUR STRENGTHS AS A TEACHER THAT YOU'RE ABLE TO MAKE THE CONNECTION WITH THE LEARNER. OK, ANYONE ELSE WANTS TO SHARE? YOUR STRENGTHS? SINDELWA?
Sindelwa: Ok, I think I'll need to break the word environment to it (word indistinct: ?varied – 01:39) and then maybe to refer that particular person to sources, maybe when teaching about biodiversity it's easier when you have a laptop, or like what you're doing now, for the learners to *see*, what is it that you are talking about. Because environment includes a lot of things and you must try by all means to explain. The learners must be able to know, when you're talking about environment … (indistinct)
[OK, SO DO YOU THINK YOU HAVE A WIDER UNDERSTANDING OF THE ENVIRONMENT, WHAT IT IS?] Ja.
OK, ANYBODY ELSE WANTS TO SHARE? ANDRIES?
Andries: I think after attending the Fundisa for Change and the Fundisa conference. I've gained a lot, more factual now [MORE FACTUAL KNOWLEDGE?] Ja, I can able to give advise more facts. [OK, SO YOUR CONTENT KNOWLEDGE IS IMPROVED AND YOU THINK YOU'RE A CONTENT KNOWLEDGE SPECIALIST ALMOST, LIKE YOU CAN HELP SOMEONE IF THEY CAME TO YOU?] Ja, ja, ja. Also to refer him or her to relevant sources of information, where to get sources or books, where to get new updated information.
OK, SO YOU'RE A GOOD INFORMATION SOURCE. SO ANYONE ELSE OR?
Tiny: I'm thinking I must really, I must try to show him or her that every time he or she goes to class, she must consider the level of complexity. That if she has to teach a certain concept in grade 10. she must check for whether the information she is given is for grade 10, if she has to teach it for grade 12 maybe, she must link what the learners have learnt in grade 10, to what they've learned in grade 11, and then again get more deeper into what they are learning now in grade 12 so that they easily understand. [OK, SO YOU THINK MORE YOU'RE LIKE A 'PHASE SPECIALIST', THAT YOU UNDERSTAND HOW THINGS LINK ACROSS THE PHASE] Ja. If learners do not have knowledge about a certain concept in grade 10 it will be difficult, because she has to start there, from the basic, then move from [TO MORE COMPLEX] to more complex, from simple to complex.
OK, AND SINDELWE YOU'RE QUESTION BEFORE, YOU WANTED HELP WITH CLIMATE CHANGE, JUST TELL US WHAT YOU NEED HELP WITH AND WE CAN SEE IF WE CAN HELP YOU?

Q7: Common (00:30)

OK I DON'T WANT TO KEEP YOU TOO MUCH LONGER. WHAT DO YOU THINK YOU ALL HAVE IN COMMON?
Acquire knowledge and improve
YOU ALL WANT TO ACQUIRE KNOWLEDGE AND IMPROVE? GREAT STUFF YOU DO HAVE ALL OF THAT IN COMMON

Q8: Value about participation (02:00)

ANYONE WANTS TO SHARE OR STILL WRITING?
Andries: Knowledge-gaining [SO, THE PROCESS OF GAINING KNOWLEDGE. OK, SO YOU VALUE THAT THE MOST, HOW ARE YOU GAINING THAT KNOWLEDGE DO YOU THINK? IN THIS CLUSTER?] Through sharing. [THROUGH SHARING. OK, ANYTHING MORE YOU WANT TO ADD ABOUT HOW YOU'RE GAINING KNOWLEDGE?] The facilitators who are facilitating the process, the workshops, they are giving us a lot of information and our colleagues, my colleagues, are also giving me a lot of information. [OK, SO YOU'VE GAINED FROM THE COLLEAGUES AND ALSO FROM THE FACILITATORS. AND THE MATERIALS AT ALL?] Ja even the materials that they gave us at the workshop.
OK, ALRIGHT. ANYONE ELSE WANT TO ADD WHAT YOU VALUE MOST ABOUT PARTICIPATING IN THIS PROFESSIONAL LEARNING COMMUNITY? ANDRIES DO YOU WANT TO ADD MORE? OK DAPHNE.
Daphne: I said I value the contacts [CONTACTS? SO THE NETWORKING] it's very useful. I know that as a teacher I will never suffer again, as an ecologist I will never suffer again, as an environmentalist I will never suffer again, I've got everything I need because of all the people I'm working with.

Q9: How can the PLC be improved (08:00)

OKAY, ANYONE WANTS TO START, HOW CAN WE MAKE THIS BETTER
Tiny: Time factor, these workshops at times they become more strenuous, since we do a lot of work within a very short period of time, let's say we had to grasp a lot of information within four days, which was too much, very tiring, we did not have even time to rest, so if even they can increase [THE SPACE BETWEEN] The space between and unlike me attending once, let's have many, more workshops. [OK, DO YOU THINK THAT PEOPLE KEEP COMING IF WE BREAK THEM UP, LIKE SAY INSTEAD OF HAVING FOUR DAYS TOGETHER IF WE HAD EVERY SATURDAY, DO YOU THINK PEOPLE WOULD KEEP COMING? BECAUSE AS YOU CAN SEE TODAY ON A SATURDAY IT WAS QUITE HARD, THERE WERE 12 PEOPLE, THERE ARE SIX OF YOU NOW, SO DO YOU THINK THAT WOULD WORK THOUGH IN KEEPING PEOPLE COMING?] I think it will because, if you check last time it was time consuming, you don't really have a time to rest and people start running away from there, because now, you have to work from morning, you don't have time to sleep in the evening and even the following morning, it really strains [OK, SO IN THE ACTUAL TRAINING ITSELF THE TIME MANAGEMENT OF IT IS CRITICAL FOR YOU?] You can not predict to say, maybe, schedule 8 o'clock to 4 o'clock you're working from 8 o'clock to 4 o'clock with breaks in between but again we have to work up until around 6 o'clock from there you have to do assignments at night, the following day again again, so (two words indistinct) too strenuous.
OK, ANYONE ELSE?
Daphne: I said, include more teachers, because its Fundisa for Change, we're supposed to impact positive change in our communities and it's only a few of us, there's only so much we can do.
OK, SO IT'S IMPORTANT TO GET MORE TEACHERS INVOLVED IN THIS AS A NETWORK, AS A COMMUNITY. OK, ANYONE ELSE?
Andries: I also said, more workshops should be done. [MORE WORKSHOPS WITH THE SAME TEACHERS WITH YOU OR WITH NEW TEACHERS?] No with new teachers, because the information that I've gained is more imperative to me I think they also need the information. Like the new books that they gave us at the workshop, is not easy to be available to everyone who is teaching life sciences. [WHICH BOOKS ARE YOU REFERING TO THAT YOU FOUND VERY VALUABLE?] The books that are supplied by Fundisa for Change. [OK THE ACTUAL TRAINING

MATERIALS] The training materials. (Female voice interjects (Tiny) : The methods book). The methods book
THE METHODS BOOK VERY VALUABLE, OK THAT'S GREAT, ANYTHING ELSE THAT YOU THINK CAN BE STRENGTHENED.
…(inaudible)
OK, AND FOR YOURSELVES DO YOU SEE THIS AS A PROCESS YOU WANT TO STAY INVOLVED IN? MEET AGAIN? KEEP DEVELOPING? DO YOU SEE YOURSELVES AS TOGETHER OR DO YOU THINK YOU JUST CAME TOGETHER FOR THIS TRAINING AND AFTER THIS IT'S (ACTS) BYE BYE?
Tiny: I think that it's good that we see each other more often because now we are from different backgrounds and then again, since we are from different backgrounds we can even share, especially when it comes to somebody whose from a rural might apply knowledge better than someone who's from the urban, or due to technology maybe someone from the urban can apply better knowledge then we can even share, let's say again, each other's contact numbers, [DO YOU HAVE THAT AT THE MOMENT? EACH OTHERS CONTACT NUMBERS?] no … we didn't have time [SO WE NEED TO SHARE EACH OTHERS CONTACT DETAILS WITH EACH OTHER WOULD YOU BE KEEN TO KEEP IN TOUCH WITH EACH OTHER? YES.
?Elizabeth Lambert: In the … (indistinct) area, because you've got a Witbank bunch you've got a Kabokweni bunch … almost many clusters that could [BUT IT WOULD BE ALSO GOOD FOR THEM TO KEEP THIS RELATIONSHIP GOING] Ja BECAUSE YOU'VE BEEN THROUGH A TOUGH TIME AS YOU'VE SAID IT WAS VERY STRENOUS OVER THOSE DAYS YOU DID AN ASSIGNMENT AS WELL AND YOU'VE LEARNT A LOT AND YOU HAVE SOMETHING IN COMMON YOU'RE BOUND NOW BY THIS PARTICULAR KIND OF TRAINING YOU'VE BEEN THROUGH. SO, FOR THE FUTURE, HOW DO WE KEEP US TOGETHER AS A COMMUNITY GROWING AND LEARNING? HOW CAN WE HELP TO KEEP THIS LEARNING GOING, TO KEEP YOURSELVES AS A PROFESSIONAL LEARNING COMMUNITY. LIKE YOU HAVE AN IDENTITY AS A CLUSTER, A FORMAL CLUSTER, HOW COULD WE MAKE THIS INTO A FORMAL WAY, YOU THINK OF YOURSELVES AS YOU ARE THE FUNDISA FOR CHANGE PROFESSIONAL LEARNING CLUSTER, OR COMMUNITY, HOW CAN WE DO THAT? WOULD YOU BE KEEN TO DO THAT? AND HOW? NOT SURE, IS IT FEASIBLE TO
Andries: I think because we are from different regions [AREAS, ITS HARD] or areas, it's not hard so we can become ambassadors for Fundisa for Change, because she's (tiny) a cluster leader, she can also spread the gospel of Fundisa for Change. I can also spread the gospel of Fundisa for Change in my area, when we meet as a cluster. So I [YOU THINK YOU COULD BECOME A TRAINER OF OTHER TEACHERS YOURSELF USING THE MATERIALS?] Ja, but using the materials we were given so it's easy to update my colleagues that are teaching (indistinct) there is a new information that is coming and we must also use it.
Tiny (cluster leader): And again when we compare the workshops that we have done by Fundisa for Change compared to the ones that they have done by the department I believe, when I check at school I have gained a lot, more than what they have. And then again if we have got each others contact at times it might happen that I might still maybe invite one to come so that we have those types of workshops at ?cluster base? Like myself it was me, Dudu and Daphne we are belonging to one cluster and where we met challenges like we are given maybe one task to do. I would still say Daphne can you come and assist Dudu can you come and assist. Unlike somebody who is alone somewhere, if you've got contact you can still invite we are educators we are there to assist each other.

[SESSION ENDS]

Appendix 4: Example of Interview Schedule for Teachers

Interview Transcription: Andries Menzi (59:55)

THANK YOU VERY MUCH FOR AGREEING TO PARTICIPATE AND TO ANSWER SOME QUESTIONS FOR ME. THIS IS THE LIST OF THE QUESTIONS IF YOU WANT TO SEE THEM AS WELL WHILE I'M ASKING THEM TO YOU. AND IF THERE'S ANYTHING THAT YOU DON'T UNDERSTAND PLEASE STOP ME AND I CAN EXPLAIN THEM. BUT THEY'RE VERY SIMPLE QUESTIONS (LAUGHS). I JUST WANT TO START OF MY ASKING YOU, FIRSTLY HOW LONG HAVE YOU BEEN TEACHING AT THIS SCHOOL?

I've got 24 years teaching here at (Skhuduza?) but 5 years I started at (Vulundlela?) [OH, DOWN THE ROAD WHERE LINDIWE IS TEACHING?] Ja, where Lindiwe is teaching for four years, and a half, after that they had a problem here at Skhuduza so they re-located us to assist here in 1995.

BUT 24 YEARS IS A LONG LONG TIME YOU'VE BEEN HERE AT THIS SCHOOL. AND YOU'RE TEACHING AT THE MOMENT, YOU'RE TEACHING LIFE SCIENCES?

Ja, I'm teaching Life Sciences and Life Orientation.

OK, WHICH GRADES ARE YOU TEACHING?

Now I'm teaching grades 8 and grade 9, Life Orientation. And Life Sciences, I'm teaching grade 11. And I'm also assisting Mr (Mthebo?) who's teaching grade 12 with some chapters that are giving, maybe, him a challenge. Ok, so we are practicing 'team teaching'.

OK, AND IN THIS 24 YEARS HAVE YOU BEEN TEACHING MOSTLY LIFE SCIENCES?

Ja, Life Sciences is my major subject, and Agricultural Sciences, those are my major subjects. Life Orientation, I'm teaching it because I have done Psychology with Unisa. So some of the things they are coming from the psychology (stream? – 01:57) but I want to enrol with, under Skill Development, there is a certificate you will supposed to do, for under Life Skills.

FOR LIFE SKILLS? SO YOU STILL HAVE TO GO FOR THIS TRAINING?

Ja, for this training, if maybe they do not take me under Life Skills maybe they can take me under Genetics.

OK, FOR DEPARTMENT OF EDUCATION?

Ja, Skills Development, under Skills Development.

OK, HAVE YOU PUT IT IN YOUR SKILLS DEVELOPMENT PLAN, WITH YOUR PRINCIPLE? YOU'VE INDICATED THAT'S WHAT YOU WILL LIKE TO HAVE AS TRAINING?

Ja, we have already filled the forms.

OK, BECAUSE YOU KNOW CYDWELL, ON, FROM, WHAT'S THE NAME OF CYDWELL'S SCHOOL. IS IT (MADLALA?), YES MADLALA, DO YOU KNOW CYDWELL? HE WAS IN THE FUNDISA TRAINING AS WELL, MR (KHOZA?), CYDWELL (KHOZA?) [Ja, I know] HE'S THE ONE, OH YOU WERE NOT THERE ON SATURDAY, HE'S THE ONE WHOSE BROTHER PASSED AWAY.

Ok, ja, I know that one, I came a little bit late.

JA, HE ALSO SAID HE WANTS TO GET TRAINING IN GENETICS.

Ok, ja, we applied, so it will depend because they want 53 teachers.

MM... WHO TOLD YOU ABOUT THE TRAINING, WAS IT YOUR SUBJECT ADVISOR?

Ja, it's supposed to be the CI who select but it will depend at the head office. Their criteria of selecting. Because I've got (word indistinct? – 03:45) Life Skills Development, not Life Skills Development, Skills Development, ja, it was standard one certificate in computer and PDM, Post Graduate Diploma in Management and Education. So we did that, I did that certificate with Regenesis. The other one it was at Nelspruit.

MM, JA, AND YOU SAID THAT WAS VERY VALUABLE FOR YOU (WORD INDISTINCT – 04:18)?

Ja, every time when you do something, you enrol with the, it could be the university or whatever tertiary institution, you benefit a lot as a teacher. Because you, your mind is always becoming more active.

MM, SO IT KEEPS YOU THINKING AND STIMULATED, OK. IF YOU THINK ABOUT THIS AREA IN THIS SCHOOL, I'M NOT FAMILIAR WITH THIS SCHOOL. AND HOW WOULD YOU DESCRIBE THE ENVIRONMENTAL CONTEXT AROUND THIS SCHOOL, AND IF YOU THINK ABOUT ENVIRONMENTAL CONTEXT, THE SOCIAL, ECONOMIC, ECOLOGICAL, WHAT ARE THE MAIN ISSUES THAT ARE IN THIS COMMUNITY.

Hmm. Under 'social', the people around the school, most of them they are not educated, they are illiterate, most of the parents who are bringing their children here, they are not literate. So sometimes that's why we find ourselves struggling, maybe when we give them homework and maybe sometimes when you ask the learners to bring their parents to school. So their parents, they are dependent on us, when we ask, to give the learner a letter, so that you must bring your parent, you could maybe sit down and, clarify some issues, you could find that even you as a teacher you end up being (word indistinct? 06:05) because the parent, they will look at you as a messiah to solve, they are looking at us as people who should know everything, so when we try to involve parents it becomes more difficult. Sometimes, other parents, they are working, they will tell you 'eish, my boss (had?) release me'. So under 'economically', it is that we are pulling very hard, especially when we need things like learning aids that are supposed to assist, the learning process, they will (several words indistinct? – 06:51) when you say learners must buy their own study material, they must bring more material because, a Life Sciences teacher, we don't use one, textbook, we should use many textbooks. And we have no one prescribed textbooks that I use for testing their knowledge. So we

are using a work schedule. So anything that is relevant to the work schedule, learners should, be able to access that information.

THAT WOULD BE SOMETHING IN THE SCHOOL ITSELF YOU'D SAY. BUT IF YOU DESCRIBE THE CONTEXT AROUND THE SCHOOL, THE MAIN ISSUES THAT ARE AFFECTING, YOU SAID, THAT AFFECT THE LEARNERS AND ARE AFFECTING THE *LEARNING* THAT TAKES PLACE FROM, WHEN I SAY THE LEARNING, I MEAN, I WANT TO BETTER UNDERSTAND 'WHAT IS IT LIKE TO LIVE IN THIS AREA?'. WHAT WOULD IT BE LIKE, IN TERMS OF, YOU WERE SAYING, THE PARENTS ARE ILLITERATE, THERE ARE HIGH LEVELS OF ILLITERACY. ARE THERE ANY OTHER ISSUES THAT ARE IN THIS COMMUNITY?

Issues like what? Interesting issues maybe that are, positive issues that are making learners to be more interested in education?

NO, JUST IN TERMS OF DESCRIBING WHAT THE *CONTEXT* OF THE COMMUNITY IS LIKE, PARTICULARLY ENVIRONMENTAL CONTEXT? SO THINGS LIKE, ARE THEY FACING ANY KIND OF WATER ISSUES, ARE THEY FACING ANY KIND OF POVERTY? OR NOT HAVING FOOD? [ok, ja] EVEN THE ENVIRONMENTAL CONTEXT AROUND THE SCHOOLS [ok, ja] THE MAIN ISSUES THAT THEY'RE FACING.

Ok, ja, I now understand, you've simplified your question. We have a feeding scheme, because before learners were coming from (our?) feeding school, that is (name? – 08:54) the primary school. So learners when they come they were getting food. [CAN YOU SPELL THE NAME OF THE SCHOOL?] (isiXopejeni?) the primary school, that is our feeding school. And also (Mlilo?) is somewhere next to the college, the primary school, they are also getting food there, it is a feeding scheme. So here, I think it was four years back, we also tried our level best to get a feeding scheme. To pull the government to supply food. So learners are getting food, during break, because some of them, they are coming from a poor family, there is a high level of parents who are not working. There factories, around, there is place for factories, and they are closed. The recent one is closed last year, that one I think it was, more than 100 people where under that factory, they lost their job. So, most of the parents who were having there learners here were working there, so it is one of the things, or factor, that is affecting our learners, that at home, their parents are not working. Most of them. And concerning the supply of water, we are thinking of having a borehole because we are supplied by what is called (Waterkant? – 10:35) so we have no running pipes, all the pipes, we have two systems that are supplying water but there is no water that is coming from the taps, so we are relying the tanks, watertanks, the municipality. [WHAT DID YOU CALL THE SCHEME? OH WATERKANT, LIKE IN AFRIKAANS, WATERKANT]. So ja we are relying on waterkant, or watertank to supply us with water. And the 'environment' here we have a place for school gardening, that we can make a garden somewhere there, but we are sometimes failing to utilize them because of water. So we have decided to green our place with medicinal plant, so we are in that process of getting plants, we have already placed an order, and we also ask learners to bring any plant that they know is a good plant to heal certain disease. So we are in that process.

WHY DO YOU THINK THAT THAT IS IMPORTANT THOUGH? THE MEDICINAL PLANTS? FOR THE SCHOOL AND THE LEARNERS?

You know, most of the countries now they are, what can I say, they are preferring herbs, instead of (word indistinct? – 12:33) or injection, as a preventive measures. Because most of the people they're sick. So sometimes if a learner knows that this tree if you take the bark or the leaves or you use the roots that root can heal a certain that is better. That is, ja, something like that. 'Healthwise' we are having a hospital in this area, but we are no clinic around this area. They are travelling now, I think it's almost five kilometres into (name? – 13:08) to get assistance if they are sick. So around this area we don't have a clinic. What else? We have a, what is it? A Home-based Care centre, or something like that, I think it's 200 metres next to the school, so learners afternoon, they are free to go there to get food, those who are from poverty families.

SO THERE IS A LOT OF POVERTY IN THE SCHOOL.

Ja, there is a lot of poverty. Learners are coming from poor families.

SO, YOU'RE THE ECO-SCHOOL CO-ORDINATOR AT THIS SCHOOL OR NOT?

I'm part of the team, there is Mr (Shongwe?), who is the co-founder of the Environmental Club, before. So Mr (Shongwe?) is the one who is supposed to be the co-ordinator but Liz (word indistinct? – 14:25) preferred Grace, you know ladies they are good in organizing (words indistinct? – 14:30), with keeping records ect. So, our co-ordinator is Grace Ngubeni

OK, SO GRACE IS THE CO-ORDINATOR. SO HOW DID YOU BECOME AWARE, *WHEN* DID YOU BECOME AWARE THAT YOUR SCHOOL IS AN ECO-SCHOOL. HOW DID YOU FIRST BECOME AWARE? HOW DID YOU KNOW YOUR SCHOOL IS AN ECO-SCHOOL?

(Thinks), we were under Eco-Schools from 2000, I was the one who was facilitating this programme under scout group [SCOUTS?] so we were workikng [THE BOY SCOUTS? OR GIRL SCOUTS?] Ja, the time I was co-ordinator here, at (Skhuduzo?). So Eco-Centre assisted us with seedlings [WHICH ECO-CENTRE?] It, I think this one next to White River, this one next to White River.

OK SO AN ECO CENTRE NEAR WHITE RIVER THEY ASSISTED YOU WITH SEEDLINGS. AND YOU WERE ALSO DOING THE SCOUTS [Ja], AND YOU CO-ORDINATED THE SCOUTS, AND THEN YOU DECIDED TO PLANT HERE? [Ja, here at school], AND THEN, HOW DID THE ECO-SCHOOLS ACTUALLY START THOUGH?

The Eco-School was only supplying us with seedlings at that time. But after that we, because of the problem of water, we didn't continue with the programme of gardening here at school. So we stopped, because we had a problem of water and sometimes learners they are, it's not like at primary, because at primary it's easy to tell the young learners to bring tins of water but at Secondary School they have started to know themselves that 'I cannot carry a bucket of water' or something like that. So it was difficult so we stopped, planting vegetables ect. So Mr. (Shongwe?) he is a founder of this, 2010, if I am not mistaken, so we started this Eco-School. So Mr (Shongewe?) the one who [[interruption]].

SO HE STARTED IT SOMETIME IN 2010, YOU SAID.

He attended these workshops.

SO HE WAS ATTENDING WORKSHOPS AND THEN CAME BACK AND SAID 'THIS IS WHAT..'. [Ja] AND THEN STARTED TO..

To recruit, as of then, Ja. So he was the one who made us to become more aware that ok we can involve us now.

SO WHAT DOES IT MEAN TO YOU FOR YOUR SCHOOL TO BE AN ECO-SCHOOL?

Um, we are benefitting a lot because learners are becoming involved, and also teachers we are also involved assisting the learners. This is what the Eco-School want from us as teachers, and also as learners.

SO YOU FELT GOOD WHEN MR SHONGWE INCLUDED YOU, OR WERE YOU 'AH, WE DON'T WANT TO DO THIS THING' WHERE YOU OPEN TO THIS IDEA OF A SCHOOL? GETTING INVOLVED?

Ah, It was nice to be part of the group because Mr. Shongwe omitted me from the list, so I argued a lot with Mr Shongwe, I fought him [REALLY?] Ja, that 'Why are you...?', because there was a form that was supposed to be filled and sent somewhere, so through internet if I'm not mistaken they got that form from internet. So Mr Shongwe didn't give me that form so I said 'why are you not giving me because you know that I am, I like nature', and I'm the first one to Scout here to recruit, to start that small garden there, something like that. So when Liz came here, I was also invited to her workshop at Fundisa, and after Fundisa, (s/he? – 19:44) also emphasize that I must be part of the Eco Committee, that's why I am in this committee.

OK, AND HAVE YOU TAKEN PART IN ANY OTHER ACTIVITIES, WITH OTHER ECO-SCHOOLS IN THE AREA, IN THIS CLUSTER?

Ja, there was this activity, the desk, the making of the desk. And the charcoal. So people were coming to meet. But last year, because I was busy with Fundisa, I was also, sometimes I didn't attend some of them because I was busy with the Fundisa but [THE ASSIGNMENT], the assignment, something like that. Maybe there is a meeting for if we are busy, some teachers they attend for us, something like that. Because as an organisation there is a lot of thing that we do. But some of the meeting I attend, some of the meeting you'll find that there is a workshop somewhere [AND SOMEBODY ELSE MIGHT ATTEND] Ja, but I'm passionate about the Eco [OK] Ja.

AND SINCE JOINING THE ECO-SCHOOLS PROGRAMME HAVE YOU NOTICED ANY CHANGES AT YOUR SCHOOL IN TERMS OF THE SURROUNDINGS? ANY OTHER CHANGES IN THE SCHOOL SINCE JOINING ECO-SCHOOLS?

Ja, we sometimes organize, we organize twice if I'm not mistaken, the cleaning campaign and we also try to green our school with plants, and, ah, now we have started with the Maringa, we have planted them somewhere there in the gardens, so after growing we will able to place them, at strategic points.

OK, AND WHY DO YOU THINK THAT'S IMPORTANT? THIS GROWING OF THE MARINGA FOR EXAMPLE?

Ah, when we look at the hand-out from internet, we had a hand-out, the maringa is a plant that is healing, many diseases, so that's why when Liz came with this maringa project, we decided to also include many medicinal plant. So, that's why we are...

AND IN TERMS OF LINKING IT TO YOUR ROLE AS A TEACHER? WHY DO YOU THINK HAVING THE MARINGA TREES, AND GROWING OTHER INDIGENOUS PLANTS, WHY IS IT IMPORTANT TO YOUR ROLE AS A TEACHER?

Ja, in Life Sciences and also in, I think even in Geography, and other subjects, there is, in our work schedule a section where we are supposed to teach about medicinal plants, ja, the role of medicinal plant, and how to save medicinal plant, from disappearing. And we also combine it with deforestation of plant.

OK, SO YOU'RE LEARNING ABOUT DEFORESTATION AS WELL? YOU'RE LINKING IT?

That sometimes traditional healers they should get 'education' about how to use, the medicinal plant. So if maybe you know that this plant is very important and is found somewhere, so if you keep this plant in one place it will be more beneficial in our education and learners should know the different types of plant that are healing different diseases.

AND, WHEN YOU'RE DOING THESE KINDS OF ACTIVITIES, LIKE THE MEDICINAL PLANT PROJECT. ARE THERE ANY OTHER PEOPLE THAT ARE INVOLVED IN THE PROJECT BESIDES TEACHERS AND STUDENTS? ARE THERE ANY OTHER PARTNERS, ORGANIZATIONS OR PARENTS OR ANYONE ELSE INVOLVED IN THESE PROJECTS?

We are, actually we are supposed to inform the SGB what we are doing here, and also Mrs, the Health Department should also be on-board, know what we are doing because the knowledge that they have (for instance? – 25:04) is more than us. So we are supposed to invite them, but we have not yet invited them [OK], because of our tough work schedule, so, but we are supposed to invite them, even the SGBs.

OK, AND IF YOU THINK OF THE PAST AND SINCE 2010 AND ANY OTHER PROJECTS YOU'VE DONE AT THIS SCHOOL. HAVE THERE EVER BEEN OTHER ORGANISATIONS OR OTHER PARTNERS OR PARENTS OR ANYONE INVOLVED IN THESE PROJECTS AT THIS SCHOOL?

This year we invited the, oh with my (regular? – 25:42) projects? [ANY PROJECTS] oh, any project we have done a cleaning campaign here at school, so the organisation that was involved was ANC [THE POLITICAL PARTY OR...] Ja, the political party, they came here to clean our classes, to clean the environment, and they also promise us that they will bring more plants that are regarded as important in our culture.

MM, BUT HAS ECO-SCHOOLS EVER HELPED YOU TO BUILD ANY RELATIONSHIPS OR PARTNERS OR OTHER, CONNECTIONS WITH OTHER ORGANIZATIONS THAT WILL HELP YOUR SCHOOL?

Uh, Eco-School so far, mm, Liz is always talking about, that we must involve them, is always reminding us, that we must try our level best to involve as many as possible because there is a list of people who should be brought on board,

BUT IT HASN'T REALLY HELPED YOU TO DEVELOP ANY NETWORKS, OF PARTNERS?

Ja, for time being, but we are, getting there.

OK, AND WOULD YOU SAY THAT ECO-SCHOOLS IN HELPING YOU WITH DEVELOPING YOURSELF, IN TERMS OF PROFESSIONAL DEVELOPMENT OF YOU AS A TEACHER?

Ja, I can say so, I can say so.

HOW WOULD YOU SAY THAT IT IS?

Through Liz, she is always trying to open, to show us where the different projects fit in our work schedule. She's always coming, one time I thought maybe she was a teacher before, because she's almost, know everything, concerning the work schedule. So she's the one who's the guiding force, she is, showing us the direction how to link, even if maybe we are sometimes becoming lazy but the way she's (word indistinct – 28:03) Eco-Schools project, is fantastic. Because she always come with books, showing us where, how to do things at times, because as teachers we have a lot of things to do. Sometimes we tend to forget, but through her she's always with us , trying to remind us that what we agreed on last time.

AND, WOULD YOU SAY THAT IT'S HELPING, ANY OF THIS KIND OF SUPPORT, WOULD YOU SAY THAT IT'S HELPING TO UNDERSTAND A LITTLE BIT BETTER ANY LOCAL ISSUES, LOCAL ENVIRONMENTAL ISSUES?

Ja, the way she's doing is good, ja, I think is there, we are, benefitting from the way she's treating this issue, before I could say we were a little bit lazy.

MM, OK. AND IF YOU DON'T JUST THINK ABOUT LIZ IF YOU THINK ABOUT, EVEN THE FUNDISA FOR CHANGE COURSE [Ok] AND THINK ABOUT HOW THAT, CAN YOU THINK OF HOW THE, WHAT YOU DID IN THE COURSE, HAS IT HELPED YOU TO BETTER UNDERSTAND ANY ENVIRONMENTAL ISSUES THAT ARE EXISTING, HERE IN MPUMALUNGA, THAT ARE AFFECTING YOUR LEARNERS AT ALL?

Ok, under Fundisa for Change, to be specific, because sometimes I [YOU SEE THEM AS DIFFERENT?] Ja, because, now you're are reminding me about Fundisa for Change. What we did under Fundisa for Change we started with the, the CAPS document, and things that we are supposed to treat under Fundisa for Change at a eKhanyeni centre where we have that workshop we learn about environmental issues. The negative impact of [[interruption]]

SO YOU WERE SAYING ABOUT THE CENTRE THAT, THE LOCAL ENVIRONMENTAL, AT FUNDISA FOR CHANGE?

Ok, Ja, at eKhanyeni centre we learn about issues that are touching the environmental, like different types of plants, and the negative impact that are done by human beings on the nature, ja, and how can we saving nature from the negative impact that are done by humans. Ja.

SO, WHO INVITES YOU TO EKHANYENI? IS IT...?

I was invited by Liz.

OK, SO SHE TOOK YOU THERE AND THEN THEY DID A WORKSHOP?

Ja, she took me there.

[[interruption – Liz calls through]]

THANKS LIZ! SO SHE TOOK ME THERE AND THEN THEY SORT OF TOLD YOU, GAVE YOU A LITTLE ABOUT WHAT'S HAPPENING LOCALLY IN TERMS OF THE LOCAL PLANTS? OR WHAT DID YOU SAY?

Ja, we learn about the different types of plants, their role, or functions, and that some of the plants are disappearing. And that how can we save plants that are disappearing. And we also went to Botanical Garden. At Botanical Garden we learn about different biomes, and types of plants that are found in different biomes, climate ect. Ect.

AND, IN ALL OF THAT, LIKE FOR EXAMPLE LEARNING ABOUT THE DIFFERENT BIOMES AND YOU MENTIONED CLIMATE AS WELL, HAS KNOWING ALL OF THIS CHANGED YOUR TEACHING METHODS IN ANY WAY? HAVE YOU FOUND IT...?

Ja, actually it was learning in disguise for me to get that, because sometimes learners they have different learning styles, some learners they learn better when they are doing this field trips, ja, they learn by touching, doing, observing, something (energy? – 33:03) so, after, that trip I also went there with my learners, while that information was still fresh in mind, ja.

OK, SO YOU FELT IT HELPED YOU TO UNDERSTAND IT? SO, OR CAN YOU TELL ME WHY DID YOU TAKE IT, TAKE THEM STRAIGHT AWAY? LIKE IN TERMS OF WHEN YOU SAY, IT WAS FRESH FOR YOU?

Ja, it was fresh, [WHAT DO YOU MEAN] that section was also in my syllabus, so it made me easy to treat that topic, biodiversity.

SO DO YOU FEEL YOU HAD THE PRACTICAL KNOWLEDGE OR...?

Ja, of teaching that chapter, that section under biodiversity.

SO YOU FELT CONFIDENT THAT YOU COULD TEACH IT?

ja, even in the classroom, theoretically, it was easier for me to teach them.

HOW WAS IT EASIER FOR YOU?

Because after taking them there to Botanical Garden, we were assisted by the team there. So after coming back we were supposed to discuss and to field questions, after coming back we reflected on the questions, so it was easy for them to come with answers. Or even to debate on certain issues that they have seen there.

AND WHY DO YOU THINK IT WAS EASIER FOR THEM TO RELATE IT NOW THAT THEY'RE?

Because they saw it, and it was sort of a field work and they were learning by observing it, so if maybe you teach a learner something that is not in his or her eyes sometimes it becomes difficult for the learner to, or a learner is supposed to imagine it, but when you take them to a field trip, they observe. They can able to touch, to differentiate, to see the different things that they're supposed to be learning.

OK, AND WHEN LEARNERS ARE LEARNING ABOUT, FOR EXAMPLE, THE, AND EVEN YOUR OWN UNDERSTANDING, LET'S LEAVE THE LEARNERS ASIDE, LIKE YOURS. SO YOU SAW WHEN YOU WENT, YOU SAW THE VALUE OF FIELD WORK, OF GOING TO SEE, PRACTICALLY, TO BE ABLE TO SEE SOMETHING [Ja]. WHERE YOU ABLE TO SEE, OR WERE YOU, IN YOUR OWN UNDERSTANDING OF ENVIRONMENT, ARE YOU ABLE TO SEE ANY OTHER VALUE TO LEARNING ABOUT, FOR EXAMPLE, BIOMES. WHAT WOULD BE THE V, WHY WOULD LEARNING ABOUT BIOMES BE IMPORTANT?

Uh, there is a need for learners to know that each region is having a different climate, and the climate is influencing what, so that different climates they have different type of plant and animals, something like that. And even the temperature is also having an impact on the type of plant that are growing there.

WHY, WHY ARE THOSE IMPORTANT THOUGH, TO KNOW THAT? WHY DO YOU THINK IT'S IMPORTANT TO KNOW THAT?

Uh, the influences that are done by, the climate, in that particular area, is important maybe, how can I put it? If you are from this area that is having this type of a climate, and you move from this type of a climate to another area, you are supposed to adapt. So it evolves also, the adaptation factor. That different areas they have different types of organizing that are growing there, or living there. And certain areas, certain types of organisms are not found because they cannot survive under certain climate.

OK, AND IF YOU THINK ABOUT THE CURRICULUM YOU ARE TEACHING, CAN YOU THINK OF ANY CONTENT IN THE CURRICULUM THAT IS NEW ENVIRONMENTAL CONTENT, THAT MIGHT NOT BE SOMETHING THAT YOU LEARNT ABOUT WHEN YOU WERE STUDYING TO BE A TEACHER OR SOMETHING THAT MAYBE YOU WERE NOT TEACHING ABOUT TEN YEARS AGO?

Ja, [[interruption – locking door?]]

OK, SO I WAS TALKING ABOUT NEW ENVIRONMENTAL CONTENT IN THE CURRICULUM. IS THERE ANYTHING NEW IN TERMS OF THE CONTENT THAT YOU HAVE TO TEACH THAT MAY HAVE CHANGED SAY FROM TEN YEARS AGO?

Ja, they've added information, but topics like the climate change, or global warming, they were there but they were not that much, having a lot of information. But now they've expanded certain topics. The topics were there but we were not, they were not having more information. Now they've extended it, like the human impact, we were always teaching the negative impact that are done by humans to the nature. But now they've extended it under Environmental Studies. There is a lot of information that they added, in our syllabus. Ja.

OK, AND SO WITH HUMAN IMPACT ON OUR ENVIRONMENT, CAN YOU THINK OF ANY WAYS IN WHICH YOU CAN LINK THAT WITH WHAT YOU ARE LEARNING ABOUT WITH FOR EXAMPLE THE MARINGA TREES? THAT PROJECT YOU ARE DOING. IS THERE ANY LINKS BETWEEN...? **[40:00]**

Ja, and, as you were asking (things you know concept?), no there is many diseases that are causing a lot of problems to people, so people, even traditional doctors they are still researching different types of medicines that can assist us as a nation, as a population. So the Maringa tree is one of the solution that people who are suffering from Diabetes, suffering from high blood pressure, they can get assistance from that plant. So different diseases were also treated but now if you look at the issue of HIV, every time you were getting your textbooks, some of the textbooks are coming with more information, meaning that they have extended the information, people are still researching.

AND BESIDE THAT EXAMPLE THAT YOU GAVE ME OF WHEN YOU TOOK THE LEARNERS TO THE BOTANICAL GARDENS, HAS THERE BEEN ANY OTHER CHANGE IN YOUR TEACHING METHODS?

Ja, at (Ukakanyeni? – 41:29) centre we dealt with methodology, we dealt with assessment, how a teacher should assess his or her learners. So the new document, the CAPS document, before I was not clear about how the CAPS document want from us, because I didn't attend that course. And even if we attended that course because of the time factor, facilitators they don't have enough time to dwell much or to get deeper into how to deal with different (paths? – 42:20). So, under Fundisa for Change, we, I came there, well versed, so to say, well versed. With more information, I still remember most of the things, I have no problem with the health documents. The way they treated it, I was nice to be there, it was nice. So I can assess, I can able to choose any methodology. Yes, even what the CAPS like, specific aims. If maybe I'm setting a question I know, which specific aim I'm (word indistinct – 43:06)

OK, SO IT'S MADE YOU MORE AWARE OF THE CAPS AND WHAT IT SAYS AND MORE SPECIFIC AIMS IN THE CURRICULUM, OK OK, SO THAT'S HOW YOU FEEL IT'S HELPED YOU PROFESSIONALLY? AS A TEACHER? IS THERE ANY OTHER WAYS IT'S HELPED YOU PROFESSIONALLY? IN YOUR, DEVELOPMENT?

Ja, after I've done that portfolio, because, we were supposed to do, a lot of reading, and also to research, to do a lot of research, so I've gained a lot from that workshop, and also in doing that portfolio.

OK, SO YOU SAID IN THE RESEARCH, HOW HAS THE RESEARCH HELPED YOU?

The research about, to research about the information that's needed in the portfolio, like 'the school environment' and, ja it, made me to be aware, because sometime you can live with something, not aware what, the impact of that something, but after coming back from that workshop, and after doing that portfolio, it assisted me in getting the understanding of my environment. [HOW?] by (pauses) what I did I interviewed some of the learners, after interviewing them I got that understanding of some of the things that were in the portfolio.

OF WHAT? WHEN YOU INTERVIEWED THE LEARNERS WHAT DID YOU 'LEARN FROM THE LEARNERS'?

Ok, like for example, the different types of plants that are important in their environment. [YOU LEARNT THAT FROM THE LEARNERS, FROM INTERVIEWING THE LEARNERS?] From interviewing the learners. Because some of the plants that are more important, they are not covered in their syllabus. Like the medicinal plant and some of the plant that are used for ritual things, that if they are performing their rituals they are supposed to bring a certain twig of a certain plant they took. Learners will bring in many issues concerning what the use of a plant (like some of the plants they are not bottled? – 46:05) and what they are doing at home when they are performing ritual activities.

SO YOU ACTUALLY LEARNT MORE ABOUT THE INDIGENOUS KNOWLEDGE OF THE PLANT FROM THE LEARNERS THEMSELVES?

Ja. From the learners themselves.

OK, AND THEN HOW DID THAT HELP YOU IN YOUR TEACHING?

So, during that, during presentation, sometimes learners are supposed to participate. So each learner brings some tree that he or she knows. To tell us about the role of that tree, and is that tree available. Is that tree disappearing, what causes that tree to disappear, something like that. And as, as a community what can we do, to make sure these plants are not disappearing.

OK, SO, DID IT HELP YOU, SO AT THE TIME, IF I TAKE YOU BACK TO THAT TIME WHEN YOU INTERVIEWED THEM. WHAT GAVE YOU THAT IDEA TO INTERVIEW THEM, FIRSTLY?

After coming, after doing that course at (name – 47:25) because we went out to [THAT WAS NOT THE FUNDISA TRAINING? WAS IT FUNDISA FOR CHANGE TRAINING?] Ja, it was Fundisa for Change training, at [AT (EKHAYENI? – 47:39)] Ja, we went out to find types of plant, structures of the leaves, so we were dissecting different types of plants, so to say, and after coming back it (word indistinct – 47:59) strategy that learners would come with different types of leafy twigs. So, but, the different types of leafy twigs must be [THE DIFFERENT KIND OF?] the different *kinds* of leafy twigs. [LEAVES

AND TWIGS] ja leafs, so, we say leafy twigs. [OK]. So after bringing them at the school, so that I can able teach them [HOW TO IDENTIFY IT?] ja so that ,ok, each learner was supposed to come with a story about that plant, and even compare the different types of plant, structure of the leaf, and even to say something about the bugs, the roles, and the role of that plant in medicine, in making the medicine, if there is anything that they know about it, about that plant.

I WANT TO GO BACK TO THE INTERVIEWS THAT YOU SAID YOU DID WITH THE LEARNERS. SO WHEN YOU INTERVIEWED THOSE LEARNERS YOU LEARNT SOME THINGS, WOULD YOU SAY THAT THOSE THINGS WERE NEW TO YOU? OR DID YOU KNOW THEM ALREADY? WHAT THE LEARNERS FOUND OUT, OR TOLD YOU FROM THE INTERVIEWS?

No, some of the things were new to me. Because you cannot know the role of each plant in making medicines, something like that. We know the general things about plants that plants are doing this and that but when it comes to medicines, the knowledge of our parents or grandparents were not open enough to everyone. So they only give certain people that knowledge, so if you ask the learners to ask their grandparents sometimes their grandparents they tell them that ok, we only want, one or two types of plants that are used for making medicine. So the grandparents can give that learner what is the role of that particular plant. So when we come back to the class to do that discussion so it was fantastic, everyone was coming with his or her plant and telling a story about that plant. [OK] So we benefitted [OK, SO THE WHOLE CLASS BENEFITTED, THEY ALL DISCUSSED AND SHARED SOMETHING?] Ja, ja.

OK, OK. THAT SOUNDS VERY INTERESTING. IF YOU NEED HELP WITH ANY NEW CONTENT OR SOMETHING THAT YOU ARE NOT VERY SURE ABOUT IN THE SYLABUS OR IN THE CURRICULUM, WOULD YOU KNOW WHERE TO GET HELP FROM?

Ja, the Department is always sending us some disk for use at the computer there, certain document that contain a lot of information that is supplied by the department. Ja and except that one we also encouraged to use website. But because we, most of us don't have access to internet, so it becomes difficult to get more information from the internet. But we rely on the information that is supplied by the Department, and the other teachers around, if I've got a problem, or a challenge, I ask my [TEACHERS] I ask my teachers who are in my [FOR ENVIRONMENTAL ONES THOUGH? WERE WOULD YOU GET ENVIRONMENTAL CONTENT?] Environmental content? We get it from the textbook and also from the disk, [OK] the document that is contained by the disk [OK]. So but, we also know that we must also go to the internet but for the time being we rely on the information that is provided by the department, through disks.

OK, AND WHEN YOU THINK OF YOUR FUNDISA FOR CHANGE TRAINING, WOULD YOU THINK OF THAT AS A PROFESSIONAL LEARNING COMMUNITY?

Ja, Fundisa, because I, after attending that workshop I attended the conference there at (name? – 52:54) it was nice to be there and where the professors are pushing this, how can I put it? I can say, new trend or the way they are pushing this Fundisa for Change programme it was nice because they want this, Indigenous Knowledge. That before we were treating or were, studying more of the issue

that are found in Europe, where it were impossible for learners to go and observe it. But we have many issues that are taking place in our environment around us that should be included in the syllabus of our children. So the programme is, I have gained a lot, that when you teach you must always concentrate on local issues. By teaching local issues they can operate as an example to other issues that are taking place outside.

AND WHEN YOU WERE AT THE CONFERENCE FOR EXAMPLE DID YOU MEET ANY PEOPLE THAT YOU ARE KEEPING IN CONTACT WITH? OR ANY OTHER TEACHERS THAT WERE INSPIRING? OR LEARN ANYTHING FROM OTHER TEACHERS WHEN YOU WERE THERE?

I had a friend, but since then I didn't phone him. Two friends who are also under Fundisa for Change, who are schoolteachers, they are around Cape Town [OK] so I have, their telephones [OK, YOU MET THEM AT FUNDISA'S CONFERENCE, ARE THEY LIFE SCIENCES TEACHERS?] Ja, I met them there. Ja, they are Life Sciences teachers, and the other lady under SACE [SORRY?] SACE Department S.A.C.E. [OK, SACE, JA] she also asked me to write an article about what I [LEARNT FROM] what I learnt or gathered from that conference. So I did that.

OK, SO THOSE TEACHERS FROM CAPETOWN, WHAT INTERESTED YOU ABOUT THEM?

No, when we talked we said, we are supposed to, because I have a plan taking learners to Capetown. Maybe few learners who are, who can able to afford. Because around Capetown there is a lot of, the biomes they are not like [HERE] ja. So we were also thinking of taking, maybe in the form of a group, learners who are under the Eco-School Environmental Club, to that place. But we are still trying to check whether they can able to afford, so that friend they, he would organise for me a place, something like that.

TO MAKE A CONTACT, OK, THAT'S GOOD TO KNOW. AND WHEN YOU WERE WORKING WITH THE FUNDISA FOR CHANGE HAVE YOU EVER DEVELOPED ANY LESSON PLANS OR RESOURCES, ANYTHING LIKE THAT? TOGETHER WITH ANY OTHER TEACHERS, OR, WORKED TOGETHER, OR, EVEN ON YOUR OWN, ON LESSON PLANS THAT ARE?

Ja, what I did when I came there I discussed with my colleague who is teaching Life Sciences, I showed him the comment from Fundisa for Change, that now there is this programme of Professors who are trying to, search, to get indigenous knowledge that is in our country, our community, and I also showed the booklets, all the books that are came from the conference, because they are containing new information and, although the information is there in the syllabus, but the information is there extended, it's more expanded, so if maybe we are treating that chapter, any teacher who is teaching that particular topic is free to make more access to that information. Ja, I'm using the documents. As a supplement to our books here at school.

THE FUNDISA BOOKLETS? THE INDIGENOUS?

Ja, the Fundisa, books, ja.

THE INDIGENOUS KNOWLEDGE BOOK, YOU'RE USING THAT ONE AS WELL?

Ja, especially the biomes side. [THE BIOMES]. Even the biodiversity. There is a lot of information, that is contained by the book.

OK, ARE YOU PART OF ANY OTHER PROFESSIONAL LEARNING COMMUNITY? LIKE A 'CLUSTER', OR ANYTHING OF THAT SORT, THAT'S RUN THROUGH THE DEPARTMENT OF EDUCATION OR ANYTHING?'

Ja we, ja I'm part of SATU [SATU, OK]

OK, AND YOU DO TRAINING WITH SATU THEN?

Ja, they do train us, sometimes. But the training we did it was two years back, we got a university certificate. (58:33) Under each circuit we have a cluster, or, each circuit we have a cluster leader who's usually after a semester we gather to check our work.

AND THAT'S FOR LIFE SCIENCES IN GENERAL [Ja, for Life Sciences], NOT FOR ENVIRONMENTAL BUT FOR?

Not for environmental, but for under Life Sciences.

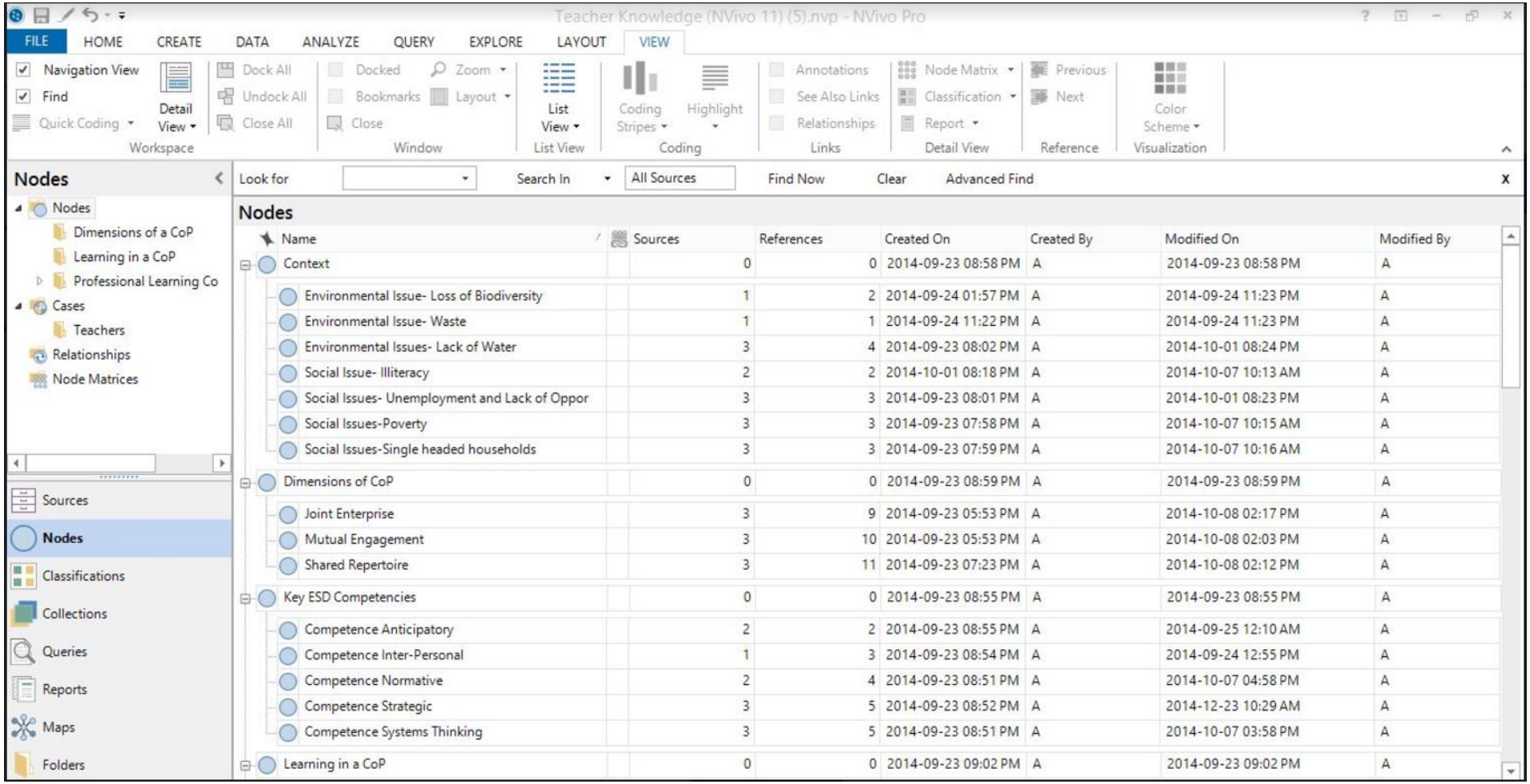
SO THE LAST QUESTION IS THERE ANY OTHER COMMENTS YOU'D LIKE TO MAKE ABOUT HOW ECO-SCHOOLS, OR FUNDISA FOR CHANGE IS HELPING YOU WITH YOUR KNOWLEDGE?

Ja, so far, what I've gained from the workshop, under Fundisa for Change, and also the Eco-School, under the tutorship of Liz, I've gained a lot. How to plan [HOW TO PLAN?] Ja, how to plan a lesson under Environment Studies, so ja, ok.

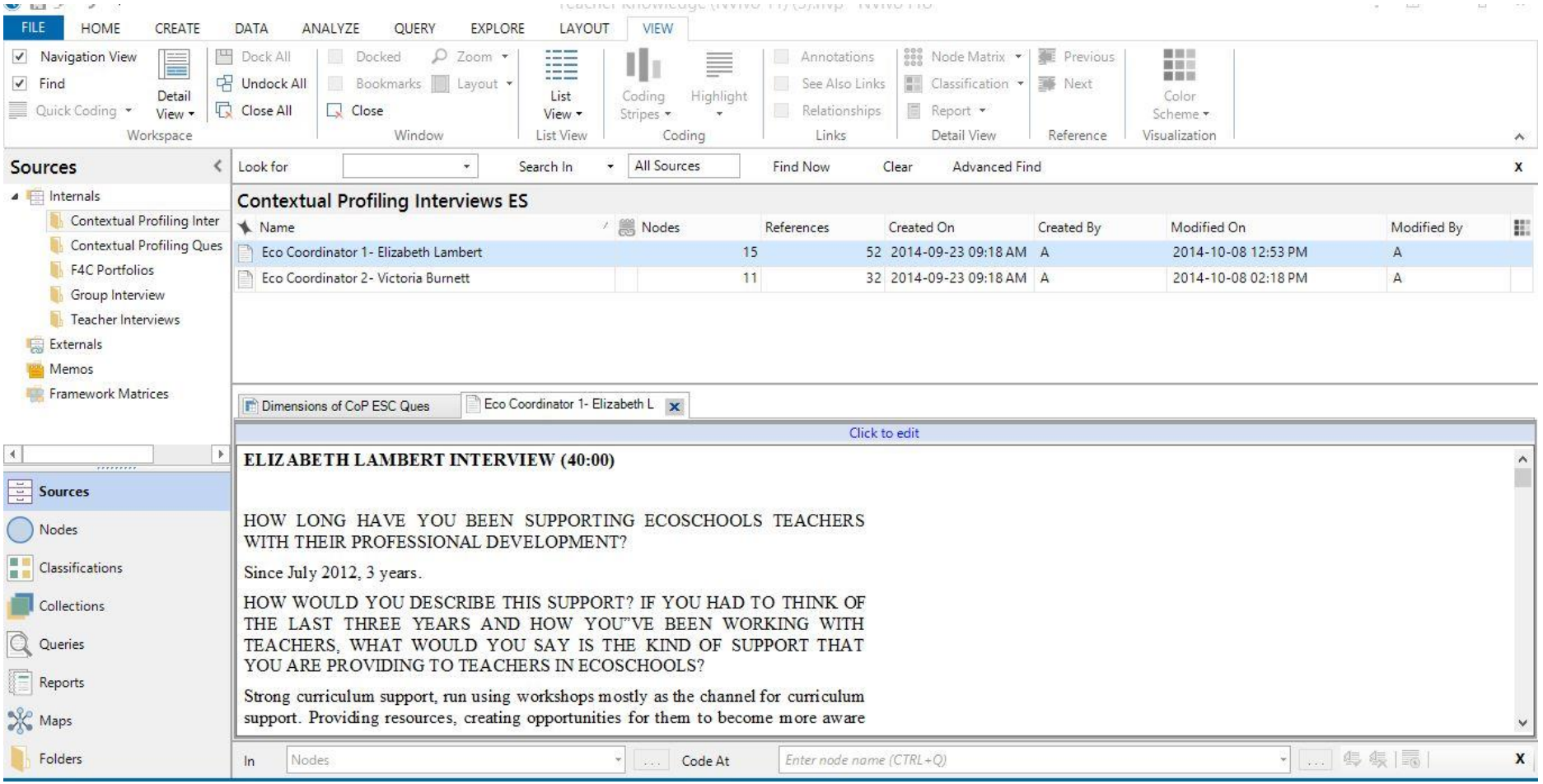
RIGHT, THANKYOU SO MUCH! THANKS FOR TAKING THE TIME I REALLY APPRECIATE IT, ON A MONDAY, KEEPING YOU LATE AT SCHOOL.

(Laughs) no problem.

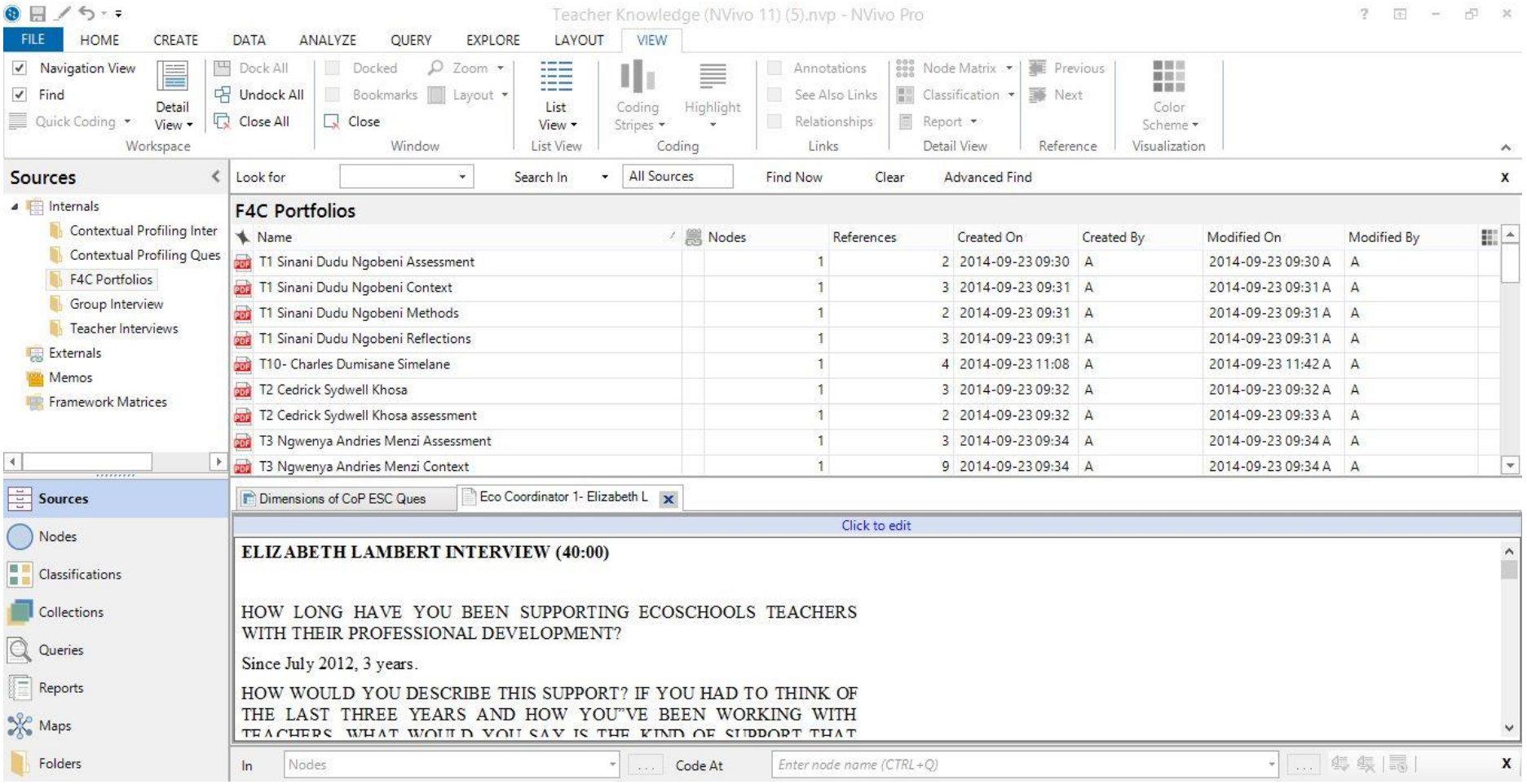
APPENDIX 5: SCREENSHOT OF NVIVO CODING CATEGORIES (NODES)



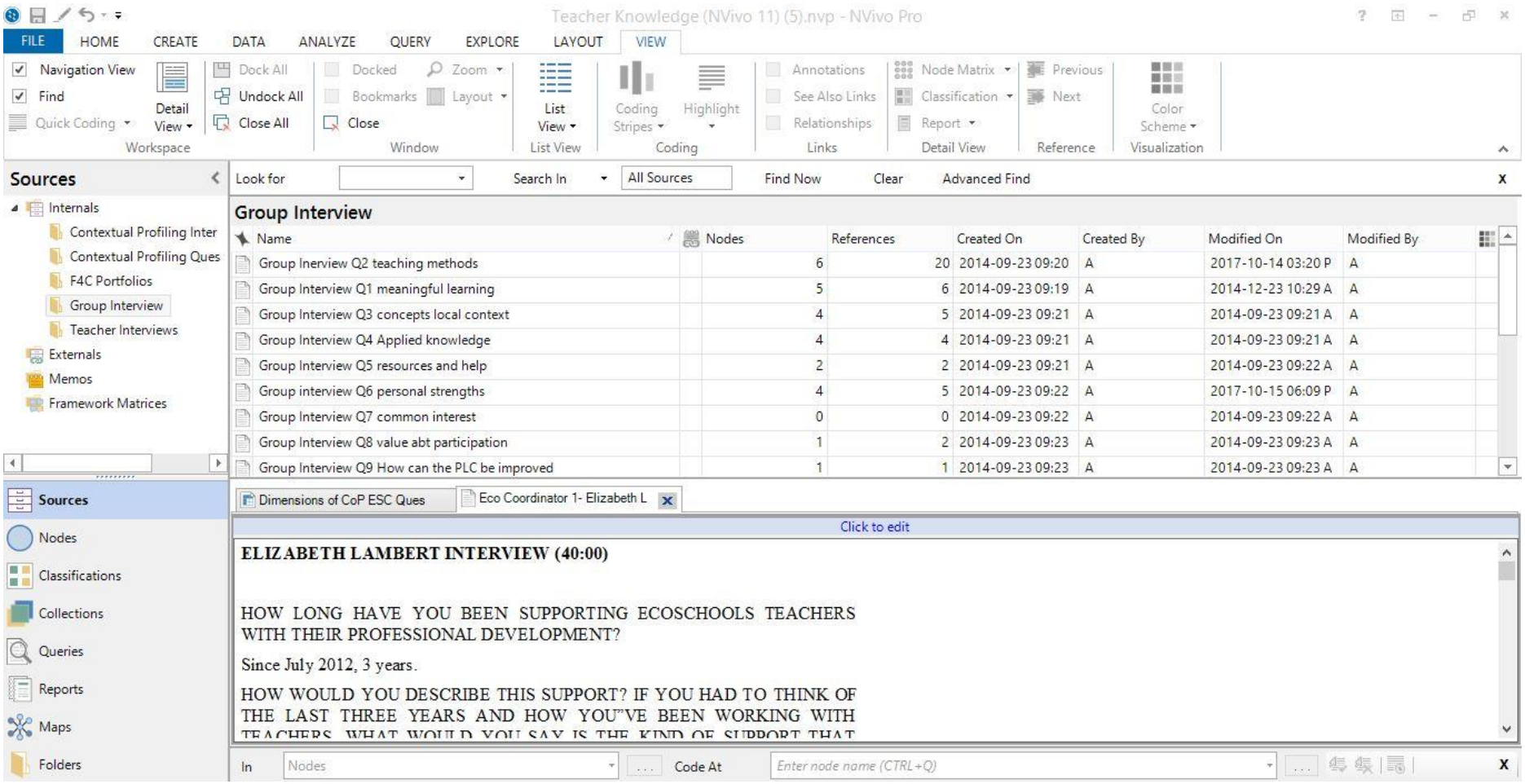
APPENDIX 6: SCREENSHOT OF SOURCES AND REFERENCES_INT 1



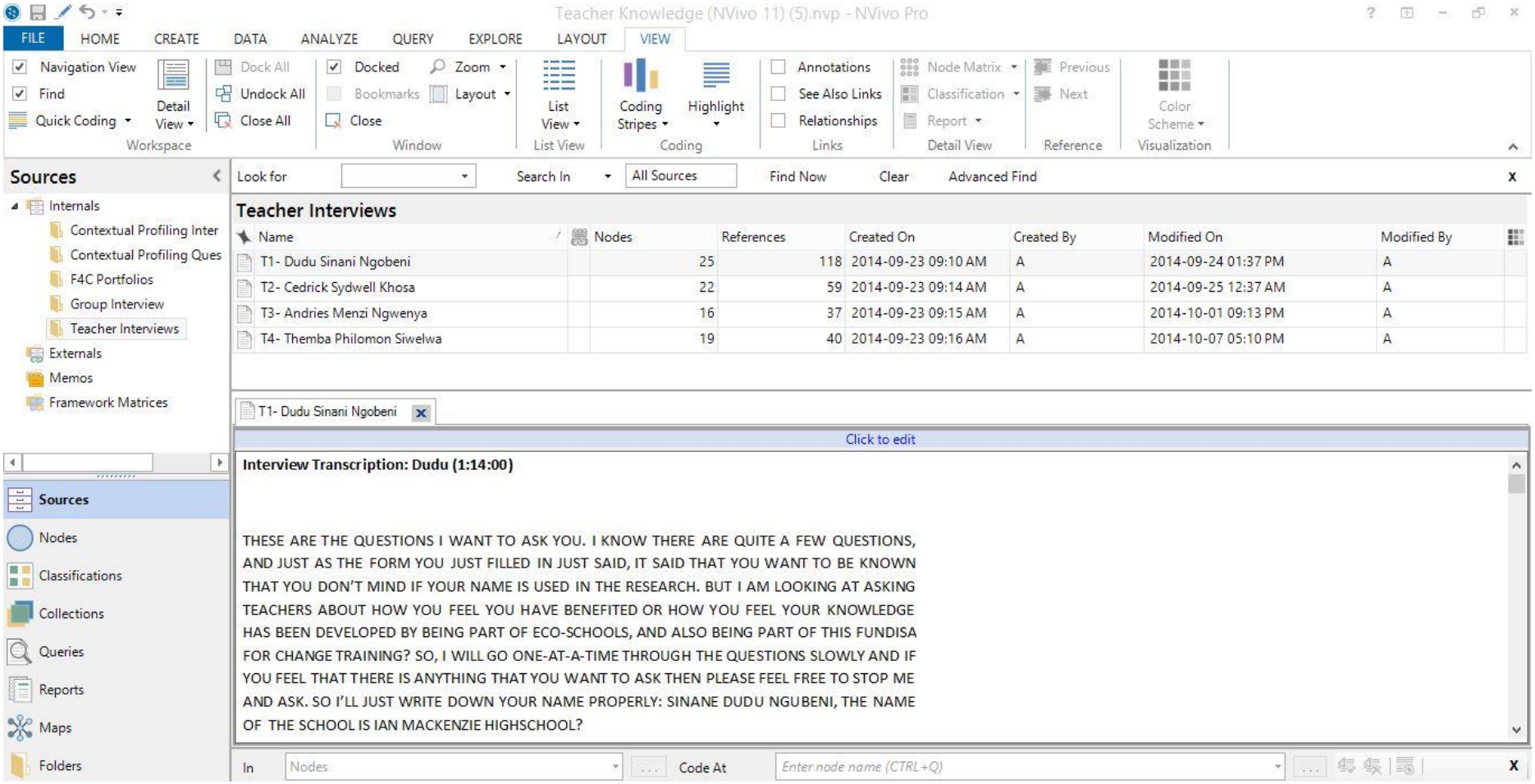
APPENDIX 7: SCREENSHOT OF SOURCE: FUNDISA FOR CHANGE PORTFOLIOS



APPENDIX 8: SCREENSHOT OF SOURCE: GROUP INTERVIEW



APPENDIX 9: SCREENSHOT OF SOURCE: TEACHER INTERVIEWS



APPLICATION TO CONDUCT RESEARCH STUDY: MS. A. KHAN

education
DEPARTMENT: EDUCATION
MPUMALANGA PROVINCE

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Litiko leTemfundvo Umnyango weFundo Departement van Onderwys Umnyango wezeMfundo
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HOWICK
3290

RE: APPLICATION TO CONDUCT RESEARCH: MS. A. KHAN

Your application to conduct research was received. The title of your study reads: "Teachers perspective on the Development of Teacher Knowledge and Competencies for Sustainability in an emergent Professional Learning Community (PLC): a developmental evaluation of a professional development community of practice in the Eco-Schools programme." The aims and the objectives and the overall design of your study reveal that your study will benefit the department and in particular the teacher development section. Your request is approved subject to you observing the provisions of the departmental research manual which is attached. You are also requested to adhere to your University's research ethics as spelt out in your research ethics document.

In terms of the attached manual (2.2. bullet number 4 & 6) data or any research activity can only be conducted after school hours as per appointment. You are also requested to share your findings with the relevant sections of the department so that we may consider implementing your findings if that will be in the best interest of the department.

For more information kindly liaise with the department's research unit @ 013 766 5476 or a.baloyi@education.mpu.gov.za.

The department wishes you well in this important project and pledges to give you the necessary support you may need.

MPUMALANGA
A Pioneering Spirit

Sisonke Sifundzisa Sive

Dear Teacher,

You were selected to participate in the Fundisa for Change initiative because of your school being part of the Eco-School's programme. As part of the developmental evaluation of the Eco-School's programme we would like to explore your perspective on how participation in Eco-Schools and professional development activities such as Fundisa for Change training is helping you professionally.

With your permission, I (Anisa Khan) would like to use your input for research purposes as part of my Masters in Education (Environmental Education) study through Rhodes University. Your input will help me and the Eco-Schools team to better understand what a teacher values in the support provided by Eco-Schools and how we can improve this where possible. Your names will not be published in my thesis if you do not wish so. Please indicate if you are willing to be quoted or if you would prefer to be anonymous.

[X] I agree to participating in this research and am willing to have my input quoted and my identity known

[ ] I agree to participating in this research but would prefer to be anonymous

[ ] I do not wish to participate in this research

Signed:

SNgobeni

Name of Teacher:

SINAMI SUDU NGOBENI

Name of School:

IAN MACKENZIE HIGH

Date:

02 - 06 - 2014