

# **Towards sustainable futures: exploring ecological learning in Early Childhood Development (ECD)**

by

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## DECLARATION

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and that I have not previously in its entirety or in part submitted it to any university for a degree.

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## ABSTRACT

The end of the 20<sup>st</sup> and beginning of the 21<sup>st</sup> century is characterised by a multiplicity of ecological complexities and alterations that are impacting both nature and humankind negatively. Such ecological problems are an indicator of unsustainable living by humans in societies, with inadequate natural resources management. These ecological intricacies are exacerbated by the increasing disinterestedness and detachment of children from the marvels of the natural world resulting in the creation of generations of ecologically unconscious citizens and imbalanced ecosystems. It seems apparent that in this ecological crisis, it is the poor and, in particular, the younger generations that are most affected. In this context; how can the manifest and evolving ecological crisis be reversed? This study is an inquiry into the usefulness of ecological learning in ECD, towards developing conscious future citizens who promote sustainable and ecological balance on the earth. The core objective is to understand current trends, scope, content and methodologies involved in ecological learning and how they may assist in preparing a pro-ecological generation. The study employs a literature review methodology to explore the concept of ecological learning in ECD; examining the application of this paradigm to the sector of ECD through an exploration of the practice of ecological learning in 2 case studies of ECD centres (the Lynedoch EcoVillage and Campus Kindergarten) that place ecological learning at the core of their practice. Using a review of literature on ecological learning and ECD and the two case studies, the study attempts to demonstrate ecological learning practices in ECD centres. The teaching and learning practices in such centres project ECD to be the primary stage whereby ultimate growth, development and learning are created and therefore a vital platform for mentoring an ecologically mindful generation of citizens. However, on the other hand, the study also observes that the scale at which ecological learning is taking place around the world is too negligible to have a large impact in producing a generation of ecologically informed citizens. The study, then, recommends a paradigm shift in the content and methodologies that prioritise ecological learning in ECD both as a way of preserving the ecology and promoting sustainable development. The study therefore suggests, (1) Underpinning ECD with transdisciplinary ecological learning within local contexts (2) Linking ecological learning to ECD may contribute to 'just transitions', and (3) Attending to the growing need of new ways of being that can generate connectedness and belonging in a post-consumerist society seem best inculcated at early ages.

## OPSOMMING

Die einde van die 20<sup>ste</sup>, en begin van die 21<sup>ste</sup> eeu word gekenmerk deur 'n magdom ekologiese kompleksiteite en veranderinge wat die natuur en die mensdom (meestal) negatief raak. Hierdie ekologiese probleme dui op onvolhoubare samelewings en natuurlike hulpbronn-bestuur. Die ekologiese uitdagings word vererger deur kinders se toenemende onverskilligheid en afsydigheid teenoor die wonders van die natuurlike wêreld, wat generasies van ekologies onbewuste burgers, sowel as 'n ongebalanseerde ekosisteem tot gevolg het. Dit is voorts duidelik dat die huidige ekologiese krisis, laer inkomste groepe en die jonger generasie die ergste raak. Teen hierdie agtergrond, moet ons onself afvra, hoe die onmiskenbare en ontvouende ekologiese krisis omgekeer kan word? In hierdie studie word daar ondersoek ingestel na die doeltreffendheid van ekologie in die vroeë kindontwikkelings- (VKO) stadium, om burgers op te lewer wat volhoubare en ekologiese ewewig bevorder. Die kernmerk is om die huidige tendense in die bestek en inhoud van, metodologieë vir ekologiese leer te verstaan; sowel as hoe dit 'n pro-ekologiese generasie help toerus. Daar word gebruik gemaak van 'n literatuuroorsig, ten einde die konsep van ekologiese-leer in VKO te ondersoek. Die praktiese toepassing daarvan in twee VKO-sentrums, naamlik die Lynedoch-ekodorp en Campus Kindergarten (CK), wat albei ekologiese leer as 'n kernaktiwiteit beskou, ondersoek. Aan die hand van die kritiese literatuuroorsig sowel as die twee gevallestudies, poog hierdie navorsing, om te toon dat VKO-sentrums toenemend ekologiese praktyke erken. Die onderrig- en leerpraktyke in sulke sentrums beskou VKO as die primêre stadium wat uiteindelijke groei, ontwikkeling en leer bepaal, en dus is dit 'n uiters belangrike platform om 'n ekologies-bewuste generasie van mentorskap te voorsien. Aan die ander kant is daar ook gevind dat die skaal waarop ekologiese leer wêreldwyd plaasvind, te klein is om enige beduidende impak te hê op die skeep van 'n generasie wat ingelig is oor ekologie. Daarom word daar aanbeveel dat daar 'n paradigmaverskuiwing in inhoud en metodologieë moet plaasvind om ekologiese leer in VKO te prioritiseer as 'n manier om die ekologie te bewaar sowel as volhoubare ontwikkeling te bevorder. Die studie dui op die volgende; (1) geïntegreerde leer, tesame met konsekwentheid in die aanbieding van onderwerpe, en die fasilitering van VKO-onderwyseropleiding en-diens; (2) die skakel tussen ekologiese opvoeding en die bydrae wat dit tot VKO lewer; (3) om nuwe maniere te vind, waarmee daar 'n skakel gevestig, en 'n verband getrek kan word, in 'n post-verbruikers sameleving.

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## LIST OF ACRONYMS AND ABBREVIATIONS

CC	Climate Change
CK	Campus Kindergarten
DAL	Developmentally Appropriate Learning
DESD	Decade of Education for Sustainable development
ECD	Early Childhood Development
ECE	Early Childhood Education
EE	Environmental Education
EFA	Education for ALL
EfS	Education for Sustainability
EYFS	Early Years Foundation Stage
FAS	Fatal Alcohol Syndrome
GEN	Global EcoVillage Network
IAASTD	International Assessment of Agricultural and Technology for Development
IISD	International Institute for Sustainable Development
IMS	International Montessori Society
IK	Indigenous Knowledge
IPCC	Inter-Governmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
LDC	Lynedoch Development Company
MDGs	Millennium Development Goals
MEA	Millennium Economic Assessment
NACC	Nature Action Collaborative for Children
NAEYC	National Association for the Education of Young Children
NCAC	National Childcare Accreditation Council
NGOs	Non-Governmental Organizations
OECD	Organization for Economic Cooperation and Development
OAS	Organization of American States
PECC	Place-based Education Evaluation Collaborative
PRI	Permaculture Research Institute
UN	United Nations
UNAIDS	Joint United Nations Program on HIV/AIDS
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNEP	United Nations Environment Programme
UNLD	United Nations Literacy Decade

UNICEF	United Nations Children's Fund
US	University of Stellenbosch
SA	South Africa
SD	Sustainable Development
SI	Sustainability Institute
SOPMP	School of Public Management and Planning
SPP	Sustainability Planet Project
WB	World Bank
WCED	World Commission on Environment and Development
WHO	World Health Organization
WWF	World Wildlife Fund for Nature

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## CHAPTER 1: INTRODUCTION

### 1.1 BACKGROUND INFORMATION

The end of the 20<sup>th</sup> and beginning of the 21<sup>st</sup> century is characterised by a chain of ecological complexities and transformations that are impacting on nature and humanity (Capra, 1998; Davis, 1998; Blatchford, 2009; Segovia, 2010; Brown, 2011; Swilling & Annecke, 2012; International Institute for Sustainable Development (IISD), 2012; Manteaw, 2012; Bickford *et al*, 2012; Constanza & Kubiszewsk, 2012; Schalteger, 2012). Such ecological problems involve the extinction of animal and plant species, loss of forest cover, habitats, top soil, aquifers and fisheries, climate change (CC)-(global warming, ozone depletion and droughts) and peak oil (MEA, 2005; IPCC, 2007; UN, 2006; IAASTD, 2008; Blatchford, 2009; Lockhart, 2011; Brown, 2011; Swilling & Annecke, 2012; Manteaw, 2012). In this ecological crisis which reflects the prevailing state of unsustainable societies and natural resources management (Jucker, 2002; Gaziulosoy & Boyle, 2012), it seems clear that it is children who will be mostly affected by the unsustainable ecological actions or policies (Davis, 1998; Baltchford, 2009; Spies, 2010; Lockhart, 2011; Satori, 2012; Fiksel, 2012; Manteaw, 2012). Part of the blame is put on existing development models that prioritise economic growth while neglecting ecological and social impacts (Davis, 1998; Morin, 1999; Harding, 2006; Segovia, 2010; Lockhart, 2011; Swilling & Annecke, 2012; Manteaw, 2012). Part of the cause of the ecological crisis is placed on the dearth of sufficient ecological awareness and the failure of education to capacitate children to think about sustainable futures (Orr, 2004; Segovia, 2010; Manteaw, 2012) which, I will argue, can be traced back to inadequate child-centred ecological learning. The growing disengagement of children from the natural world is creating a generation of children with ecologically unconscious mindsets (Louv, 2005; 2008; Charles, 2009; Charles & Louv, 2009; Segovia, 2010; Lockhart, 2011; Stevenson, 2011, Satori, 2012).

One of our greatest tasks is therefore to generate sustainable living, societies and futures that can meet the needs of the current generation without diminishing that of the next generations (WECD, 1987; Pezzoli, 1997; Hattingh, 2001; Segovia, 2010; Manteaw, 2012; Swilling & Annecke, 2006; 2012; IISD, 2012). Yet the generally held view is that one of the most effectual way to address the prevailing and future ecological challenges is through education (Hattingh, 2001; Tilbury *et al*, 2002; Orr, 2004; UNESCO, 2005; 2008a, b & c; Sterling, 2008; Segovia, 2010; Manteaw, 2012; UNESCO, 2012; Swilling & Annecke, 2012), "... not a typical education but a new kind of global education specifically designed to meet these challenges" (Global EcoVillage Network (GEN), 2006: 2). Ecological learning (which resonates with the "UN Decade for Sustainable Development (DESD) (2005-2014") can be viewed as a potential

strategy to reverse the impact of prevailing unsustainable practices impacting negatively on the ecological system (Jucker, 2002; Blatchford, 2009; Segovia, 2010; UNESCO, 2012; Manteaw, 2012). The DESD assimilates the practices, values and doctrines of SD “into all aspects of education and learning” (Nsanzimana & Tushabe, 2010: 28; Semetsky, 2010: 36; Manteaw, 2012: 380). Sustainability education (principally ecological learning) seeks to build sustainable futures by generating impartial societies, ecological integrity, and economically viable communities (Sterling, 2001; 2008; Segovia, 2010; Manteaw, 2012; Swilling & Annecke, 2012; UNESCO, 2012).

Ecological learning entrenched within the context of Sustainable Development (SD) and Education for Sustainability (EfS) is one form of education that can possibly allow humanity to perceive the earth in novel ways in efforts to move from the prevailing unsustainable and disparaging mode of thinking and living (Capra, 1996; UNESCO, 2008a; Sterling, 2008; Segovia, 2010; Semetsky, 2010; UNESCO, 2012). Ecological learning seeks to uphold SD in young children in ways that promote the values, attitudes, skills and knowledge that make sustainable futures possible (Segovia, 2010; UNESCO, 2012; Bickford *et al*, 2012). Ecological learning cultivates young children to have a “sense of awesomeness”, respect and attachment to “the web of life” (Capra, 1996; Segovia, 2010; Semetsky, 2010). In this way, ecological learning in ECD fosters young children’s competences in imagining the future, critical thinking and collaborative decision making. It is therefore necessary for children to be equipped with the imperative experience, skills, values and attitudes that form the foundation for future positive results whilst dealing with ecological problems (Davis, 1998; 2009 & 2010; UNESCO, 2008a; Davis *et al*, 2009; Segovia, 2010; Manteaw, 2012; UNESCO, 2012; Birkford, 2012).

In this study, Early Childhood Development (ECD) is viewed as the initial stage whereby lifelong growth, development and learning are created (McCain, Mustard & Shanker, 2007; UNESCO, 2008a; Davis, 2009; Davis & Elliot, 2009; Sutton, 2009; Canter & Brumer, 2012). This supports the argument that ECD is an indispensable platform for grooming an ecologically conscious generation of citizens. ‘Catching the children young’ with the message of sustainable ecologies increases their chances of understanding the existing and future crisis and consequently to physically and mentally grow with a positive attitude to ecological issues (Davis, 1998; Davis, 2010).

In this context, this study seeks to explore the meaning of ecological learning (Chapter 2) and connect the paradigm to the ECD field (Chapter 3) through a literature review. The study will also explore the prevailing practice of ecological learning through primary and secondary literature review of two model case studies (Lynedoch Crèche-South Africa and Campus

Kindergarten (CK)-Australia) that promote ecological attitudes and sustainability as fundamental elements of their structure and curriculum (Chapter 4). In exploring these models of “success stories”, this study culls from the respective institutions’ strategies and philosophies, some of the most critical dimensions of successful ECD learning for a sustainable ecological system with a view to promote them (or even fine-tune them further) for future adoption and use.

## **1.2 PROBLEM STATEMENT, OBJECTIVES AND RESEARCH QUESTIONS**

### **1.2.1 Problem statement**

As revealed above, there are rising global challenges caused by ecological challenges. I will argue that such ecological problems are a consequence of inadequate ecological awareness caused by (among other factors) the increasing detachment of people (especially children) from the natural world and an underestimation of the role that ecological learning in children can play in promoting sustainable futures. The imperativeness of ecological learning (specifically in ECD) in nurturing ecological sensitivity and a sustainability culture in children demands a constant appraisal in relation to the state of prevailing ECD education focused on the conscientisation of growing minds to ecological issues. Imperative in this process is a constant critique of the usefulness of current modes/models of ecological learning in preparing minds for sustainable futures.

This study is an inquiry into the usefulness of ecological learning in ECD, towards developing conscious future citizens who promote sustainable and ecological balance on the earth.

The major objective is to understand current trends, scope, content and methodologies involved in ecological learning in ECD, and how they help prepare a pro-ecological generation.

My approach is to do this through:

- Building a paradigm of ecological learning through its exploration in a literature review, including four examples;
- Examining the application of the ecological learning paradigm to the ECD sector;
- Examining the practice of ecological learning through 2 case studies; and
- Concluding remarks and suggested areas to be taken into account in building a new strategy.

### **1.2.2 Research questions**

I will do the above in my attempt to answer 4 questions:

1. What is ecological learning?
2. How is the ecological learning paradigm applied to the ECD sector?
3. What are the major highlights/practice of ecological learning in ECD, strengths and weaknesses?
4. What are the concluding remarks to the practice of ecological learning and what areas should be taken into account in building the new strategy?

### **1.3 LIMITATIONS AND ASSUMPTIONS OF THE STUDY**

The study relies heavily on literature review and therefore assumes that the necessary documents and sources of information are already gathered and ready for critical reading and analysis. The study also assumes that information obtained from official documents is correct. This implies that second (rather than first) hand information is reviewed and analysed in most cases. However, the study acknowledges the possibility of some biases and incorrect information that may be obtained in the documented official articles and shall utilise possible ways of verification. However, the study does not dispense or discredit the use of primary data which is used for a specific case study – the Lynedoch EcoVillage (see Chapter 4). More so, the study relies on literature from case study models, thereby assuming that the information about the specific models is correct. However, this may not be necessarily true as some of the vital information may not be documented. The challenge with this approach is that information is limited to what has been documented and this may result in narrow perspectives and conclusions. Errors of omission in the analysed documents may result in compromised conclusions. However, the study makes a strenuous effort to verify all information used as the basis for conclusions. The study shall triangulate all the collected data. Triangulation refers to the incorporation of more than one approach in a particular study (Cheng, 2005: 72). A triangulation methodological approach was employed in analysing information gathered from interviews, observations and literature review to reach conclusions. The advantages of triangulation are that it enhances validity and credibility of qualitative studies (Cheng, 2005). Moreover, the number of case study models in Chapter 4 is also limited by constraints of space and time. This may also limit the range of insights that can be discerned from them as each of the case studies is explored in brief.

## 1.4 DEFINITION OF TERMS/CONCEPTS

**Ecological education** refers to educational approaches that seek to uphold the natural and physical, cultural and social environments (Hautecoeur, 2002).

**Environmental education** denotes to programs and curriculums that seek to educate humanity about the nature and how the system in it functions (Davis, 1998).

**Ecological learning** is a form of education seeks to uphold the exploration and relationships with nature that connects all life activities by endorsing SD and its principles in manners that promotes attitudes, skills and knowledge, that authorise children to have a sense of wonder, proficiency in imaginations, critical thinking and cooperativeness in decision making that builds suitable futures (Segovia, 2010; Manteaw, 2012; Center for Ecoliteracy, 2012a; UNESCO, 2012).

**Early Childhood Development (ECD)** is widely understood as a “process of emotional, mental, spiritual, moral, physical and social development of children from birth to nine years” (Department of Social Development, 2005: 5). However, for the purpose of this study I will focus on the 0-6 year age range.

**Childhood Development** is defined as the psychological or biological transformation from birth to the age of adolescence. At this stage, the child grasps the complexity of thinking, moving, feeling and interaction with surrounding objects and people (Department of Social Development, 2005).

**Early Childhood Education (ECE)** involves encounters or activities that are meant to develop effective changes before enrolment into formal schooling.

**Sustainable Development (SD)** is “...development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development (WCED), 1987:43).

**Education for Sustainable Development (EfS)** is an enduring learning process that aspires to incorporate the values and principles of SD into all learning aspects by giving everyone the chance to have the knowledge, skills and competence that promotes an ecologically, socially and economically equitable society (Segovia, 2010; Manteaw, 2012; UNESCO, 2012).

## 1.5 MOTIVATION AND SIGNIFICANCE OF THE STUDY

### 1.5.1 Motivation

The Introduction to Sustainable Development module delivered at the Sustainability Institute in February 2010 stirred my interest in ecological and sustainability issues. Professor Mark Swilling who heads the Sustainable Development Programme presented a topic on global challenges which awakened me to the realisation that while the world is in crisis; the message and information of sustainability change needs to be spread widely to strategic population groups which include children. I realised (as this study contends) that children will bear the consequences of today's action or inaction and as such a culture of sustainability or change should be oriented towards them. Shortcomings in sustainability education; for instance in Africa, is basically caused by "...inaction and non-commitment ..." as well as deficiency in concrete policies and actions (Manteaw, 2012: 3). My choice of the area of study is therefore strongly supported by Davis (2007: 3) who says that "unless we change our ways—and soon—our children and future generations will inherit a sadly depleted earth and their own contributions will exacerbate the problem". This implies that children (and therefore ECD) are indispensable in efforts or strategies of reversing the current environmental problems.

I view children as the most vulnerable social group to future ecologically-induced global problems and therefore the most suitable target group to impart sustainable ecological knowledge. I am also motivated by the time I spend at the Lynedoch EcoVillage during my studies in the B/Phil in Sustainable Development Planning and Management. It was the period when I took interest in the Lynedoch ECD centre which led to my admiration of the Montessori system of learning, particularly the ecological aspects of it. I became interested in carrying out research that would involve ECD and children in ecological and SD issues. I realised that young children could be the entry point in dealing with ecological issues facing the future.

I observed that besides what their teachers and curriculum prepares for their activities; children's own actions, initiations and ideas can offer alternative approaches to ecological education. During that time I noticed that children have the ability and are more excited to participate and engage in ecological or community issues. They are generally interested and curious to engage themselves in ecological activities and I realised that this psychological trait informed by their young age can be exploited, be strengthened and developed into a culture of ecological mindfulness. I also thought of contributing to my country (Zimbabwe) and Africa where tackling ecological challenges appears not to be as urgent as socio-economic matters.

In addition to the above, I was requested by the Sustainability Institute (SI) to provide a background study to their consideration of a strategy that would enhance ecological learning in the SI and all its related transformative learning work, in particular within the Lynedoch Crèche (owned and managed by the SI), Learning for Sustainability Further Education and Training College responsible for ECD. This, however, does not mean going into detail of the strategy, but to seek to articulate core philosophical ways of seeing that may underpin their unfolding strategy. To this end, my research is to be used to back up any further decisions in this regard, and I will present this to the SI Leadership Team at the end of November, 2012.

### **1.5.2 Significance of the study**

The improvement of ecological learning approaches for children in ECD (being the custodians of the future) will help to provide answers to the current sustainability crisis facing the globe. The study is poised to highlight the state of child-centred ecological learning for sustainability for further refinements to current models, content and methodologies towards boosting effectiveness. The results or information gathered in this research will therefore contribute in improving programmes, policies, teaching guidelines and methodologies in ecological learning in ECD thereby improving ecological and sustainability awareness. Moreover, I would also like to make my learning in this area be available and be used more widely in my home country (Zimbabwe) as I feel this could be significantly relevant considering the fact that the country has faced climate change-induced droughts which can be traced to the destabilisation of the ecological system as well as growing youthful population separated from traditional values and alienated from indigenous knowledge. As mentioned above, my research will have an immediate possibility for impact within the SI and Lynedoch EcoVillage through the work with the Lynedoch crèche, and Learning for Sustainability FET College.

## **1.6 RESEARCH DESIGN AND METHODOLOGY**

The section highlights the methods/techniques and procedures of information gathering employed in the study. The section is divided into two sections; the research design and the methodology. The selected research design aims at sufficiently answering the formulated research questions. The methodology delineates and validates clearly the research assumptions and their practicality (Robson, 2011). Clough & Nutbrown (2002: 34), add that a research methodology assists the investigator "... to locate the claims which the research makes within the traditions of enquiry which use it." The research methodology concentrates on the research procedures and the type of tools that are incorporated. As such, details, justification, pros and cons of each approach are provided below. "Equally, it is our task, as

researchers, to identify our research tools and our rationale for their selection” (Mouton, 2001: 56). The research mostly employs qualitative approaches that include a narrative and evaluation (Mouton, 2001: 161). The major research method in this study is literature review. However, other relevant research methods including, interviews and participant observation are used to complement literature review to achieve the goals of the study.

### **1.6.1 Research design**

Theron & Saunders (2009) argue that literature reviews familiarise with the field under study and helps the researcher to develop the core argument. The literature review identifies the important literature in relation to the subject topic. Literature review is best referred to as a “process of knowledge acquisition” (Bless *et al*, 2006: 19-27 in Theron & Saunders, 2009: 179). Literature review as a research method is mainly used in the study’s engagement with the following issues: the concept of ecological learning (Chapter 2), the application of ecological learning (including four pedagogical examples of ecological learning) to the ECD (Chapter 3) and model case studies (in Chapter 4).

However, in one of the case studies (the Lynedoch EcoVillage), interviews and participatory observation will complement information and conclusions gathered through a literature review of documents about the EcoVillage. This is because the EcoVillage is physically easily accessible to the researcher. The information gathered through this practical research will be combined with the information gathered from literature from Campus Kindergarten case study in order to come up with recommendations and conclusions. Due to the language barrier in accessing data in Portuguese for Brazilian case studies (where ECD ecological learning is widely practised) this study, the Campus Kindergarten case study is selected as the second case study that shows exemplary ECD ecological learning and sustainability practices.

### **1.6.2 Methodology: A qualitative approach**

Qualitative methods are considered as a data collection and analysis tool. This section defines and explains the qualitative methodological approach focusing on literature review - types, benefits and challenges.

Qualitative methods are “concerned with collecting and analysing information in as many formats, chiefly non-numeric, as possible” (Blaxter *et al*, 1996: 60). They increase the researcher’s knowledge on sensitive, difficult procedures and impacts, their justification and the practicality of recommendations (Mayoux, n.d). The qualitative methods used for this study

involves my review of literature which is backed up by two case studies. One of the case studies – the Lynedoch EcoVillage – focuses on a local ECD child-centred ecological learning institute. This enables the researcher to relate the different dimensions provided in the theory of ecological learning and ECD to specific and practical contexts for instance, how the EcoVillage is promoting sustainability through ecological learning as well as the strengths and weaknesses of their ECD model/practices. The role of the researcher will be to “design, research and analyze issues” (Mayoux, n.d: 4).

Much will be gained in terms of document and literature analysis-that is, why certain issues are happening within specific contexts, children’s aspirations, and the complexity of interactions, institutional structures, interventions and strategies from a grassroots level (Petty *et al*, 2012: 378). This can increase the researcher’s knowledge in framing recommendations or suggestions of the findings. As Coldwell & Herbst (2004) assert, qualitative methods can produce accurate results of issues that are complex, facilitated by the continuous interaction with the participants. However, the process can be cumbersome making it difficult to focus and reconcile the differences.

The section has shown that a qualitative approach is used as a data collection and analysis method. An understanding of what is meant by qualitative methods was given, together with the benefits and challenges. The following section offers a detailed explanation of literature review, interviews and participant observations.

### **1.6.3 Research instruments**

The section details the research instruments that are employed in the study. Mouton (2001: 115) defines a research instrument as “pretty much anything that you use to get to the data that you’re going to analyse”. An outline of literature reviews, interviews and participant observation is given as well as their efficacy for this study and the expected outcomes each method can bring.

#### **1.6.3.1 Literature review**

Literature reviews are an inspection of the research that has been carried out prior to the study. According to Hart (1998: 13) literature reviews is a selection of existing documents (unpublished and published) on the subject/ topic that contain evidence, data, ideas and information. The selection is presented in an argumentative manner, expressing ideas and fulfilling stated aims on the subject under investigation. Literature review “provides an overview

of a scholarship in a certain discipline through an analysis of trends and debates” (Mouton, 2001: 179).

In this study, inductive reasoning is used, that is, a critical analysis of literature on ecological learning, ECD and two case studies of ecological learning in ECD institutions in South Africa and Australia in order to understand current trends in ecological learning in ECD. Such an understanding reveals the efficacy (or inefficacy) of using ECD as an interventionist strategy to shape sustainable futures.

A number of sources were consulted in developing the topic and core argument. These include abstracts, databases, websites, books and journal articles. The gathering of the literature is informed by the research objectives outlined above. In my review, I particularly focus on the literature that highlight the meaning of (and debates about) ecological learning, ECD and emerging trends in ECD that relate to ecological learning. More so, as for the literature about the two case studies, particular emphasis was placed on literature that details the origins of the institutions, their major policies, philosophies, teaching and learning strategies.

The pointers and hints obtained from a critical review of literature and the conclusion thereof are used to come up with recommendations on how best to improve ecological learning strategies in ECD. Moreover, suggestions on issues pertaining to ECD curriculum, improvements, and paradigm changes in ECD teaching and learning methods are made.

In this study, the benefits of a literature review approach may be summed up as following:

- It builds on the theoretical aspects of the study.
- It saves time and avoids replication of preceding researches.
- It acquaints the researcher with the newest developments in the field under study and correlated areas so as to present a “holistic picture” of the research realities.
- It endows the thesis a special value [as] prior findings and suggestions [underpin the current research’s thesis argument] (Mouton, 2001: 86).

There are a number of types of literatures reviews. Kelly (2010) in her article “Types of Literature Review Methodology” cites Petticrew & Robberts (2006) who says that there are six main types of literature reviews. These are narrative, conceptual, traditional, critical, ‘state of the art’ and systematic reviews. This research adopts a systematic literature review for the reasons given below.

In 2009 Pippa Hemingway wrote an incisive article titled “What is a systematic review?” In this article, Hemingway provides an understanding of systematic literature reviews as a research methodology. Hemingway states that systematic reviews are increasingly being used and have taken the position of narrative and traditional reviews. According to Hemingway (2009: 1), systematic reviews select vital unpublished and published data, identify reports and studies to be involved, evaluate the quality of each report or study, formulate research questions, synthesise the results of reports or study in an unprejudiced manner, present and interpret the summaries of the results whilst taking account of errors or imperfections of the evidences (Hemingway, 2009: 1).

For Hemingway (2009: 1), “systematic reviews attempt to bring the same level of rigour to reviewing research evidence as should be used in producing that research evidence in the first place”. He adds that it is mandatory for systematic reviews to be reviewed by peers so as to avoid replication. Imperfections in a systematic review are reduced because systematic reviews are more accurate in nature; they tackle formulated questions such as the ones clearly delineated in section 1.2.2 in this current study. There are a number of advantages that are associated with systematic reviews. The researcher can get well detailed and historical information in the field under study (Coldwell & Herbst, 2004; Petty et al, 2012). Systematic reviews are condensed, permitting readers to interpret results from large amounts of information (Coldwell & Herbst, 2004). Because systematic reviews are objective, there are reduced possibilities of error or bias (Coldwell & Herbst, 2004). The systematic search strategy makes the reviews more balanced as they include voluminous studies. One of the most important aspects of the systematic review is that they are verifiable; they involve transparent procedures on how the researcher has reached her conclusions. This permits reviewers to assess concerns of meaningfulness, feasibility and appropriateness (Hemingway, 2009). Systematic reviews are duplicable, flexible and can be updated frequently. One can identify fault areas and formulate new research questions. The way in which systematic reviews are presented makes them readable.

### **1.6.3.2 Interviews**

Interviews are used in this study as a supplementary research tool to gather vital information about the Lynedoch EcoVillage which is easily accessible to the researcher. The study employs interviews to obtain more information and to clarify certain issues arising from a literature review of documents about the Lynedoch EcoVillage. The research defines interviews as an official or formal face-to-face meeting between two people who are the interviewee and the interviewer (Coldwell & Herbst, 2004; Petty *et al*, 2012). According to

Theron & Saunders (2009: 180) people who are involved are experts and have the best experience in the field under study and therefore provide with first hand insider story/information. Theron & Saunders (2009) adds that interviews allow the researcher to gain knowledge from experts in the field by meeting with the interviewees on the 'known and unknowns'. In interviews information is gathered through interactive processes of listening and talking. The study adopted structured and semi-structured interviews in order to give room for further questions arising during conversations (Robson, 2011), and was aided by the use of a tape recorder (Petty *et al*, 2012). A common language (English) between the interviewer and interviewee was employed in developing a common ground. An interview protocol was followed using, proper channels by getting permission from authorities.

Interviews enabled me to get an in-depth detail of the subject under investigation and to fill in some of the data/information gaps created by the literature review process. The use of a tape recorder made it possible to assemble the relevant information and to archive it for references in data analysis. This study avoided common pitfalls of interviews such as raising open ended questions and guided questions which influence the interviewee's responses.

### **1.6.3.3 Participant observations**

This study employed participatory observation as a secondary research method to explore the practises of ecological learning at Lynedoch EcoVillage. Participatory research involves the researcher interacting with the community (Babbie & Mouton; 2001: 314-332; Petty *et al*, 2012: 380-381). Babbie & Mouton (2001) adds that participatory observation is a form of research that is associated with participatory learning and involves action of both parties. Participatory observation involves the forming of relationship between the observed and the researcher (Theron & Saunders, 2009; Petty *et al*, 2012). Its purpose is to boost the researcher's knowledge of the subject under examination. Participant observations may "gather accurate information about how the system operates, particularly with regard to process" (Coldwell & Herbst, 2004: 49), as the observed hold more knowledge than that of the researcher (Theron & Saunders, 2009). Observations "capture the unexpected, unusual or unsaid" (Mayoux, n.d: 9). Participant observations are very useful in that:

- 1) The researcher may be able to understand the context better.
- 2) Information can be cross-checked making it possible to discern differences between theory and practice.
- 3) The researcher can evaluate the participant's relationships for instance; race and ethnicity.

4) The researcher benefits from new insights whilst discovering information that may have not been revealed from texts.

5) Participant observation empowers the people being observed (in this study's case - teachers and children) in the research process (Mayoux, n.d).

The major challenge associated with participant observation is that it may be difficult to interpret behaviours and to categorise observations (Babbie, 1998). According to Petty *et al* (2012) there are chances that the observer may influence the behaviours of the observed or participants. To avoid this challenge, I did not interfere with the day to day activities of the children by keeping myself busy with other activities while covertly monitoring the learning processes.

Data was collected using the key informant and insider's perspective criterion. Respondents included the director of the Sustainability Institute and the Montessori ECD educators and trainers. The advantage of this criterion is that the information gathered from such sources was considerably reliable since it was from insiders who are involved in the EcoVillage's processes. The resource persons shed light on the practical processes involved in the EcoVillage's model of ecological learning – that is the curriculum, methodologies, content and practises.

#### **1.6.4 Content analysis**

Content analysis is a technique that is used to make conclusions in a comparative and objective manner by focusing on particular features of messages (Petty *et al*, 2012). It involves mostly the study of content of texts or documents. Content analysis techniques are not constrained to textual analysis but may be applied to other fields. Mouton (2001: 166) states that in content analysis, the examination of documents and texts is done in a non-reactive manner, reducing the possibility of errors that result from the researcher and subjects. According to (Stemler, 2001) content analysis allows the drawing up of conclusions from different data collection methods. Data from literature reviews, interviews, and observations are combined and analysed together. The use and valuation of different techniques and actions makes it possible for the researcher to suggest recommendations (Webber, 1990:9).

There are however some limitations that are associated with content analysis. The method often relies on published or documented information (Rubbin & Babbie, 2008: 407). There is a probability that mistakes can be replicated from one source to the other. As such, the researcher may possibly be limited to develop new ideas and opinions in the field under

examination. There can be an element of bias on the selection of the material or content to be assessed or examined. For Mouton (2001: 166) there may be little authenticity of the sources of data. He furthers that the texts that are analysed may not be a true representation of the analysed data, making the end result of the research to be of less value.

### **1.6.5 Ethical considerations**

It appears the use and value of ethics in ECD and ECE is increasing (Davis, 2009). According to Mouton (2001: 238) “the ethics of science concerns what is wrong and what is right in the conduct of the research”. Scientific research involves human conduct and which makes it imperative for the researcher to observe the generally accepted values and norms. I understand the need to carry out the research in a professional and academic manner as prescribed by the University of Stellenbosch (US) guidelines and standards. Davis (2009: 13), states that there are “practical issues of conducting research with/on/about very young children”, which require proper ethical considerations. The assumption is that children are defenceless and therefore need to be strongly protected whilst observing their rights (Davis, 2009: 13; Mouton, 2001: 239). However, the researcher “... has the right to search for the truth, but not at the expense of the rights of other individuals ...” (Mouton, 2001: 23).

To avoid misconducts, I employed innovative strategies that avoid the manipulation and coercion of young children. In avoiding misconducts, I did not interfere with the day to day activities of the children but kept an observatory role. Direct contact with young children was strictly avoided without permission from the caregivers. Children were not asked to respond to any questions. Participant’s privacy were observed by considering the anonymity, confidentiality and non-traceability of photos, drawings and voice recording that may be of use in interpreting the EcoVillage’s ECD programme. I see no harmful ethical complications that may be associated with the research.

## **1.7 RESEARCH OUTLINE**

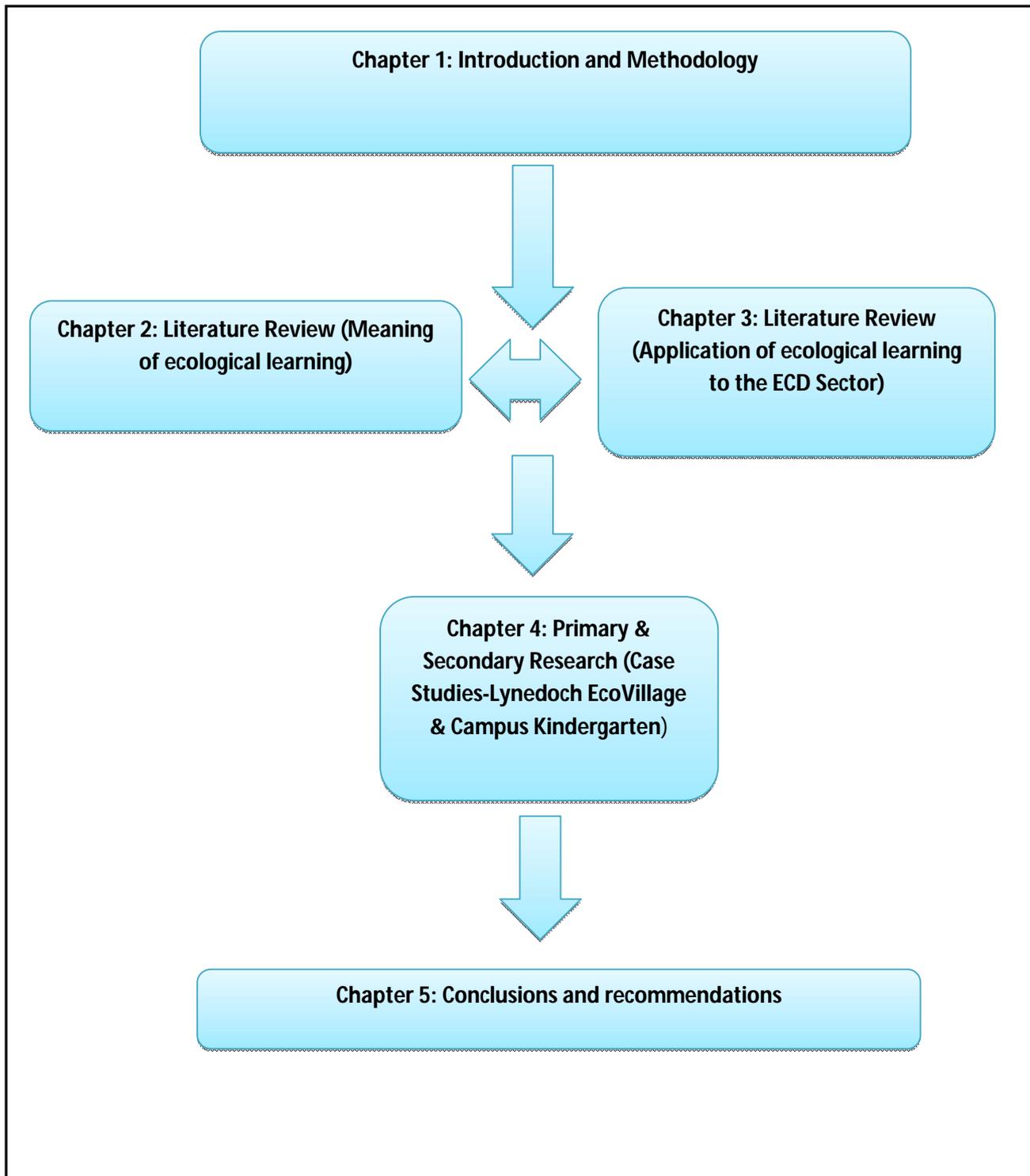
Chapter one consists of an overview of introductory remarks, research design and methodology. The following sections are in this chapter: background information, research questions and objectives, assumptions and limitations of the study, definition of key terms, motivation and significance of the study, research design and methodology and the research delineation.

Chapter two reviews the literature in building the paradigm of ecological learning. The Chapter will explore the meaning of ecological learning and contend that it must be advanced within the context of systems thinking, SD, EfS and ecological literacy.

Chapter 3 will review relevant literature dealing with the meaning of ECD and presents some emerging perspectives in ECD centering on those that promote ecological learning. The chapter gives four brief examples of practical ecological learning that seeks to re-connect children with nature.

Chapter four consists of two comprehensive case studies namely Lynedoch EcoVillage (South Africa) and Campus Kindergarten (Australia). The focus is on establishing how each institution's ECD approaches facilitate ecological learning.

Chapter five will capture concluding remarks and proffer suggestions on areas for further research.



**Figure 1.1: Diagrammatic view of the study**

## **1.8 CONCLUSION**

The chapter has attempted to outline the framework in the approach to this thesis, including introductory remarks, objectives, research design and methodology used in the study. The motivation in undertaking the study was stressed. A literature review methodology was selected as the most suitable research tool in ascertaining the discourses and debates in pertinent and contemporary literature in the field of ecological learning, ECD and sustainability. The literature review methodology is backed up by practical research tools that include interviews and participant observations (used for the Lynedoch case study only) in coming up with informed conclusions. Triangulation has been selected as a support mechanism to enhance the validity and reliability of the study. The next chapter builds the paradigm of ecological learning through a literature review exploring the theory and (some) practise of ecological learning.

## **CHAPTER 2: SUSTAINABILITY AND ECOLOGICAL LEARNING: A CONCEPTUAL FRAMEWORK**

### **2.1 INTRODUCTION**

The previous chapter gave the introductory remarks, outlined the objectives, research questions, design, methodology used for the study and the inspiration for undertaking the study. The main thrust of this chapter is to explore the meaning of ecological learning in line with the first objective set in section 1.2.1 of the introductory chapter; that is, to build a paradigm of ecological learning through its exploration in a literature review. I shall argue that ecological learning and sustainability are based on an understanding of systems thinking which creates new ways of thinking and lessen unintended penalties (Laslo, 1998; Sterling, 2008; Fikslel, 2012). It shall be further averred that it is necessary to educate children with the basic knowledge of ecology so as to generate a sense of reverence, connectedness and awe that may provide a form of 'immunisation' against ways of living that further damage the web of life (Carson, 1965; Capra, 2006; Semetsky, 2010; Stevenson, 2011).

The chapter stresses the fundamental role of education in shaping sustainable futures. The chapter gives a context of global frameworks in line with ecological learning as an international context for connecting children with nature through education. The focus will be on ecological learning in ECD as a branch of "Education for Sustainability" (EfS). I detail how ecological learning in ECD can help to create conscious minds to save the planet's increasingly imbalanced ecology and promote sustainability. I shall briefly trace the concept of sustainable development (SD) in the context of current efforts at addressing global problems through education. In this light, a link between SD and education (ecological learning in ECD) shall be established. An understanding of EfS and its background will be outlined. I will also focus on the Decade of Education for Sustainable development (DESD) and its main objectives and how it is linked to other major global educational initiatives. The chapter ends with an argument that education alone does not guarantee sustainability; as such, we need educational approaches that prioritise ecological learning at an early childhood stage to promote a culture of sustainability.

### **2.2 THE INCREASING CONCERN: SUSTAINABLE DEVELOPMENT (SD)**

It is essential that the research provides with a context of SD. The section passingly traces the background of SD that led to the recognition to address the universal crisis. The section shall argue that education has a key role in advancing SD. It shall be shown that although there are

complexities on the comprehension of SD; SD is too valuable to be neglected because it gives hope for long-term sustainability. There is a general consent that “there is no single route” in achieving SD. However, SD is linked with several interpretations that diverge from one society to another (UNESCO, 2008c).

The first context of SD emerged in the 1970s in the developed countries (Hattingh, 2001; UNESCO, 2005). This was driven by production patterns and industrialisation that progressively endangered the environment (Hattingh, 2001: 4). It was due to this recognition that economic prosperity was a result of over reliance on the exhaustive natural resources resulting in the inability of the earth’s system to continuously absorb wastes (Meadows *et al*, 1972; Dresner, 2002; Rogers, Jalal & Boyd, 2005; UNESCO, 2008a). This background resulted in the urgency to address the appalling issues with the agenda of promoting sustainability (Hattingh, 2001; Swilling & Annecke, 2012). Several reports were made amongst them are: *A blueprint for survival* (1972) and *The limits to growth from the Club of Rome* (Hattingh, 2001: 4). During this period it was realised that material growth was ending, hence the indispensability of education in promoting SD (Hattingh, 2001: 4). Echoing on the role of education, Schumacher (1999: 139) in his article “*Small is Beautiful, Economics as if People Mattered*” states that “development does not start with goods; it starts with people and their education, organization, and discipline. Without these three, all resources remain latent, untapped, and potential”. The second context of SD was that of the United Nations (UN)-directed Stockholm Conference (1972), the 1992 Rio Earth Summit and the 2002 Johannesburg World Summit on Sustainable Development 1987 (WSSD) (Hattingh, 2001: 4; Segovia, 2010: 750; Swilling & Annecke, 2012: 220; Manteaw, 2012: 377). It was at the WSSD summit that the prominent and quoted definition of SD was accepted. It is the one given in the Brundtland Report (*Our Common Future*); which is: “... development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987:43). From this definition, a sustainable community is one that does not destroy the natural resource base (Orr, 1994: 23). The main ideas that emanate from the definition are:

- Inter-generational justice - the inevitability to protect the well-being of the upcoming generations and not compromising their opportunities to achieve their needs.
- Intra-generational justice - the unavoidability of promoting the development and wellbeing of the needy by ensuring equitable allocation of resources.
- Respect for life and environmental preservation - a growing cognizance over the way in which we harm nature that sustains lives whilst promoting environmental ethics that

respect the rights and survival of nature (WECD, 1987: 43; Hattingh, 2001: 4; IISD, 2012:1).

Drawing from this view, “sustainability has become a catch-all phrase to refer to the long-term viability ...” (Swilling & Annecke, 2012: 221). It is argued by Hattingh (2001: 2) that “sustainability and sustainable development are too valuable as concepts to just get rid of in our policy framework; they should be taken seriously as we possibly can ...” As such, SD has emerged as an alternative mode of development in response to the current global crisis and the challenges that education for sustainability is facing (Manteaw, 2012: 366).

I have so far in this section provided a general context of SD drawing on the background that led to the recognition of the need to address global challenges. The section has highlighted that education has a strategic role in advancing SD.

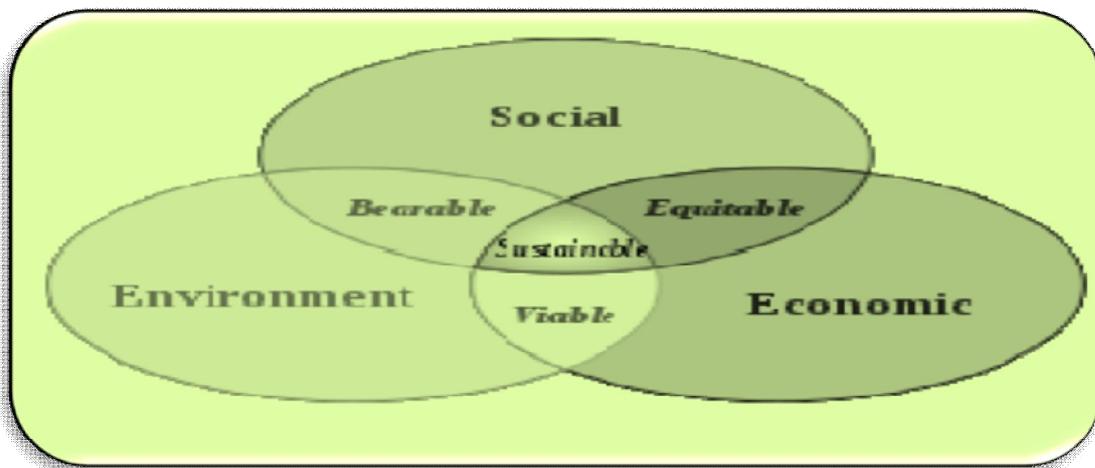
### **2.2.1 Linking education to SD**

The previous section outlined the context of SD. The background to SD that resulted in the necessity to address the global problems was proffered. It was suggested that education holds a strategic role in advancing SD. It was indicated that SD is hope for enduring sustainability. This section shows the link between SD and education.

I have previously mentioned that although there are differing perceptions on the meaning of SD, it could be derived from all the definitions the role of education is to provide measures of achieving SD (Jucker, 2002; Segovia, 2010; Manteaw, 2012). The legitimacy of humans in controlling or preserving the earth’s exhaustive resources also lies at the heart of SD (WECD, 1987; Pezzoli, 1997; Hattingh, 2001; Swilling & Annecke, 2012). However, the relationship between the earth and society can assist or hinder SD.

For educators and learners to understand the significant role of education in supporting SD, they must first have knowledge of the three pillars of SD as pronounced at global tables (Segovia, 2010; Manteaw, 2012; UNESCO, 2012). The three pillars of SD include the economy, society and the environment (UNESCO, 2007; 2008a; Blatchford, 2009; Nsanzimana & Tushabe, 2010; Segovia; 2010; Swilling & Annecke, 2012; IISD, 2012; UNESCO, 2012). These pillars affect every activity of lives. It is therefore vital for learners and teachers to uphold such connections in their learning endeavours. As stated by UNESCO (2008c: 57) these pillars “give shape and content to sustainable learning”. This implies that “all sustainable development programmes (...) must consider the three spheres of sustainability”

(UNESCO; 2005: 14). However, one challenge in ECD ecological learning is for mentors to implement pedagogic practices, curriculum and educational systems that sustain each of these pillars and to acknowledge that they work mutually (Blatchford, 2009: 14; Segovia, 2010: 751). Figure 2.1 is a pictorial view of the conventional and embedded view of the three pillars of SD and how they are connected. The diagram seeks to illustrate the need to go beyond the conventional/conservative approach to SD in which the environmental, social and economic spheres trade-offs with one another. The concentric circles demonstrate that 'embeddedness' does not only eliminate trade-offs, but is also more symbolic of the kind of ecological learning embedded in nature, not separate to.



### **A conventional approach to SD**

Source: (Adapted from Nsanzimana & Tushabe, 2010).



### **An embedded approach to SD**

Source: (Adapted from Mebratu, 1998)

**Figure 2.1: A conventional and an embedded view of the three pillars of SD**

***Economy:*** Individuals are expected to be conscious of the prospective limits of economic growth and their consequences on the ecology and society.

***Society and culture:*** There is need to acknowledge the significant role that social organisations can nurture in supporting the development and transformation. However, there is a need to create a democratic space for autonomous participation that permits consensus and self-opinion especially by ECD teachers.

***Environment:*** Education must progressively show the essentiality of addressing natural resources use such as; biodiversity, agriculture, energy and water. Education must also capacitate learners to adopt sustainable behaviours in natural resource use and preservation. It must be common knowledge of learners that sustaining the earth necessary for their survival and development. Children must develop an awareness of resource exhaustion and its associated consequences on human and ecological systems whilst they promote equitable socio-economic development (WECD, 1987; Pezzoli, 1997; Hattingh, 2001; UNESCO, 2005; 2008a; Blatchford, 2009; Nsanzimana & Tushabe, 2010; Segovia, 2010; IISD, 2012; Swilling & Annecke, 2012; UNESCO, 2012; Manteaw, 2012).

SD presumes transformation as an enduring process. It is therefore vital for communities to balance these elements (Swilling & Annecke, 2012). The interrelatedness of the three pillars of SD is underpinned in the facet of culture. In this context; culture is understood as “ways of being, relating, behaving, believing and acting that differ according to context, history and tradition and within which human beings live out their lives” (UNESCO, 2005: 15). Early Childhood Education (ECE) should therefore recognise the importance of values, identity and practises that nurture shared commitment (Tilbury *et al*, 2002). Cultural aspects in sustainability education recognise the significance of:

- Diversity: Diversity is an important element of a resilient and stable system of community. Each socio-cultural context is essential to the sustainability of the system.
- Respect and acceptance of differences: It is necessary to meet with other ECD educators so as to enrich, and stimulate each other.
- Promotion of dialogue and open debate.
- Establishing dignity, respect and values that are guided by SD for both individual and organisational life.
- Shaping of human capacity.
- The use of locally appropriate indigenous knowledge (IK) to plants and animals. According to Manteaw (2012: 381) there is a growing acknowledgement that development that respects local ways and ideas “... are more likely to meet people’s needs ...” and promote SD.
- The development of local languages and communication patterns.
- The use of dance, music and art (Tilbury *et al*, 2002; UNESCO, 2005; Segovia, 2010; Manteaw, 2012).

This section attempts to show that ecological education and SD are inseparable and that the later thrives on the former. It was indicated that education gives the measures of achieving SD and is therefore tied to socio-economic development. The section has advanced that it is necessary for learners and teachers to understand the three pillars of SD knowing that they are underpinned by culture. I have so far in the previous two sections argued that there is a growing concern that promotes SD and has shown the connection of education and SD. In the next section I will argue that a foundational knowledge of systems thinking is necessary for sustainability or ecological learning to be achieved.

## 2.3 SYSTEMS THINKING

This section builds on the foregoing one, maintaining that is essential to have an understanding of systems thinking in advancing sustainability or ecological learning. My argument in this section is based on Sutton's belief that "sustainability requires systems thinking" (2009: 19).

Sutton (2009) contends that children are inherently systems thinkers; hence the comprehension of connections that interweave the planet must be imparted to them (Capra, 1998; Herbert, 2008; Blatchford, 2009; Semetsky, 2010; Arnarson, 2011; Swilling & Annecke, 2012). Fritjof Capra mentioned in his article "*Ecology, Systems Thinking and Project-Based Learning*" that: "We did not weave the web of life," but we "we are merely a strand in it" and "whatever we do to the web, we do to ourselves" (Capra, 1998: 4). He stated that one of the most significant aspects of the ecological theory is the idea of living systems (Capra, 1998: 4). It seems that systems thinking will bring novel ways of thinking and seeing the world (Cilliers, 1998; Capra, 1998; Hawken, 2007; Pressoir, 2008; Sterling, 2008; Sutton, 2009; Semetsky, 2010; Arnarson, 2011; IISD, 2012). Systems thinking is referred to as the "... cognition in terms of processes, relationships, embeddedness, and interconnections" (Laszlo, 1998: 9). While there are many examples of these systems, in this study, the most important ones are social and ecological systems (Cilliers, 2000; Tilbury *et al*, 2002). Ecological systems are found in ecosystems, for instance; human, microorganisms, plants and animals and are seen as integrated wholes. Social systems involve schools, village or families.

Systems thinking seeks to understand systems in their totality including its sub-elements (Capra, 1996; Laszlo, 1998; Cilliers; 2000; Sterling, 2001; 2008; Sutton, 2009). In systems thinking, the world is a summation of combined wholes whose features cannot be split to smaller elements (Capra, 1998; Cilliers; 2000; Sterling, 2001; 2008; Semetsky, 2010). Systems thinking assist young children to comprehend the complexity of the earth and to think in ways that suits their context whist improving their relations and connectedness (Capra, 1996; 1998; Laszlo, 1998; Sterling, 2001; 2008; Sutton, 2009; Center for Ecoliteracy, 2012a). Capra (1998) and Sterling (2008) agree that the concept of systems thinking can be valuable to educational settings as it assists in detecting the different scales of phenomenon. This includes the surrounding ecosystems, communities, school, classroom and the child (Capra, 1998: 5). Sutton (2009) says that the apprehension of the different scales of phenomenon necessitates change in individual perceptions. This provides various but beneficial ways of teaching, community and institutional arrangements (Center for Ecoliteracy, 2012a). Senge's experience in organisational learning reveals that incorporating systems thinking in ECD

ecological learning curriculum has high chances of improving the cooperation of learners and teachers (Senge, 2006 in Sutton, 2009: 20; Segovia, 2010: 751). Sutton (2009) proffers practical examples that show cooperation between mentors and learners. As shall be evidenced by the Lynedoch EcoVillage case study in chapter 4, Montessori schools in South Africa utilise systems thinking. According to the systems theory, all living systems are common in that they share organisation principles and properties (Capra, 1998; 5). This implies “systems thinking can be applied to integrate academic disciplines ...” (Capra, 1998: 5).

The section has presented systems thinking as one point of departure in advancing ecological learning. It has been highlighted in the section that systems thinking can promote new ways of thinking and seeing the world because it allows young children and educators to think in ways that promote their relationships with one another and the earth whilst suiting their contexts. The following section maintains that the comprehension of human and ecological systems is crucial for ecological learning therefore necessary to capacitate children and teachers with the properties and principles of ecology.

## **2.4 ECOLOGICAL PRINCIPLES**

The previous section has argued a case for systems thinking as key to advancing ecological learning. The section has demonstrated that systems thinking promote relationships and contexts for learners and educators. In my reading of the literature I came across five ecological principles that I feel must be included in ecological learning and these shall be explored in this section.

The understanding of human and ecological communities is an essential element in ecological learning. It is therefore essential for children and educators to be equipped with an understanding of the principles of ecology so as to reconnect them to ‘the web of life’ (Orr, 1992; Macy, Young-Brown; 1998; Semetsky, 2010). The understanding of ecological principles will help create spiritual and emotional beings that can profit the future generations (Miller, 2004; Herbert, 2008; Segovia, 2010; Stevenson, 2011). It capacitates us to acquire valued lessons from earth that is a home to microorganisms, animals and plants (Capra, 1994; Segovia, 2010; Stevenson, 2011; Arnarson, 2011; Center for Ecoliteracy, 2012a). This means that curriculums must educate children with the “...fundamental facts of life” (Capra, 1998: 7; Segovia, 2010: 751). There are five main ecological principles that can be advanced in ecological learning. According to Capra (1998) these principles work hand in hand and therefore cannot be practised or taught in isolation. This is because the organisation of the ecosystem is described in terms of their principles (Capra, 1994: 1; Capra, 1998: 3). These

principles can be applied to human as well ecological communities and are to be discussed below:

1. **Interrelated relationships:** Ecological and human systems are an element of the “web of life”; every action affects its sustainability (Capra, 1996; McCallum, 2010; Arnarson, 2011). It is therefore vital that children establish an understanding of the connection that links all activities of the earth (Davis, 1998; Capra, 1998). This is because ecological systems consist of dissimilar species; including microorganisms, plants and animals that live as a community (Charles & Louv, 2008; Arnarson, 2011). These species relies and interact with each other for continuity (Stone, 2009; Spies, 2010). The interconnectedness of these species is not linear but forms cyclical networks of relationships (Sterling, 2001; Capra 2007; Semetsky, 2010; Center for Ecoliteracy, 2012a). Similar to educational communities, they feed and depend on one another through a connection of networks as can be seen in food chains. It is important that these relationships are fully comprehended as they form the foundations for critical thinking (Capra, 1994: 3). A sustainable learning community is therefore one that acknowledges the multiplicity of relationships that exist in it (Capra, 1998; UNESCO, 2008a; Sutton, 2009). These relationships need to be plotted so as to discover new structures and forms of relationships (Capra, 1998; Sterling, 2001; 2008). New structures of relationships will assist learning settings to notice the new and beneficial patterns within systems (Capra, 1998; Sterling, 2001; Arnarson, 2011; Holmgren, 2012). They promote consensus and cooperation in the classroom or the school (Centre for Ecoliteracy, 2012a).
  
2. **Forms and patterns:** A pattern is defined as “a configuration of relationships appearing repeatedly” (Capra, 1994: 3). The study of ecosystems empowers us to comprehend the relationships and patterns within it. Comprehending such relationships and patterns requires us to answer the following questions: “What is matter made of? What is reality made of? What are its ultimate constituents? What is its essence?” (Capra, 1994: 4). These questions develop knowledge of the main elements which are water, air, fire and the earth. These elements are important as all matter is enclosed in them. Plotting these relationships happens through continuous surveillance of the earth. Capra (1998: 7) argues that the study of patterns is an ecological need. In ECD, patterns must be incorporated into the educational curriculum through art (Saracho & Spodek, 2000, Centre for Ecoliteracy, 2012b). Art enables children to express and recognise patterns (Saracho & Spodek, 2000). This makes art a very useful tool of endorsing systems thinking in learning processes (Centre for Ecoliteracy, 2012a).

Capra avers that patterns are critical to ecological learning in ECD “because the study of pattern comes naturally to children; to visualize pattern, to draw pattern, is natural” (Capra, 1994: 5). As such, allowing children to draw makes them understand the systematic patterns of life. Capra (1994: 5) mentions that “the pattern of life is a network pattern. Wherever you observe the phenomenon of life, you observe networks”.

- 3. Networks:** Network patterns are a common feature of human and ecological communities (Cilliers, 1998; Capra, 2007; Capra, 2005). They are constituted of functional and feeding relationships from diverse life processes (Cilliers, 1998; Capra, 1997; Capra, 2007). All organisms are made up of networks just like those of a cell that is constituted of various components (Cilliers, 2001; Capra, 2005). Capra (1994; 1997) says that life also takes the form of a network that operates in cyclical manners. In these network cycles, there are feedback loops (Capra, 1994: 6; Capra, 1997: 4; Semetsky, 2010: 32). “A feedback loop is a circular arrangement of causally connected elements, in which an initial cause propagates around the links of the loop, so that each element has an effect on the next, until the last “feeds back” the effect into the first element of the cycle” (Capra, 2007: 4). This makes feedback loops an essential element of every educational setting because they promote balance and self-regulation of systems (Sterling, 2001; Stone, 2009; Semetsky, 2010). The advantage is that educators can admit their mistakes, learn, self-correct whilst reorganising themselves (GEN, 2006; Semetsky, 2010). They can constantly generate or regenerate through transformation and substitution (Capra, 2007). The conservations that are triggered in communities will in turn trigger other beneficial conservations that may result in self-regulating loops (GEN, 2006; Capra, 2007; Semetsky, 2010). In ECD centres this may result in values, explanations and shared beliefs that may yield sustainable organisational mores, culture and traditions (Segovia, 2010). One way to promote sustainable organisation culture is through facilitation. This brings shared knowledge personal and informal relationships (Semetsky, 2010).
- 4. Self-Organisation:** Life should be conceived of as a self-organising network (Capra, 1997: 3; Capra, 2007: 476; Semetsky, 2010: 33). All life processes and components are linked in a network (Capra, 2007: 478). The understanding of these networks makes communities to increase their knowledge of fundamental life principles, patterns and networks in practical ways (Capra, 2007; Center for Ecoliteracy, 2012a). In coordinating these activities, partnership is needed that also promote flexibility and diversity (Stone, 2009; Semetsky, 2010).

**5. Flexibility and diversity:** The resilience of an ecological community is advanced through flexibility and diversity (Sterling, 2001; Stone, 2009; Semetsky, 2010). The flexibility of an ecosystem is evidenced through structured networks. These structured networks are dynamic and therefore fluctuate over time (Capra, 1994: 8; Sterling, 2001: 54). In cases that there is inflexibility; the feedback loops will bring back system to its normal state (Sterling, 2001; GEN, 2006; Semetsky). It is important to note that everything within an ecological system fluctuates at one point for instance; rainfall, nutrient supplies and population densities (Holmgren, 2012). This fluctuation helps the systems to adapt to harsh conditions making them to be resilient (Capra, 1994; Sterling, 2001; Stone, 2009; Holmgren, 2012).

The section has explicated ecological principles that must be considered in any attempts at teaching and understanding of the ecosystem. The section has focused on the five ecological principles and how each can result in benefits for educators and learners. I shall (in the next section) review the fundamental role of education in promoting sustainable futures centring on Education for Sustainability (EFS) to show how ecological learning can be a useful tool in creating sustainable futures.

## **2.5 EDUCATION FOR SUSTAINABILITY (EFS)**

Advancing the quality of life and sustainable livelihoods are the fundamental role of education and a prerequisite for SD (Hattingh, 2001; Jucker, 2002; Tilbury *et al*, 2002; UNESCO, 2005a; 2008a & c; Sterling, 2008; Segovia, 2010; Swilling & Annecke, 2012). However, the predominant educational practises are doing little to promote sustainable practises (Tilbury *et al*, 2002; Sterling, 2008; UNESCO, 2008b; Segovia, 2010). Some scholars argue that such educational practises are promoting unsustainable practises, especially in developing nations (Jucker, 2002: 8; UNESCO, 2008b: 9). However, learning and education are an aspect "... of the iterative dynamic of social change: in order to change society, we need to change the way we learn and educate, and in order to change the way we learn and educate we need to change society" (UNESCO, 2008c: 3). Education can therefore be conceived of as performing an essential role in addressing appalling contemporary global problems because it offers individuals the knowledge to make informed decisions and to actively participate in ecological and socio-economic development (Sterling, 2001; 2008; UNESCO, 2008c; Segovia; 2010; UNESCO, 2012; Bickford *et al*, 2012). Maria Montessori once wrote that: "the education of every child, therefore, does not aim at preparing him for school, but for life" (Montessori, 1948

in Sutton, 2009: 24). As can be discerned from the statement, we need to educate young children in ways that promote long-lasting sustainability to ensure their future.

The section broadly explored the central role of education in promoting sustainable futures. In the succeeding section, I briefly trace the background of EfS. The DESD will also be reviewed, indicating its main agendas and how it is connected to other significant educational international initiatives. The main features of EfS are to be outlined, arguing that they should be advanced in ecological learning whilst promoting the values of EfS.

### **2.5.1 What is Efs?**

EfS originated on the backdrop of international economic and political brainstorming and mobilisation by organisations such as Organization of American States (OAS), Organization for Economic Cooperation and Development (OECD) and the United Nations (UN) (UNESCO, 2008c). Leading global leaders endorsed sustainability as an international vision (Tilbury *et al*, 2002: 14). “Education for Sustainability” (EfS) is an evolving concept; it goes beyond the narrow conception of environmental education (Orr, 1994; 2004; Fien, 1995; Sterling, 2008). EfS is aimed at improving human welfare through ecological conservation, social advancement and economic progress (Rogers, Jalal & Boyd, 2005; UNESCO, 2008c; 2010; 2012; Segovia, 2010; Manteaw, 2012). It involves education for peace, cultural diversity, gender equity, human rights and poverty alleviation amongst others (UNESCO, 2007). Many scholars confirm that the vision of EfS is to create a world whereby all individuals have access to core education (UNESCO, 2008c; 2010; 2012; Segovia, 2010; Manteaw, 2012; UNESCO, 2012). Individuals are expected to be capacitated with lifestyles, behaviours and values that are needed to promote a sustainable living (Tilbury *et al*, 2002; Blatchford, 2009; Segovia, 2010; Manteaw, 2012; UNESCO, 2012).

### **2.5.2 Background to EfS**

The last two decades have seen a number of global agendas indicating the significant role that can be played by education in constructing sustainable development. In 1989, the UN Convention on the Rights of the Child accentuated education as a right to every child (UNESCO, 2008a & c). The 1992 United Nations (UN) Stockholm Conference on the Human Environment engaged in an agenda of promoting socio-economic issues (underdevelopment and poverty), the environment and their interrelatedness (Tilbury *et al*, 2002; UNESCO, 2005; Manteaw, 2012). It was discussed that the improvement of the quality of life and satisfaction of human needs should happen in manners that do not compromise that of the future

generations (UNESCO, 2005; 2008a, b & c; Swilling & Annecke, 2012; Manteaw, 2012). This implies balancing socio-economic and ecological concerns in ways that preserve the planet.

The book entitled *Caring of the Earth* by the World Conservation Union (IUCN) stresses that the role of education is to assure that communities are educated, abide and live according to the ideologies of sustainable living/SD (Jucker, 2002; Tilbury *et al*, 2002). A *Strategy for Sustainable Living* of the World Conservation Union (IUCN), the *World Wide Fund for Nature* (WWF) and the *United Nations Environment Programme* (UNEP) link SD with the improvement of mankind's quality of life in manners that respect the carrying capacity of the earth (IUCN, UNEP & WWF, 1991: 5; UNESCO, 2005: 13). It was stated in the publications that the role of education is to assure that communities are educated, abide by and live according to the ideologies of SD (Tilbury *et al*, 2002; IISD, 2012). The renowned Brundtland commission says that educators hold an essential role in creating social transformation that results in SD (WCED, 1987; Tilbury *et al*, 2002; IISD, 2012). The Brundtland commission reaffirmed the IUCN's definition of SD that emphasises on advancing the quality of life whilst leaving the earth to regenerate itself. The commission stated that SD must benefit human and ecological systems. Emphasis is placed on the need to acknowledge formal and informal forms of learning and teaching (society and families included) in achieving SD (Semetsky, 2010; Manteaw, 2012). The Agenda 21's chapter 36 accentuated the inseparability of education in sustaining SD (Tilbury *et al*, 2002; UNESCO, 2005; 2007; 2008b; Manteaw, 2012). The same chapter reveals the importance of improving people's capabilities in upholding development and ecological concerns (UNESCO, 2005: 13; Manteaw, 2012: 377). Agenda 21 stressed the need to: (1) promote core education (2) redesign the current education to meet the goals of SD (3) promote public consciousness and understanding and (4) training (Nsanzimana & Tushabe, 2010:2; Segovia, 2010; 750; Manteaw, 2012: 377). Above all, there has been a shared attentiveness by most UN conferences on the link between education and SD indicating education as a driving factor for change (UNESCO, 2005: 13; Segovia, 2010: 749-750). In 2002, the Johannesburg Summit expanded the idea of SD and reiterated the EFA and MDG's educational objectives (UNESCO, 2005: 13). It was at the 57<sup>th</sup> gathering of UN General Assembly in December 2002 and at the Johannesburg Summit that the Decade Of Education for Sustainable Development (DESD) (2005-2014) was recommended (Tilbury *et al*, 2002; UNESCO, 2005; 2008a & b; Manteaw, 2012). The DESD stressed education as a requisite to the achievement of SD (UNESCO, 2008a; Segovia, 2010; Manteaw, 2012; UNESCO, 2012). At this juncture, the research stresses the importance of education as endorsed at global forums through the DESD.

### 2.5.3 Decade of Education for Sustainable Development (DESD)

This section focuses on the DESD, explicating its connectedness with other UN global initiatives. The main objectives of Education for ALL (EFA), Millennium Development Goals (MDGs) and the United Nations Literacy Decade (UNLD) are to be indicated. It shall be advanced that the DESD is a sustainable framework for SD. The DESD stresses on the learning, content and function of education in social and ecological development.

The UN General Assembly implemented the DESD (which stretches from 2005 to 2014) to advance the goals of SD, particularly improving the quality of life for the current and upcoming generations (UNESCO, 2005; 2008a & b; 2012; Blatchford, 2009; Segovia, 2010; Manteaw, 2012). The DESD is a form of learning and education that perceives the principles of SD at its heart (UNESCO; 2005; 2012; Manteaw, 2012). UNESCO was given the mandate to control the DESD and the implementation of the International Scheme (IIS) (UNESCO, 2005: 8; 2008b: 9). However, the DESD began at a period when other global educational initiatives were already positioned. It was believed that the DESD will help other UN initiatives that regard education as a core human right (UNESCO, 2008c). Such initiatives include EFA, MDGs and the UNLD (UNESCO, 2005: 11; UNESCO, 2008b, 7; 2008c: 8). These global initiatives seek to increase the quality of life in particular that of the marginalised whilst promoting human rights including active citizenship, democracy, poverty reduction and gender equality amongst others (Tilbury *et al*, 2002; UNESCO, 2005; UNESCO, 2008a, b & c). These initiatives also share a common ground on the essentiality of basic education and its enhancement. Each of these initiatives is to be briefed below:

- EFA accentuates basic education as a need that should be accessible to every individual (children and adults inclusive). EFA states that basic education must not differentiate between sexes, but should promote life skills and pertinent learning whilst upholding equality.
- As prescribed by the UN, the MDGS offers calculable and tangible visions whereby accessibility to primary education is one of the fundamental goals. The MDGS also includes other fundamental facets of education including non-formal education and literacy as the prerequisites to the achievement of the MDGs.
- The UNLD advances the EFA goals that regard literacy as a precondition. The UNLD proposes learning tools for all modes of education. The UNLD seek to progress self-cultural esteem, participatory citizenship and self-confidence (Tilbury *et al*, 2002; UNESCO, 2005; 2007; 2008c; Segovia, 2010; Bickford *et al*, 2012).

The above contexts led to the DESD which is seen as a more viable tool as it suits the purpose and content of the MDGS, EFA and the UNLD. It seems that MDGs, EFA, and the UNLD have not adequately achieved their goals, especially in education. However, the world still has miniature faith in the DESD given the two years that are outstanding (Manteaw, 2012; UNESCO, 2012). The DESD promote approaches and practises that enhance the values of SD (UNESCO, 2008b: 7; Manteaw, 2012: 366-377). The main objective of the DESD is to make education an opportunity for every citizen to be equipped with lifestyles, behaviour and values needed to build a sustainable community through transformation (Tilbury *et al*, 2002; UNESCO, 2005; 2008c). It concentrates on the quality of learning, process and content of education (UNESCO, 2008c: 22). The main goals of the DESD involve:

- Promoting the fundamental role of learning and education in enhancing SD, support networking, links, interaction and exchange of all EfS stakeholders.
- Perfecting the dream of SD by advancing all modes of learning.
- Intensifying the quality of learning and teaching for SD.
- Implementing strategies that embrace the capacity of EfS (UNESCO, 2005; 2012).

The links between DESD and other global initiatives show that SD goes further than promoting education; it also involves issues of human rights and peace. EfS do not only focus on the learning content but also the 'purpose of education' (UNESCO, 2005). However, achieving EfS demands the provision of educational services that upholds the approaches and values of SD. This implies that EfS "must also address pedagogical processes, the validation of knowledge, and the functioning of education institutions" (UNESCO, 2005: 11).

The section has shown that the DESD is intricately tied up with SD. The section also revealed how DESD is connected with other UN international educational initiatives. I have briefed the crucial roles of the EFA, MDG and the UNLD then advanced to argue that the DESD is a viable option as it provides with the learning, purpose and content of EfS. The section has given the main goals of the DESD and has ended by indicating that the DESD should further address other pertinent issues such as; pedagogical issues, knowledge validation and the functioning of educational entities. The next section is an outline of the main features that should be promoted by EfS.

#### 2.5.4 Key features of EfS

The previous section has revealed that the DESD is associated with other international initiatives. The main objectives of the EFA, MDG and the UNLD have been summarised. The section has argued for DESD as a viable tool for SD and has given its main goals and further issues that still need attention. This current section outlines the main features of EfS for which DESD is part.

EfS promote the connectedness of human and ecosystems (UNESCO, 2005). However, EfS educators should bear in mind that EfS include Environmental Education (EE) as well as socio-cultural factors (Orr, 1994; Tilbury et al, 2002; UNESCO, 2005). Moreover, EfS must be combined with other subjects and should seek to inaugurate the following:

- **Holistic and interdisciplinary** - EfS must be advanced in every subject therefore should not be taught separately. It should also concentrate on the social, economic and ecological aspects of sustainability.
- **Problem solving and critical thinking** - Children should be encouraged to be confident, act on sustainability matters.
- **Value driven** - It is crucial that the philosophies and values of SD are promoted in ways that they can be practiced, tested, questioned and analysed.
- **Multi-Method** - Experiences, art, drama and word are the pedagogies that facilitate the learning process. Teaching is not only about giving knowledge to learners. Learners and educators must assist each other to search for knowledge whilst shaping their learning communities.
- **Active decision making** - Learners must enthusiastically contribute to decisions that touch their learning and lives.
- **Applicability** - Learning must match the daily living of learners and their surroundings.
- **Locally suitable** - Communication must tie with the learners' language and sustainability concepts must be clearly delivered in creative but different languages.
- **All modes of education** - It should advance informal, non-formal and formal education (UNESCO, 2005; 2008c; Segovia, 2010; Manteaw, 2012).

In addition to these features EfS should also be merged with science and technology. Science and technology can assist learners to appreciate their ecologies if integrated with the lifestyles, principles and values of SD (Orr, 1994; Tilbury et al, 2002; UNESCO, 2005). It has been

proved that technology offers individuals with mechanisms that allow expression of ideas (Orr, 1992; 1994).

The section has shown the indispensability of EfS in promoting SD. The section has made it clear that EfS moves beyond EE but should be merged with other disciplines of the curriculum. The main features of EfS were listed in the section. I have indicated that despite the soundness of EfS's characteristics; EfS should consider merging with science and technology. The following section shows the necessity of promoting the values of EfS.

### **2.5.5 Promoting the values of EfS**

The preceding section uncovered the importance of EfS in stimulating high quality teaching and learning. The main features of EfS were specified in the section. This section argues that EfS is concerned about values and therefore in key element of sustainability learning.

EfS is fundamentally concerned about the relationship between individuals and between individuals and their ecologies (UNESCO, 2005: 16). As such, the human aspect is broadly acknowledged as a critical variable to education. EfS must promote the following core values:

- Respect for every children's rights.
- The value of the human rights for inter-generational equity and the upcoming generations.
- Upkeep and respect for communities and the protection of ecologies.
- Tolerance for cultural multiplicity and the use of locally acceptable culture (UNESCO, 2005; 2007; Segovia, 2010).

These values offer the best opportunities for probing and encouraging behaviours that promote sustainability (UNESCO, 2005: 16). UNESCO (2005: 16) argues that "transformative education is needed: education that helps bring about the fundamental changes demanded by the challenges of sustainability". Thus, the key roles of education in EfS are:

- Education must instil an attitude that every individual has the ability to foster positive change.
- Education is the most prime agent that can promote SD whilst improving the capability of early childhood learning to nature their visions in practical ways.

- Education must promote young children and educators to make viable decisions, protect ecologies and equity.
- Education must create and promote future-oriented mind-sets (UNESCO, 2005).

Given the different values and impact of EfS; it has to be accepted that EfS affects every stage of lives and must therefore be taught to every individual. It happens within the context of a “life-long learning, engaging all possible learning spaces, formal, non-formal and informal, from early childhood to adult life” (UNESCO, 2005:22). Although it is essential to concentrate on the formal learning system, it should be acknowledged that most learning not only occurs within the school environment. In most circumstances, children interact and learn everyday with the television, family or computers, through learning by mistakes, listening, articulation, reflection, experimentation, copying and observing. This contributes to their attitudes, behaviours and decisions (UNESCO, 2005; Charles and Louv, 2009; Segavio, 2010). Educators should take this into consideration in their planning, noting that informal and formal learning are progressive processes. ‘Good practices’ of SD for instance; natural resource use, recycling and energy saving must be advanced (Orr, 1994; UNESCO, 2005; 2008b; Davis, 2005). As such, educators must be engaged in training and staff development so as to meet the growing changing demands of sustainability.

The section has indicated that EfS is concerned with promoting values that enhance SD while stabilising the ecosystem. The values were summarised as: respect for human rights, inter-generational equity, and respect for human communities and acceptance for cultural multiplicity. It has been highlighted that these values propagate behaviours and values that promote sustainability. The section argued that EfS is transformative education and the key roles of education were given. In addition to these roles there is need to acknowledge and accept other forms of learning spaces. The broader section of EfS has demonstrated the significant role of education (particularly “education for sustainability”) in promoting sustainable futures. The next section gives a review of the meaning of ecological learning, explicating its role in generating ecologically knowledgeable children.

## **2.6 ECOLOGICAL LEARNING**

The aim of this section is to unpack the meaning of ecological learning through literature review. The section invokes secondary material to argue that it is vital to educate young children with the basics of ecological knowledge so as to enable them to understand the human and ecological systems of which they are part of. It is advanced that ecological learning

is one form of education that can foster new ways of thinking whilst improving the connection between individuals and the ecology (Sterling, 2008; Sevigovia, 2010; Bickford *et al*, 2012).

There is a growing realisation that ecological learning is one of the best tools that can be used to solve the ecological crisis and to shape sustainable futures (Orr, 1992; 1994; Sterling, 2001; Cutter-Mackenzie & Smith, 2003; Capra, 2006; Louv, 2008; Stevenson, 2011; UNESCO, 2012). According to UNESCO (2012) ecological learning develops behaviours and attitudes that promote sustainability. For many years, ecological learning has attempted to link children and educators with the sensations of the natural world (Orr, 1992; Sutton, 2009; McCallum, 2010; Semetsky, 2010; Arnarson; 2011). David Orr advocated that every child exits the academic life with a basic ecological knowledge and content (Orr, 1992; 1994; 2004). This raises the alarm for humanity to seek new ways of thinking and seeing the world. The new ways of thinking will enable us to learn from our past mistakes and help us to search for new meanings and patterns that suits the social and local learning context (Sterling, 2001; 2008; Stone & Barlow, 2005; Semetsky, 2010; Arnarson, 2011; Manteaw, 2012). E.O Wilson argues that solutions to the ecological crisis start with children's love for nature (Wilson, 1984; Kellert, 2005; Pressoir; 2008; Spies, 2010; Lockhart, 2011). Wilson refers to the love/affinity for nature as 'biophilia' which is the "innate tendency to focus on life and life like process" (Wilson, 1994:1).

The term 'ecology' emanated from the Greek term *'oikos,'* referring to how humans associate with one another and their surroundings (Capra, 2007; Sutton, 2009; Semetsky, 2010). Ecological learning is therefore concerned about the examination of relationships that ties all the activities of the world (Orr, 1994; Capra, 2007; UNESCO, 2008a; Herbert, 2008; Sterling, 2008; Hagglund & Pramling-Samuelsan, 2009, McCallum, 2010). It is a form of learning that promotes thinking and acting "... in terms of relationships, connectedness, and context" (Capra, 2007: 3). It is based on the 'sense of place' that is advanced through relentless interaction with nature (Capra, 1998; Louv, 2005; 2008; Herbert, 2008; Charles & Louv, 2009; Lockhart, 2011 Stevenson, 2011). Ecological learning perceives human (especially children) as an integral element of 'the web of life' (Capra, 1996; Herbert, 2008; Louv, 2008; Sterling, 2008; Segovia, 2010). In buttressing this view; Sevigovia (2010: 748) arguing on the oneness of man with nature said that "unless we realize that we are only part of the bigger system, we have no future". Ecological learning thus creates a consciousness in children that they are part of the ecosystem that constitutes of 'flora and fauna'; cultural and social systems hence should be protected (Capra, 1998; Herbert, 2008; Charles & Louv, 2009). For ecological learning; the world comprises of multiplicities and complexities of natural processes that should be integrated in social functions (Orr, 1994; Cilliers, 2000; Sterling, 2001; 2008; Tilbury *et al*,

2002; UNESCO, 2008a; Segovia, 2010). This knowledge capacitates children to study the connectedness of relationships that exist between dissimilar subjects.

Ecological learning moves beyond indoor skills (Louv, 2005; 2008; Davis *et al*, 2009; Robertson, 2008a & b; Stevenson, 2011; Chitwood, 2011; Vasager, 2012). It is concerned about the appreciation of nature whereby one's mindscape should be integrated with the landscape (Segovia; 2010; Semetsky, 2010). According to Barry Lopez "the interior landscape ..., "responds to the character and subtlety of an exterior landscape; the shape of the individual mind is affected by land as it is by genes" (Orr, 1994: 86). It is clear in the statement that one should be able to understand the correlation between activities and patterns of the earth. As such, learning combines ecological sciences and systems analysis (Sutton, 2009). The knowledge of connectedness and holism are central to ecological learning (Sterling, 2008; UNESCO, 2012).

Ecological learning is guided by the principles of connectedness and holism (Pezzoli, 1997; Davis, 1998; Hattingh, 2001; UNESCO, 2008a; Nsanzimana & Tushabe, 2010; Segovia, 2010; UNESCO, 2012). The central dimensions of SD are areas of concentration (Hattingh, 2001; Tilbury *et al*, 2002; UNESCO, 2008a; Nsanzimana & Tushabe, 2010; UNESCO, 2012). It capacitates children with the knowledge of their ecologies, economy, and society (Hattingh, 2001; Tilbury *et al*, 2002; Nsanzimana & Tushabe, 2010; Semetsky, 2010; Swilling & Annecke, 2006; 2012; UNESCO, 2010; 2012). These are promoted by developing a culture of respect for oneself, others and the planet (Krcmarova, 2009; Amarnson, 2011). It also promotes values and attitudes for sustainable futures (Wilson, 1996; Davis *et al*, 2009; UNESCO, 2012).

Ecological learning goes beyond 'just' outdoor play; to speak and discover the natural beauties of the ecosystem (Wilson, 1996; Robertson, 2008a & b; Early Years Foundation Stage (EYFS), 2008; Davis *et al*, 2009; Stevenson, 2011). It involves giving children opportunities that facilitate intellectual dialogues pertaining to sustainability and behaviours for ecological protection (Page, 2000; UNESCO, 2008a; Davis *et al*, 2009; 2010; Blatchford, 2009), whereby educators expose young children to the complex realities of the world (Orr, 1992; 1994; Pratt & Moore, 2007; Robertson, 2008a & b; Holmgren, 2012). Relevant experiences and practical learning for learners are of significance for example; gardening and recycling. Ecological learning does put especial emphasis on arithmetic, writing and reading (as in conventional learning) but involves practical projects where children apply their knowledge and skills (Orr, 1992; Saracho & Spodek, 2000; Tilbury *et al*, 2002; Cone *et al*, 2009; Davis, 2010; Spies, 2010).

Some scholars agree that ecological learning transcends the 3Rs (arithmetic, writing and reading) (Orr, 2004; Sutton, 2009). It is also not merely about having knowledge on environment and related issues (Orr, 1992; Blatchford, 2009; Swilling & Annecke, 2012). Ecological learning therefore involves integrated curriculums whereby dissimilar subjects are taught (Saracho & Spodek, 2000; Cone *et al*, 2009; Centre for Ecoliteracy, 2012b). The 7Rs namely refuse, reflect, repair, respect, recycle, reuse and reduce are critical activities of the ecological learning curriculum (UNESCO, 2008a; Segovia, 2010; Swilling & Annecke, 2012). Relating humans and their ecological systems is also important in ecological learning.

Ecological learning is concerned about how societies relate with one another, their natural systems and how they may act sustainably (UNESCO, 2005; 2008a; 2012; Swilling & Annecke, 2012). It aims at advancing the knowledge of how the natural system works and making humanity to be aware of the interconnectedness of life (Orr, 1992; 1994; Miller, 2002; Hawken, 2007; Herbert, 2008; Hagglund & Pramling-Samuelson, 2009; Semetsky, 2010; Segovia, 2012). Ecological learning compels people to know their history of ecological development (Orr, 1994; Krcmarova, 2009; Segovia, 2010; Arnarson, 2011). This makes us understand that our wellbeing, health and survival rely on the natural forces.

Ecological learning seeks to uphold the direct experiences that lead to the development of positive attitudes and feelings on issues concerning nature and its surroundings (Davis, 1998; 2010; Charles & Louv, 2009; Gambino *et al*; 2009). Examples of such experiences may involve planting seeds, flowers, vegetable gardens and nature aesthetics (McCallum, 2010; Chitwood, 2011; Vasager, 2012). Ecological learning (especially in ECD) can thus be conceived of as encouraging and supporting children to be action takers, problem solvers and to be problem seekers (Chawla, 1994; Pratt & Moore, 2007; Chawla & Escalante, 2007; Blatchford, 2009; Davis, 2009; 2010). Although this may allow children to take on challenges (of unsustainable practices) whilst discovering new areas of exploration (Davis, 1998; 2009 & 2010; Jucker, 2002; UNESCO, 2008c; Davis *et al*, 2009; Stevenson, 2011), there seem to be reluctance in supporting children's initiatives that promotes sustainability. A clear example was the lack of adequate support from the community in the Shopping Trolley Project<sup>1</sup> in Australia (Pratt & Moore, 2007; UNESCO, 2008a).

In ECD, ecological learning encourages children to develop an understanding of how ecological systems operate; their complexity and how people connects or interacts with the natural environment (Davis, 1998; Laslo, 1998; Cilliers, 2000; Sterling, 2008; Spies, 2010). In

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<sup>1</sup> The Shopping Trolley Project is an initiative by children from Campus Kindergarten to promote sustainability principles in society.

ecological learning children are taught to understand ecological matters and topics (Davis, 2009). Basic and complex concepts like shelter, water, energy; green building, waste and food are introduced and propagated in the children's minds as they grow mentally (Swilling & Annecke, 2012). However, literatures show a lack of consistence and an undervaluation of the capacities of children to understand such concepts (Young, 2007; UNESCO, 2008a). Critical ecological themes, literacy skills and environmental content are taught to the young children so that they develop mentally with a conscious awareness of their life's dependence on the balance of the ecosystem and this increases their sense of responsibility for the planet (Pratt & Moore, 2007; UNESCO, 2008a). Ecological learning attempts to promote the 'social action' and 'social critique' that result in sustainable change (Davis, 1998; Davis & Elliot, 2009), by seeing the young as agents of change (Davis, 2009; 2010). Young children are tutored to view the environment as inherently connected with their being and future thus propagating a culture of pro-ecological habits (Blatchford, 2009; Stevenson; 2011).

This section has provided an understanding of ecological learning and its capacity to develop young minds (especially in ECD) to grow with a sense of duty in maintaining ecological balance. The section has stressed the need to equip children with ecological knowledge in order for them to comprehend the relationship between human and ecological systems. As such, education (in particular ecological learning) has been identified as one of the best tools to jolt us into new ways of thinking about the necessary measures for protecting the ecosystem. Ecological learning is understood as a form of learning that allows learners and educators to advance their relationships amongst each other and the ecosystem. It is made clear that ecological learning moves beyond indoor skills and is guided by the principles of connectedness and holism. It was also highlighted that ecological learning seeks to link humans and their immediate environment. The next section highlights some of the benefits to ecological learning.

### **2.6.1 Benefits of ecological learning**

The previous section explicated the meaning of ecological learning. At this point, I demonstrate that ecological learning is associated with a number of benefits and some of them are to be reviewed in this section.

The idea of attaching children with nature is not new (Carson, 1965; Louv, 2005; 2008; Charles & Louv 2009; Krcmarova, 2009; Amarson, 2011). Rachel Carson's studies, Montessori Method, Steiner and Forest school education substantiates this point (Carson, 1965; Miller, 2004; Knight, 2009), and have since announced the immense benefits associated

with linking children with nature (Wilson, 1984; 1996; Kellert, 2005; Louv, 2008; Robertson, 2008a & b). Theorising on the "... history of ecological relationships ..." (Krcmarova, 2009: 4), and other scholars take the view that man has always been tied with nature for survival and nature has always endowed people with a number of profound benefits (Wilson, 1984; Kellert, 2005; Charles & Louv, 2008; Segovia, 2010). Ecological learning gives children real experiences on the function of the earth (Louv, 2005; Kellert, 2005; Krcmarova, 2009; Stevenson, 2011). According to Orr (1992: 3) "we have a decade or two in which we must make unprecedented changes in the way we relate to each other and to nature". The statement clearly indicates the need for a paradigm shift in moving towards activities that promote nature whilst recognising its importance.

ECD theorists such as Dewey, Froebel, Pestalozzi and Montessori have acknowledged that children's development and learning are largely influenced by direct encounters with natural materials and nature (Davis, 1998; 2009; Miller, 2004; Semetsky, 2010). Nature promotes children to take the lead in their play, imaginations and time spent in nature which results in children becoming active members of the ecosystem as can be evidenced in Montessori and Forest schools. It is believed those children's direct experiences with nature results in positive attitudes towards the ecology (Carson, 1965; Miller, 2004; Pratt & Moore, 2007; Davis, 2009; Gambino *et al*, 2009; Krcmarova, 2009; Stevenson, 2011). Children are generally interested in ecological issues and associated complex concepts (Wilson, 1996; Kellert, 2005; Gambino *et al*, 2009; Suggate, 2004 in Davis & Elliot, 2009). Palmer (1999) in Gambino *et al* (2009: 3) reported evidence of deep understanding of global challenges (ozone depletion and the greenhouse effect) and their effects on four and six year age groups. Such concepts can be understood and be retained in active learning encounters.

Time spent in nature has proved to "be a powerful form of therapy for attention-deficit disorders and other maladies" (Courtney, 2010:1). Louv (2005; 2008) equates the need for sufficient sleep with the time that children need to contact or relate to the earth. Chawla (1996), Palmer (1993), and Tanner (1980) in Wilson (1997) argue that "regular contact by young children with the natural environment creates environmental stewards, happiness and sensitivity". They add that outdoor experiences in the early years encourage optimistic attitude towards the natural systems. Louv (2008) submits that children are just like endangered species that need to be protected. As such, children and the natural system cannot be separated.

Carson (1965) says that children cannot do without nature and by connecting with nature they grow a sense of belonging. For children nature is revealed in many different forms, for

example; snail path, bird nest or ants (Robertson, 2008a; Stone, 2009). In nature children see a different world that is different from that of elders or parents. Nature also heals children who live in destructive environments (Spies, 2010). In ecological learning (for instance, in place-based learning) children draw and relate to fantasies of culture. This promotes creativity in young children by utilising senses and visualisation. Louv (2005: 7) says that “in nature, a child finds freedom, fantasy, and privacy: a place distant from the adult world, a separate peace”.

‘Ecological play’ promotes cognitive and social development in positive ways (Wilson, 1997; WB, 2011; WHO, 2011). During the first six years children develop emotional security. This is promoted through forming relationships with the natural systems (Robertson, 2008a & b; NACC, 2008; Stevenson, 2011). According to Davis, (1998; 2009) children can combine, store and retrieve information through their active involvement with the ecology. They can also reframe concepts and relate them with the ecosystems. By reframing concepts children get a sense of responsibility that they are the custodians of the ecosystems (Sterling, 2001; UNESCO, 2008a). This credits early childhood as an opportunity to develop experience and ecological selves with nature that shapes long lasting personalities.

Chawla’s (1998) studies looked at the experiences and ways that result in one’s development of ecological consciousness. His studies showed that ecological learning results in ecological sensitivity (Chawla, 1998). It is important to have extensive experiences with nature so as to develop ecological sensitivity. Such experiences can be attained through direct and indirect experiences with nature from childhood to adulthood. Contact with nature in ecological learning “produces the greatest maturational benefits” given an accessible, stable and culturally, physical and social environment (Kellert, 2005: 88).

In her book *The Sense of Wonder*, Rachel Carson wrote on the importance of discovering and rediscovering nature in young children (Carson, 1965). She stressed that children have an ‘inborn sense of wonder’ that needs to be promoted and shared with adults (Carson, 1965; Stevenson, 2011). For many years ecological learning has helped children to rediscover the mysteries, excitement, and joy of this world (McClallum, 2010; Stevenson, 2011; Arnarson, 2011). Carson talks about the importance of knowing and feelings. Carson says “if facts are the seeds that later produce knowledge and wisdom, then emotions and impressions of the senses are the fertile soil in which they must grow. The early childhood is the time to prepare the soil” (Carson, 1956: 55). Well prepared and raised children develop helpful emotions. Such emotions, when aroused results in love or admiration, pity, feelings of sympathy, anxiety of the ‘known and unknowns’ and sense of beauty (Carson, 1956; Stevenson, 2011). Children see perfection and beauty even in little objects. Children make use of their senses making them

observe, relearn and produce wisdom that have an enduring meaning (Carson, 1956; Gambino *et al*, 2009).

Children are seen as endowed with some values and attitudes that are pertinent to the balance of the ecosystem (UNESCO, 2012). Lorenzo adds that children have the power to create, imagine, fantasise and adapt to life situations (Lorenzo, 1989: 2 in Page, 2000: 56). It is further observed that children explore options and possibilities about the future that are neglected by adults (Wilson, 1996; Chawla, 2004). Children's 'natural inclination', 'quick-wittedness' and 'nimbleness' give them insights about the possibilities of creating a sustainable world (Page, 2000). The more the autonomy the child has, the more confidence he builds and the more he is aware of his environment (Louv, 2005). Forest school education, for example; gives evidence that children who have more contact with nature have shown better performance in assigned tasks (Robertson 2008a & b; Knight, 2009). Contact with nature varies; it may be backyards, school yards, neighbourhoods (Louv, 2005). Regular contact with nature also results in reduced aggression and more self-discipline (Louv, 2005). Green spaces/nature promotes access to adults and creative play which are key elements of children.

Although there is a possibility that ecological learning can assist in building sustainable futures (as noted in the above accrued benefits) the approach, there are problems associated with it. According to Spies (2010) the approach seems to rely more on the capability of ECD teachers to handle the day-to-day encounters of their surroundings. Such capabilities may be limited due to lack of careful observation and proper planning (Holmgren, 2012). Another shortfall could be that since the approach aspires to connect children with nature there is a need for adequate green spaces which may not be available in some ECD centres especially those located in highly industrialised metropolises (Louv, 2008). Moreover, there seem to be misguided belief by educators that mere exposure to nature is enough to create ecological consciousness (Blatchford, 2009: 15). Blatchford therefore argues that 'mere exposure' does not guarantee ecological consciousness in children. He explains that there are a number of factors that must be considered.

As noted by some scholars, the approach seems to be promoted in a technologically invaded era which may be difficult to monitor or stop children from watching televisions, and to use other technologically advanced implements such as; smart phones, iPods or play stations that encourage indoor play (Louv, 2005; 2008; Charles & Louv, 2009; Segovia, 2010). While the benefits of ecological learning in ECD are clearly spelt out as revealed in this section, it is not particularly clear how the refocus to nature in ECD can be accomplished especially given the

modern inventions of indoor play and learning centres. There is increasing evidence that shows a decrease in children's contact with green spaces in rapidly growing urban settings and developed world (Wilson, 1996; Louv, 2005; 2008; Charles & Louv, 2008; Blatchford, 2009; Bickford *et al*, 2012). Cohen's studies indicate that above 95% of American children spend most of their times in indoor settings (Cohen, 1984 in Wilson, 1996:1).

From my experience as an inhabitant of the developing world, it seems that the approach (ecological learning) may be difficult to implement in developing nations where ecological issues are not as urgent as social, political and economic ones. Manteaw (2012: 366) argues that the fragile ecological face of developing nations calls for speedy consideration as the ecological predicament is projected to increase as most developing nations are dogged by extreme poverty, rising consumerism, structural inequality, and exploitation of the earth. Manteaw further contends that this may make it problematic for developing nations to "... reorient education, policy, practice and investment to address, sustainability" (Manteaw, 2012: 377). This indicates that a shift in mindsets is as valuable as the more ecologically-focused learning, a swing from the unsustainable lifestyles and activities (which have contributed to the socio-ecological complexities) (Segovia, 2010; Manteaw, 2012; Bickford *et al*, 2012); and also the need for opportunities to reverse the growing alienation of children from the natural world (Louv, 2008; Stevenson, 2011). One can argue that, one of the most pertinent critiques to the ecological learning paradigm is concerned with the modalities of re-orienting children to appreciate the ecology and nature.

The section reviewed the immense benefits associated with ecological learning and has argued that the approach is not necessarily a "blue print" to the ecological crises. In the next section, I argue that education alone is not enough to build sustainable futures. It shall also be argued that there is need for a new kind of specialised education; that is, education that creates an ecologically literate generation.

## **2.7 ECOLOGICAL LITERACY**

The term ecological literacy was propounded by Fritjof Capra and David Orr in the 1990s. It is defined by Garret Harding as "... the ability to ask "What then?" (Orr, 1994: 85). The ability to ask "what then" will result in the development of assumptions, trends and practices that promote sustainability and educational reform (Orr, 1992; Sturdavant, 1993). Arnie Naess (one of the proponents of the concept of deep ecology) also stresses on the need to "ask deeper questions' about the position on nonhuman and human life (Macy-Young & Brown, 1998; Taylor & Zimmerman, 2005; Sterling, 2008; Semetsky, 2010). Deep ecology is an ecological

perspective that argues that all life forms have the right to live and flourish despite the instrumental need by man (Taylor & Zimmerman, 2005; Drengson, n.d in Spies, 2010; Williams & Millington, 2004 in Lockhart, 2011). In substantiating this claim the perspective of deep ecology provides the following principles that clearly form the basis and justification for ecological learning:

- The success and wellness on non-human and human life with nature have an innate value.
- The multiplicity and richness of life forms adds to the realisation of these innate values.
- Mankind does not hold the right to diminish the multiplicity and richness of nonhuman life other than meeting their human needs.
- A decrease in human population is needed for the success of cultures, human and nonhuman life.
- Human intrusion with nonhuman life disproportionate and the state is increasingly becoming worse.
- There is a requirement to change the current policies as they have an effect on ideological, technological and economic structures. This has a possibility of changing existing state of affairs.
- Increasing the standards of living hold less value as compared to raising the quality of life.
- Those who adhere to the preceding principles have a high probability to put in place sustainable changes (Taylor & Zimmerman, 2005; Harding, 2006).

Although some criticise the perspective of deep ecology for being philosophically radical and being politically inclined (Taylor & Zimmerman, 2005), this current study does not intend to scrutinise these debates, but rather to develop the idea of people's connectivity to nature espoused in the concept of deep ecology. Ecological literacy is concerned with one's ability to comprehend natural systems' principles and how they can be incorporated in constructing a sustainable society (Stone & Barlow, 2005; Bickford *et al*, 2012). It is one of the key foundations in reducing the sustainability crisis. Ecological literacy also involves the teaching of fundamental philosophies about the ecology in instilling a culture of sustainability in young children (Stone & Barlow, 2005).

One of the greatest challenges is that children can count, read, and can work on the computers, but they are not ecologically literate (Orr, 1994; Charles & Louv, 2008; Stevenson, 2011). They are failing to ask "what then" (Orr, 1994). There seems to be concentration on

computing, counting and reading, and this has led us to suffer from the ecological crisis. Orr (1992: 85) argues that “the failure to develop ecological literacy is a sin of omission and of commission”. The current education system is doing too little to advance ecological literacy – that is, educating children about the ecological systems and how they operate (Orr, 1992; Stone & Barlow, 2005; Semetsky, 2010; Bickford *et al*, 2012; Gaziulusoy & Boyle, 2012). Orr (1992) argues about the indispensability of educating children about ecological systems and how they operate. This enables children to be environmental stewards as they can learn how to maintain and preserve ecological systems (Cutter-Mackenzie & Smith, 2003; Stone, 2009; Segovia, 2010). According to Orr (1992) educators should not concentrate on the problems of the ecological crisis. Ecological perspectives, instead; should be taught in a number of subjects (Saracho & Spodek, 2000; Center for Ecoliteracy, 2012a & b; Gaziulusoy & Boyle, 2012; Canter & Brumer, 2012). The media should assist in promoting a sense of responsibility and belonging in children (Jucker, 2002; Moss, 2012). Children should become ecologically literate and be able to comprehend water and food systems whilst recognising their life history and position in nature (Orr, 1994; Arnarson, 2011).

According to Bickford (2012) the chaotic disorder that characterise the modern world drives the urgency of ecological literacy. Unlike other forms of knowledge, “ecological literacy is driven by the sense of wonder, the sheer delight in being alive in a beautiful, mysterious, bountiful world” (Orr, 1994: 86). Ecological literacy must start in childhood, so as to discover the instinctive ‘sense of wonder(s)’ (Carson, 1965; Orr, 1992; UNESCO, 2008a; Stevenson, 2011). It is essential for adults to discover these inborn ‘senses of wonder’ in young children with happiness, anticipation and coyness (Carson, 1965; Orr, 1994; Wilson, 1996). This is one departure point to connection or relationship with life (Davis, 1998; 2009; Wilson, 1996; UNESCO, 2008; Louv, 2008; Bickford *et al*, 2012).

E. O Wilson’s concept of ‘biophilia’ reveals that human beings have an innate like-mindedness for nonhuman life which must be discovered at a younger age (Carson, 1965; Wilson, 1984). According to Wilson, the discovering of these feelings has a possibility of improving individual’s (mostly children) enthrallment, ‘sense of security’, awe and gratification for nature (Wilson, 1994: 360). In support of Wilson’s theorisation on ‘biophilia’, J. M Benyus’s own theory of biomimicry contends that we must seek solutions from nature (Arnarson, 2011). Benyus views nature as a mentor/measure upon which life solutions should be sought and as such children must learn to imitate (and be part of) nature in their younger ages (Wilson, 1996; Arnarson; 2011). Benyus argues that nature will bring us enduring sustainable solutions such as reducing material costs, saving energy, eliminate and redefine waste and climate control whilst permitting us to see what is viable and not (Arnarson, 2011).

The world is therefore in need of competent and ecologically literate people who can come up with sustainable solutions using the bottom up approaches (Orr, 1994; Sterling, 2001; Stone & Barlow, 2005). It seems that most of the solutions use the top down approaches (from elders and higher education) and are not concerned about children and their ecological literacy capability (Manteaw, 2012: 380). This requires us to implement teaching and learning approaches that promote ecological competence in young children (Orr, 1994; Wilson, 1996; UNESCO, 2005; UNESCO, 2012). Orr further comments that, “the goal of ecological competence implies a different kind of education and a different kind of educational experience that develops the practical art of living well in particular places” (Orr, 1994: 84). This implies we need to nurture a generation of ecologically literate citizens (Sterling, 2001; Stone & Barlow, 2005; Charles, 2009; Charles & Louv, 2008; Stevenson, 2011).

### **2.7.1 Towards shaping an ecologically literate generation**

One of the most prominent ecologists David Orr (2004) has made the paradoxical claim that the most educated population on the planet show highest levels of unsustainable practises and behaviours. Spies (2010) and Segovia (2010) add that the growing levels of education seem to increase the ignorance of human. While this seems factual, Orr cautions us on the risk of some forms of education. Orr argues that “education is no guarantee of decency, prudence or wisdom. Much of the same kind of education will only compound our problems” (Orr, 2004: 8). He furthers that “it is not education but education of a certain kind that will save us” (Orr, 2004: 8). Following on Orr’s startling observation, this section stresses the indispensability of ecological literacy.

An ecologically cultured individual holds the fundamental information needed to promote ecological stewardship and to interpret the interconnectedness of life (Hawken, 2007; Sutton, 2009). For Orr (1994; 92) “such a person would also have the practical competence required to act on the basis of knowledge and feeling”. Practical competence can only come as result of progressive experience. According to Orr (1994: 92) practical competence, caring and knowledge are the main elements of ecological literacy.

An ecologically literate individual/community appreciates the systematic organisation of ecological communities, for instance; how the ecosystem operates (Sterling, 2001; Stone & Barlow, 2005; Stone, 2009). These form the principles that facilitate educational reform (Capra, 1997: 3). An ecologically literate community lives sustainably by avoiding activities that destruct the earth thus promoting ‘good thinking’ and the ability to distinguish between a health and an unhealthy system (Sterling, 2001; Stone & Barlow, 2005; Herbert, 2008; Stone, 2009;

Segovia, 2010). Those who are not ecologically literate slip “the element of good thinking” making them incapable of differentiating between a healthy and unhealthy natural system (Orr, 2004; Sterling, 2001; 2008).

An ecologically literate person is acquainted with basic knowledge of the ecological crisis, and how it came into existence (Orr, 1992; 1994; Rogers, Jalal & Boyd, 2005; Krcmarova, 2009). Such a person has the ability to know the trends, rates and magnitude of the crises and the planet ecosystems (Rogers, Jalal & Boyd, 2005; Krcmarova, 2009). This could involve resource and energy use, resource exhaustion, soil loss, desertification, deforestation, species extinction, climate change amongst others (Orr, 1994; 2004; MEA, 2005; IPCC, 2007; UN, 2006; IAASTD; 2008; Swilling & Annecke, 2012).

An ecologically learned individual sees the ecology as the foundation for seeking meaning and patterns (Orr, 1994; Arnarson, 2011). Such an individual asks ethical questions and promotes sustainable values and places limits to resource consumption (Sterling, 2001; Swilling & Annecke, 2012). An ecologically conscious mind is in a position to ask the following questions:

- How does the earth’s system function?
- What is the source of materials, water, energy, food and the associated costs?
- What does my waste get discarded?
- What relation does he/she have with the surrounding region?
- How does the history of my region look like?
- What are the main plant and animal species in my community?
- What soil types do we have?
- What are the water and rainfall patterns like? (Orr, 1994; Stone, 2009; Arnarson, 2011; Swilling & Annecke, 2012).

Being ecologically literate can change one’s mindset. This results in the development of values and attitudes that respect basic principles of action and thoughtfulness that shapes a sustainable society (Stone & Barlow, 2005). It is therefore vital to nature ecological minds at tender ages (Wilson, 1996). As such, children need to be knowledgeable about plants and animals that surround them before they reach adulthood (Segovia, 2010; Center for Ecoliteracy, 2012a & b). For this to happen, educators need to be mentors and must include parents, teachers or neighbours who act as role models or advisers (Kammerman, 2010; Lindberg, 2012). In addition, it is essential that there can be learning materials that raise

consciousness. The next section deals with some of the key foundational areas that can assist in shaping an ecologically literate society as discussed below.

### **2.7.2 The foundations of ecological literacy**

The previous section explored the concept of ecological literacy and linked it to the creation of ecologically (and thus sustainability) minded next generation of citizens. At this stage, the study focuses on the foundations of ecological literacy in order to find out how its basic tenets link with the concept of ECD to produce ecologically conscious mind-sets.

Education must teach children the most relevant ecological content (Tilbury *et al*, 2002). However, children are being taught about ecological consciousness in environments that do not improve their relationship with the earth (Davis, 1998; 2005; Louv, 2005; 2008). These are inadequate to emotive or intellectualise the young children to live sustainably. Ecological literacy alters the way children live and talk. Learning must advance real life experiences of learners. Learning does not give distinctions between the community, school, learner or teacher (Orr, 1994: 91). My belief is that real learning is experimental and participatory. Children are active agents; they define the content and methods in which learning can be advanced. Their experiences with the earth form a vital tool for improving an understanding of the earth.

Children should be made to understand and accept that they are an element of the natural system (McCallum, 2010). As such, all forms of education should indoctrinate children with fundamental ideas of ecological stewardship (Tilbury *et al*, 2002; Segovia, 2010; IISD, 2012). Education must therefore teach children not to be dependent on nature but to show likeness for nature (Sutton, 2009).

For David Orr “education occurs in part as a dialogue with a place and has the characteristics of good conservation” (Orr, 1994: 91). Good conservation is a mutual activity that does not rely on the intelligence of one person. Orr says that ‘words and faithfulness have power’ in advancing good conservation. This is because they have an effect on behaviour and perception (Orr, 1994; Bickford *et al*, 2012). Individuals who are good conservationists are conversant with “the language of nature” for example; water, wind, insects, birds, and whales (SWSF, 2008; Chitwood, 2011; Stevenson, 2011; Arnarson, 2011 Vaseger, 2012). This form of language is richer than the general human’s speech. One’s ability to understand is determined by his or her knowledge of the natural systems. “Good conservation is unhurried”. It has its own rhythm and pace” (Orr, 1994: 91). It is guided and or controlled by the sequences and seasons. A good conservation is purposeful and takes a form of a structure

(Semetsky, 2010). Thus one should be able to ask the following questions “What is here? What will nature permit here? What will nature help us to do here?” (Orr, 1994: 91). A good conservation promotes heals and restores human and ecological systems. It is therefore essential to deliver a relevant content in learning processes.

Relentless experiences with the natural environment teach children to be observers of their landscapes (Sutton, 2009; Chitwood, 2011). They can be able to differentiate between a healthy and an unhealthy ecosystem. To have a reasonable understanding of nature, one needs to be an intellectual observant. This makes nature a “vehicle of thought, a source of language, metaphor and symbol” (Orr, 1994: 92). Diversity in nature is a source of intelligence and creativity; it promotes individuals to build their communities and neighbourhoods in a sustainable manner. This in turn may lessen overconsumption of materials, water, energy and food. As such, education can facilitate competence in learners to protect nature.

Theorists like Dewey say that “... practical competence is an indispensable source of good thinking” (Orr, 1994: 92). Good thinking comes as a result of one’s recognition of real problems and reflective thought (Segovia, 2010; Lockhart, 2011). Sustainability demands individuals to be active participants in reconstructing their neighbourhoods, communities, homes and towns. I therefore argue that it is necessary for young children to know the value of lengthening the supply of resources such as food and energy supply.

The section has highlighted the key factors in developing ecologically-minded children and future citizens of the planet. The major observation culled from the literature review is that children must be exposed to nature as much as possible so that they appreciate its importance to their own existence. An appreciation of the entire ecosystem (including the food chain) will alert children of their dependence on nature and inspire them to protect the ecological balance as a way of safeguarding their (and the environment) lives.

## **2.8 CHAPTER SUMMARY**

In line with the study’s objective to use literature review methodology in understanding the current trends in (and usefulness of) ecological learning-focused ECD approaches, the chapter has unpacked the concept of Education for Sustainability (EfS), connecting it ecological learning and ecological literacy. The chapter reviewed the Decade of Education for Sustainable Development and revealed the opportunities it has created for ecological learning and EfS. The main features of EfS were outlined as wells as the key roles of education in advancing sustainability. It was contended in the chapter that ecological learning is not entirely

a new concept, but it is gaining limelight due to the need to combat the negative impacts caused by the increasingly imbalanced ecosystem and unsustainable practises. Ecological learning and sustainability have been revealed as thriving on the understanding of systems thinking which enables individuals to appreciate and relate to their ecosystems in innovative sustainable ways. The wider section of the chapter has emphasised on the importance of education (particularly ecological learning) in creating sustainable living and futures. The next chapter will examine the application of ecological learning to the ECD sector.

## **CHAPTER 3: ECOLOGICAL LEARNING: A PARADIGM TO EARLY CHILDHOOD DEVELOPMENT (ECD)**

### **3.1 INTRODUCTION**

The previous chapter explored the meaning of ecological learning, revealing that ecological learning is underpinned by systems thinking. The chapter highlighted that ecological learning is best advanced within the context of SD, EfS and ecological literacy. This chapter seeks to examine the application of the paradigm of ecological learning (developed in the previous chapter through literature review) to ECD. The chapter is guided by (and responds to) the research question: how is the ecological learning paradigm applied to the ECD sector? The chapter is subdivided into three segments which address the following issues:

- The definition of ECD
- Emerging perspectives in ECD focusing on those that promotes child development and can form the basis to ecological learning
- Four different examples of approaches in ECD;
  - Montessori Method,
  - Steiner Schools,
  - Forest Schools and
  - Place-based learning.

The chapter provides brief case studies (through secondary research) of places where each of the types of ecological learning is taking place around the world, showing how each approach attempts to connect children with nature.

According to Mustard & Rutter (2000) in Davis (2009: 3), "... childhood years are the period of the greatest and most significant developments in a person's life and are generally regarded as the foundation upon which the rest of their life is constructed". It is during the early years that lifelong values and skills needed to solve current and future ecological crises can be imparted, and potentially develop mind-sets that consider the ecology as integral to their own lives (Davis, 1998; 2009; Blatchford, 2009). At this phase; children obtain basic life skills, for instance; persistence, problem solving, creativity, autonomy and cooperativeness (McCain, Mustard & Shanker, 2007; Pressior, 2008). Such skills are absorbed and can be retained as they grow older.

### 3.2 UNDERSTANDING EARLY CHILDHOOD DEVELOPMENT (ECD)

ECD refers to principles, concepts, programmes and policies that support the development of children from immaturity to maturity stage (Katz, 1996: 137). The UN General Assembly Special Session on Children in the article entitled “*A World fit for children*” argues that all children must be secured, cared and nurtured in ways that they can “be physically healthy, mentally alert, emotionally secure, socially competent, and able to learn” (WB/ UNICEF /UNAIDS, n.d: 1). The UN Convention on the Rights of the Child in their “General Comment 7” therefore understands ECD as the process of socio-emotional, physical, linguistic and cognitive development of children from 0-9 years (UN, 2006 in WB, 2011:5). ECD is the initial period of human development, and it begins during pregnancy (UNICEF, 2006; WB, 2011). According to WHO (2011: 6) ECD is determined by the structure and function of an individuals’ brain development as they are at risk to stimulation, poor childcare, stress, toxins and malnutrition amongst others (UNICEF, 2006; WHO, 2011; WB, 2011).

Childhood is an opportunity that can be capitalised for the mental development of the child and the building of a foundation for sustainable futures (Department of Social Development 2005; UNICEF, 2006; Heckman, 2006; McCain, Mustard & Shanker, 2007; WB, 2011; WHO, 2011). Intervening at this time can have enduring impacts on the behaviour, personality and intellectual capability of an individual. ECD programmes are important in that they exploit these opportunities to nurture the children’s psychological, mental, social, physical and cognitive development (WB, 2011; WHO, 2011).

ECD is a holistic procedure; “the progress of one domain often acts as a catalyst for progress in other domains” (WB, 2011: 5). The unconformity of one domain leads to functional or structural deviation of the other domains (UNICEF, 2006: 2; WHO, 2011: 6; WB, 2011: 5). There are mainly four correlated domains of ECD namely; socio-emotional, linguistic, cognitive and physical development (UNESCO, 2008a; WB, 2011; WHO, 2011).

The physical development of a child is mostly noticeable in the infant years until early or late adolescence. At this phase, children develop the proficiency to control their individual bodies through fine and motor skills (Brudete *et al*, 2005; Grisham-Brown, 2005; WB; 2011). EYFS (2008: 30) argues that children’s physical development must be supported by creating opportunities for interaction, creativity, movement, manipulation and control. Such developments promote specific activities, for instance; walking, crawling, writing and grasping of concepts (Kimberly, 2010). Kimberly (2010) asserts that children must be made to understand the significance of physical activities and how they can benefit them. According to

the WB (2011) physically fit children have more chances to comprehend the world in which they are embedded.

Cognitive development is a process whereby children develop a “basic understanding of facts and terms, creating rudimentary classifications, and crudely discerning causal relationships” (Kellert, 2008: 68). At this phase, children partake in actions that assist them to identify core ideas and information, for instance; labelling or distinguishing properties and features. According to Kellert (2008: 68) children develop the capacity “to know, label, and classify, which is the first stage of cognitive maturation”. The child develops the capacity to grasp concepts, match colours and solve puzzles. At school going age he/she broadens the capacity to grasp knowledge of names, alphabets, printing and numbers (WB, 2011: 7-8). Children’s cognitive development can also occur through metaphorical ways. The early childhood books for instance; help children to draw; paint and count. The child progressively shapes knowledge through absorption. This can be noticed in children’s development of primary mathematical abilities, memory, mental problem solving and analytical skills (Burdette *et al*, 2005; WB, 2011). These assist children to increase their attention span hence promoting their learning, organisation and planning skills (Burdette *et al*, 2005).

Language development starts with babbling, gestures, development and expansion words (WB, 2011: 8). According to EYFS (2008: 22) the development of appropriate language skills encourages cognitive development and advanced syntax that facilitates good thinking. EYFS (2008) adds that children must be supported in developing language, listening, speaking and reading skills. Caregivers and parents are encouraged to verbally communicate with their children from birth so that children develop the confidence and capacity to tell stories, depict letters, develop and grasp words (EYFS, 2008: 22; WB, 2011: 8).

Socio-emotional development refers to the manner in which children understand their own feelings and deals with peer relations (Grisham-Brown, 2005). In pre-schoolers, socio-emotional development is determined by past experiences and grows to involve self-regulatory capacities (control of personal and emotional behaviour), social perception (depicting feelings and views for self and others), behaviour management, and social competence (relations with educators and peers) (WB, 2011). At two years of age, children grow trust to those who surround them in suiting their own circumstances (WB, 2011; Grisham-Brown, 2005).

The domains of ECD are the departure point for promoting child development. In this context, “children must be provided with the experiences and support which will help them to develop a positive sense of themselves and of others; social skills and a positive disposition to learn”

(EYFS, 2008: 19). ECD scholars advance that the knowledge of the development of the child should provide the guidelines in teaching practices of children (Katz, 1996). Such knowledge of ECD assists teachers and researchers in developing new themes in the field (Grisham-Brown, 2005).

The section has broadly defined ECD and explicated its domains. The next section focuses on emerging themes in ECD.

### **3.3 CHILD DEVELOPMENT: EMERGING PERSPECTIVES**

There are a number of emerging perspectives in ECD that are mainly underpinned by the need to increase knowledge, enrolment, promote quality care and to sustain child development (NAEYC, 1996; 2009). Studies reveal that the understanding of the child is vital (UNESCO, 2011; WB, 2011; WHO, 2011). This section reviews some of the fundamental issues that are emerging in ECD concentrating on those that deal with child development. The section focuses on:

1. Developmentally appropriate learning
2. Interdisciplinary learning
3. Parental involvement and
4. Anti-bias or multicultural education.

#### **3.3.1 Developmentally appropriate learning (DAL)**

DAL refers to the implementation and or incorporation of pedagogies and curriculums that prioritises child development (NAEYC, 1996; Saracho & Spodek; 2000; NAEYC, 2009). DAL involves “taking into account what is known about how young children develop and learn, and matching that to the content and strategies planned for them in early childhood programs” (Feng, 1994: 5; Saracho & Spodek 2000: viii). Children need to be involved in the construction of their own knowledge through creative learning experiences (Saracho & Spodek, 2000: 122; NAEYC, 2009: 10). However, the capability of children to learn and understand concepts depends on their stage of personal development (EYFS, 2008; NAEYC, 1996; 2009).

In DAL, each child is considered to be dissimilar from the other children. According to NAEYC (1996; 2009) children have dissimilar growth patterns, family background, learning style, and personality. They add that educators must seek and consider these distinct elements and make decisions and actions that suit each child’s context (NAEYC, 1996; 2009). It should also

be considered that children's development differs intellectually, socially, emotionally and physically (WHO, 2011; WB, 2011). As such, ECD educators are encouraged to take into consideration the developmental rates of each child.

Research and theories on human development reveal that children grow rapidly in their early ages (Saracho & Spodek, 2000; WHO, 2011; WB, 2011). In most cases, children's developmental transformations are common and foreseeable in the initial 9 years. In DAL children have transforming capabilities hence are and should be treated in relation to their current and precedent experiences (NAEYC, 1996; 2009). Every child has learning proficiencies that authorise him/her to grasp information; skills and behaviour that promotes own development, personal judgment and behavioural change (NAEYC, 1996). According to Kostelnik *et al* (1993) learners should be allowed to communicate and express their own ideas, solutions, think critically and make decisions. DAL is guided by childhood learning and development principles that include:

- **The holistic development of the child:** The child is conceived of as an integrated whole whose development is based on the summation or the interrelatedness of the whole. The whole involves the physical, social, language, emotional, cognitive and aesthetic developmental elements. These developmental aspects depend on each other hence are equally valuable.
- **Child development is like a pattern:** Development is structured; it fluctuates with time and in logical ways. These logical sequences are a common aspect of child development and they can be anticipated.
- **Child development occurs at varying rates amongst, and within children:** Each child unlike the other has dissimilar aspects of development may be noticeable children and at dissimilar times of childhood.
- **Child development as interlinked:** Child development is historical, present and future are correlated hence are linked to one another. The understanding of new capabilities builds on the past.
- **Development has deferred, and accumulative effects:** Child development has a history of common and recurring experiences that can promote or obstruct child development, making the early experiences of the child to be the most elemental as they can have an enduring effect on the child.
- **Child development has optimal periods:** The ECD years are a phase where the most crucial transformations transpire. At this phase, the child is more receptive to negative and positive factors than in adulthood.

- **Children are knowledge constructors:** They enjoy active learning and deriving sense from their surroundings.
- **Every child has a different learning style:** According to Howard Gardiner every individual holds at most seven multiple intelligences (Saracho & Spodek, 2000). Gardiner argues that our knowledge and understanding of the world is facilitated by these intelligences that include interpersonal, intrapersonal, bodily-kinaesthetic, spatial, musical, logical-mathematical and linguistic (NAEYC, 1996; Saracho & Spodek, 2000). As such, every “person’s blend of competencies in each area produces a unique cognitive profile and determines the ways in which a person learns best” (Feng, 1994: 8).
- **Play enhances the learning of a child:** Play is a driver and a measure of mental growth. The wellness of the developmental domains is promoted through a variety of play (NAEYC, 1996; Saracho & Spodek, 2000).

ECD programmes are encouraged to integrate common elements that promote productive learning and development of the child and these include:

- The role of the physical environment to promote learning opportunities of children by encouraging them to explore the material and objects in it.
- Learners hold the right to work independently, as a group and to decide their learning encounters.
- The duty of the educator is to assess, record and observe and to teach establishing from the children’s information whilst discovering the strengths and weaknesses of each learner.
- Educators are intellectual beings; they understand and enhance the expressive and intellectual capacities of young children. They exchange information, ask questions and experiment in dissimilar ways.
- Emotional and social development promotes the intellectual ability of the child; they must be incorporated in curriculums and the classroom.
- Educators should make every effort to boost the children’s productivity, expressive and imaginative thinking.
- Children are intellectually and emotionally self-centred. They should be well taken care of by communities and families
- Learning must be advanced in interdisciplinary manners to stimulate the literacy capabilities of children (NAEYC, 1996; 2009).

### 3.3.2 Interdisciplinary learning

It appears that one weakness of modern education is “the division of knowledge into specialised disciplines ...” (Spies, 2010: 40). However, interdisciplinary learning is increasingly becoming vital in ECE with the aim of improving child development and learning outcomes (Saracho & Spodek, 2000: 268). Interdisciplinary learning refers to the advancement of more than one discipline in ECD curriculum without restricting to one area (Saracho & Spodek, 2000; Cone *et al*, 2009; Semetsky, 2010; Centre for Ecoliteracy, 2012b). These disciplines are and must be connected to one another through experience, topic, process, problem, issue or theme (Jacobs, 1989 in Cone *et al*, 2009; Centre for Ecoliteracy, 2012b). Interdisciplinary learning needs educators to identify the objectives, themes, skills and content that assist in evaluating children’s growth and development whilst facilitating learning (Cone *et al*, 2009, 4; Saracho & Spodek, 2000: viii; Feng, 1994: 9).

The integration of subjects is best advanced from the knowledge of “child development and the ways in which school prepares a child to be a productive member of the community” (Cone *et al*, 2009: 5). For Cone *et al* (2009) young children learn and develop as wholes; their development and learning aspects affects each other and by nature; children see learning as a package of integrated disciplines hence should not be detached. Disciplines must be selected in ways that support the “developmental capacities and ecological context in which” the children learn and inhabit (Feng, 1994: 10). John Dewey furthers that disciplines must be tied to the real life encounters and must include hands-on activities (Cone *et al*, 2009: 5; Saracho & Spodek, 2000: 268; Semetsky, 2010: 32). Interdisciplinary learning may therefore involve arts, physical education, science, maths, history or ecological knowledge (Orr, 2004; Saracho & Spodek, 2000, Centre for Ecoliteracy, 2012b). Educators are encouraged to generate occasions for learners to request and investigate key topics (Saracho & Spodek, 2000: 269), to allow children to utilise their potential through the familiarisation of different issues and context.

Selecting integrated disciplines involves a number of considerations including seasons or time of the year, teachers’ interest, resource availability, chances for skills application and relevance (UNESCO, 2008). Some of the key considerations include:

- Subjects or topics must build on the knowledge that the children have.
- Subjects must be advanced in a ways allows children to want to investigate more rather promoting memorisation of concepts.

- Subjects must supported by adequate research and content.
- Hands-on and active inquiry must be conveyed in learning.
- Themes must be revised or expanded in ways that show the understanding and interests of children (Saracho & Spodek, 2000; UNESCO, 2008).

Cone *et al* (2009: 5) confirms that “children learn best with the use of this [interdisciplinary] approach”. The approach ‘nourishes’ and maximises on the potential of each learner (Gardner, 1983 in Cone *et al*, 2009: 5). Piaget says that, “children profit from a concrete, practical, active learning experiences that bridge the gap between abstract concepts and hand-on real world” (Cone *et al*, 2009: 5). Interdisciplinary education promotes purposeful and thoughtful learning; carefully integrated subjects allow children to apply skills whilst boosting their knowledge (Saracho & Spodek, 2000; Feng, 1994: 10). Other benefits of interdisciplinary learning involve; brain development, improved understanding, increased capacity to learn significant developmental life skills, improved expression, communication, interest and self-motivation (Overbay *et al*, 2005; Cone *et al*, 2009). In addition, interdisciplinary education allows children to transfer knowledge and skills from one subject to another. It is therefore necessary to integrate parents in issues that concern learning and the development of young children.

### **3.3.3 Parental involvement**

Practice and research have in the last two decades revealed that parental involvement is an essential element of child development and learning (Saracho & Spodek, 2000; Heckman, 2006; McCain, Mustard & Shanker, 2007; UNESCO, 2008a; Kamerman, 2010). The Organization for Economic Cooperation and Development made it clear in 2006 that the significant role of parents must be acknowledged in policy formulations (OECD, 2006 in Kamerman, 2010). However, it seems apparent that most of the pre-school going children spend the greater part of their time at school or with caregivers as compared with the time they spend with parents (Kamerman, 2010). Saracho & Spodek (2000: 81) and Kamerman (2010:1) share the view that an effective ECD institution and curriculum is inadequate without effective parental involvement. Parental involvement refers to the systems and programmes that promote parents to be actively involved in the development and learning of their children (Burdette *et al*, 2005; Kamerman, 2010). Parental involvement may involve; special events, adult learning, open days and workshops. Parents are the primary and most influential teachers or mediators of children (Saracho & Spodek, 2000; Burdette *et al*, 2005; UNESCO, 2008a; Kamerman, 2010). It is stated by a number of scholars that parents have the greatest

impact in constructing fruitful skills, behaviours, values, attitudes of their children (Saracho & Spodek, 2000; Burdette *et al*, 2005; UNESCO, 2008a; Kamerman, 2010).

The childhood years are seen as a unique period whereby the child can understand particular/ definite skills such as language (Saracho & Spodek, 2000; Grisham-Brown, 2005). Saracho & Spodek (2000: 74) contend that “an effective curriculum must emphasise the development of language skills”. Nonetheless, children develop their first vocabulary at homes where they are in regular contact with their immediate families. Parents must assist children in developing the literacy and language skills that include the knowledge, vocabulary, structure and the syntax of language (Saracho & Spodek, 2000). According to Saracho & Spodek (2000) language skills develop efficiently when the children are given sufficient time to intermingle with their parents and elders. This entails that children must be constantly provided with the opportunities that facilitate literal expression of ideas, and exploration of language use. Parents are expected to discuss pertinent vocabulary or terminology with children. It is therefore essential for parents to identify and be knowledgeable about children’s early developmental stages and to give children practical activities that ensure that their children use, hear and discuss vital vocabulary (Wasik & Bind, 2001 in Saracho & Spodek; 2000).

### **3.3.4 Anti- bias curriculum or multicultural education**

Teachers are finding it difficult to educate and prepare learners from different cultural backgrounds because of age, religion, socio-economic status, sex, race, ethnicity, language amongst others (UNESCO, 2005; Banks, 2008). They add that it is difficult to achieve meaningful child development and educational excellence devoid of equity (UNESCO, 2005; Banks, 2008). In the context of education, equity refers to “equal opportunities for all students to develop to their fullest potential” (Bennet, 1990: 13 in Feng, 1994: 13). Young children are cognisant of their physical capability, race, and colour in their early ages. The negative biases of human and societal differences affect child development especially their health and social skills (UNESCO, 2005). Anti-bias or multicultural education endeavours to nurture every child’s development to his/her maximum potential. Children learn to distinguish, classify feelings and things in their early years. The main goals of multicultural education are therefore to:

- Create confident and knowledgeable children.
- Promote compassionate interaction amongst children.
- Promote critical thinking.
- Build self confidence in children.

- Promote decision making and problem solving techniques (Banks, 2008).

The section has reviewed emerging perspectives in ECD concentrating on those that promote child development. I highlighted the following approaches: Developmentally Appropriate Learning (DAL), interdisciplinary learning, parental involvement and anti-bias or multi-cultural education. However, it was discovered that none of these approaches is especially concerned with connecting children with nature. In my view, without an explicit connection of the child's experiences with nature, a vital opportunity is lost for the child to grow with a sense of awareness of his or her relationship with nature; that is, his or her appreciation of the importance of maintaining an ecological balance for a sustainable future. The succeeding section demonstrates that child-centred learning methodologies that focus on the child's learning environment offer a useful platform or starting point for ecologically focused ECD learning.

### **3.4 ECD PEDAGOGIES TO ECOLOGICAL LEARNING AND RECONNECTING CHILDREN WITH NATURE: CASE STUDIES**

Informed by the apparent side-lining of nature in ECD approaches discussed above, this section uses brief desktop researched case studies to demonstrate the theory and practice of nature-based early childhood development approaches. In this study, connection with nature is seen an essential aspect of every child's existence and development (Pyle, 2003; Louv, 2005; 2008; Charles & Louv, 2009; Sutton, 2009; Davis, 2010; Stevenson, 2011; Chitwood, 2011; Vaseger, 2012; Bickford *et al*, 2012). However, there is evidence that shows a reduction in children's direct contacts with nature hence increasing disassociation of children with their ecologies (Chalwa, 1998; Burdette *et al*, 2005; Louv, 2005; 2008; NACC, 2007; 2008; Charles, 2009; Stevenson, 2011). Studies published in the 2009 *American Journal of Play* showed that the numbers of children who have concrete experience with the earth are: India 18%, France 45%, South Africa 18%, America 33%, Indonesia 7%, Brazil 18%, and China 5% (Charles & Louv, 2009: 8). This deficiency is driven by fear of children's safety and health, lack of support, time and resources and the growing scheduled and structured time for children by mostly parents and guidance (Louv; 2008; Charles, 2009; Charles & Louv, 2009). Literature indicates that lack of affiliation and relationships with nature results in lack of discipline, low self-esteem, poor academic performance and problem solving skills, lack of creativity, stunted cognitive development and health problems (Charles, 2009: 468).

In most cases, ECE allocates more time to educator-directed lessons, leaving less time for learning and investigating exercises that uphold the children's curiosity and 'sense of

awesomeness' for nature (Davis, 1998; Davis *et al*, 2009; NACC, 2008; Segovia, 2010; Stevenson, 2011). "Rather than teaching students how to solve problems ..., students should be taught to examine why the problem arises and how it is connected to other problems" (Oblinger & Verville, 1998: 129 in Sutton, 2009: 20). While this remains a challenge, there is growing confirmation that making children feel that they are a component of the natural world results in more contented, accommodating, conscientious and creative children (Louv, 2005; 2008; Charles, 2009; Sutton, 2009; Chitwood, 2011; Stevenson, 2011; Vasager, 2012). Scholars agree that young children need to form concrete relationships with nature and those who surround them in their premature stage (Orr, 2004; Capra, 1996; NACC, 2007; 2008; UNESCO, 2008a). The child's sense of awesomeness is high during the early years; children yearn to investigate the world making it "the perfect vehicle for absorbing fundamental understanding about the Earth and its systems" (UNESCO; 2008a: 64).

The previous section reviewed emerging themes in the field of ECD. The rationale of this current section is to review ECD pedagogies that seek uphold ecological learning by connecting children with nature. Four different approaches have been selected as examples of ecological learning in practice in ECD: Montessori Method, Steiner Schools; Forest Schools and Place-based learning. The section briefs each of these approaches and will cite four examples of cases studies of where it is happening around the world. In this section, the investigator shall also give global examples within these four mini-case studies. The examples of case studies selected in this section are international, tried and tested in both developing and developed countries.

#### **3.4.1 Case study 1: The Montessori Method in South Africa**

The Montessori Method was devised by Maria Montessori who was a physician and educator in the 1900s (International Montessori Index, 2006). Maria Montessori spent most of her life implementing an innovative education system for young children when attending to the disadvantaged and mentally challenged children in Rome (International Montessori Index, 2006). The Montessori's approach was adopted by many countries, and examples of ECD Montessori schools around the world include; La Petite Montessori in America, Wonder Kidz International school in India and Buzan Montessori in China (International Montessori Society, 2009).

In her research in ECE and ECD, Montessori discovered that a 'sensory- based pedagogy' was essential for the establishment of effectual teaching and learning (Montessori, 1967), in ways that promote the ecological balance in holistic manners (Sterling, 2008; Sutton, 2009;

Segovia, 2010). One of the most central aspects of the Montessori approach is that it prioritises the individual child in realising his/her maximum potential (UNICEF, n.d; Sutton, 2009; Chitwood, 2011; Mabeba, 2011). The approach contends that each child is not the same as the other thus the approach seeks to suit the needs and context of every child by granting them a proactive role in learning processes that involve them in nature (Edwards, 2002; Miller, 2004; International Montessori Index, 2006; Sutton, 2009; Chitwood, 2011). In Montessori learning every child is an element of nature that is constituted of one web (Sutton, 2009; Segovia, 2010). Montessori contends that every child possesses some inside power that drives him/her to look for specific interactions and activities that sustains nature (Crain, 2004). The child is the most spiritual entity that can construct the foundations for a sustainable world (Edwards, 2003; Miller, 2004; Hawken, 2007; Sutton, 2009). Montessori promotes interdisciplinary education for young children that is strongly ingrained in nature (Edwards, 2002; 2003; Sutton, 2009; van Nierkerk, 2012). Montessori education advances interrelated subjects that facilitate the child to interpret the different aspects of the earth's systems (Saracho & Spodek, 2000; Miller, 2004; Sutton, 2009).

The Montessori Method is based on the following principles:

**The absorbent mind:** The approach believes that each child is capable of educating him/herself; the duty of the educator is to enhance learning (UNICEF, n.d; Edwards, 2003; Sutton, 2009; Chitwood, 2011; van Nierkerk, 2012). For Montessori the capability of the child to learn is determined by the child's surroundings that usually allow freedom to explore and choose activities (Edwards, 2003; Chitwood, 2011). As UNICEF (n.d; 39) confirms "what the child learns depends on people in his environment, what they say and do and how they react to him".

**Sensitive periods:** According to Montessori, each child has sensitive phases whereby they can grasp particular techniques; the teacher must depict these sensitive periods and create an enabling learning environment that uphold the intellectual aptitude of children to assertively conserve nature (Edwards, 2002; Sutton, 2009; Chitwood, 2011; Mabeba, 2012; van Nierkerk, 2012; UNICEF, n.d).

**The prepared environment:** Children's learning can be best advanced in a 'prepared environment' (UNICEF, n.d, Edwards; 2003; Sutton, 2009; van Nierkerk, 2012). An excellent 'prepared environment' is one that makes children see beauty and connect them with the marvels of the natural world (Edwards, 2002; Miller, 2004). Such a prepared environment is aesthetically pleasing, inviting, orderly, inviting and purposeful as evidenced by the practical

life area in South Africa, America, China, Canada and Japan Montessori classes (Edwards, 2003; Sutton, 2009). Montessori says that the “prepared environment” allows a learner to freely identify and promote their distinct power on specific tasks (UNICEF, n.d). In a ‘prepared environment’ children observe, discover and learn how to handle materials and objects for instance; toys, stationery and furniture (Edwards, 2003). According to Spies (2010: 61) “the inclination to value and appreciate the beauty and to care for and respect ones’ surrounding is likely to inform the way in which children relate to and discover nature”.

The progressive learning approach of the Montessori Method allows children to make “sense of new information through reflection and interaction” (Weissglass, 1999: 46). This is because nature helps children to meditate and interact with peers and educators. Learners can educate themselves through interaction with the ‘prepared environment’ that consists of interrelated tasks that demand critical cognitive thinking as they discover one another and the earth (Miller, 2004; Sutton, 2009). According to Rathunde & Csikszentmihalya (2005:345) in Holfester (2008: 1) the method can result in a task-oriented child “... who is intrinsically motivated to master challenging tasks”. Children can develop social and cooperative relations, aesthetics and imaginations and problem solving techniques (Edwards, 2003). This ability can be ‘seeded’ into children as they are the wardens of tomorrow.

As shall be illustrated in Chapter 4, in South African prepared environments, for instance, the Lynedoch EcoVillage, children appear better placed to understand that:

- Life is like a chain that connects people, societies and their interests
- Nature operates in cycles and is self-organising
- Life is constructed in bottom-up manners
- Nature is a recycler of waste
- Nature solves a multiplicity of problems and not one
- Information is needed for nature and human to thrive
- Life is better optimised rather maximised (Hawken, 2007; Semetsky, 2010; Arnarson, 2011).

**Self-education:** Children can self-educate themselves in an independent environment but can be directed by “pedagogic apparatus” of their preference (Holfester, 2008; Sutton, 2009). The manipulative tools employed in a Montessori class include, household items, metal objects, puzzles, rods, blocks wooden numbers, letters among others. By using a ‘sensory

based learning' young children acquire vital knowledge that supports ecological sensitiveness and protection (Edwards, 2002; Miller, 2004; Sutton, 2009).

**The educator's role:** Education is an innate process that develops instinctively in humans. The goal of a Montessori teacher is to stimulate learners, permitting them to develop inner discipline and self-confidence with little intervention (Edwards, 2002, in Holfester, 2008: 3), whilst utilising the sensitive periods before that of the mind (Lopota *et al*, 2005; Holfester, 2008), as the exit points to form bonds with nature (UNESCO, 2008a). For many scholars; teachers are guiders, partners and nurtures of ecological consciousness (Edwards, 2003; Sutton, 2009, Chitwood, 2011). They assist in boosting the confidence of children around nature issues through systematic observation (Edwards, 2003; Sutton, 2009; Chitwood, 2011). Edwards adds that, "the teacher brings the young child into close contact with reality through sensory investigation and practical activity ..." (Edwards, 2003: 36). Such activities may include sustainable gardens, river, lake and stream clean up and preservation of habitats (Chitwood, 2011). The Montessori approach encourages that teachers bring children, community and societies together so as to integrate their spirit, body, mind and emotions as one foundation of promoting holistic learning (Edwards, 2002; Sterling, 2008; Segovia, 2010; Semetsky, 2010; Lockhart, 2011; UNESCO, 2012). In support of Edwards; (Swartz 2010: ii in Lockhart, 2011: 20) advocated for spiritual renewal, "... but in a renewed mind and in a different pattern of spirituality". Segovia (2010: 748) believes that spirituality can awaken in children consciousness that nature is consecrated and exists hence must be treated with care and admiration.

Outdoor time (that promotes spirituality) is a significant element of South African Montessori learning centres such as the Lynedoch crèche. This is because teachers reckon that young children require time to survey nature. The educators create free time for outdoor activities and encourage children to protect nature whilst increasing inquisitiveness. This inquisitiveness results in children to want to learn about ecological conservation (Sutton, 2009).

Educators confirm that an interactive environment offer high chances of independent learning (Mabeba, 2012). Learners are permitted to partake in activities through 'learning by doing' (Sutton, 2009). As such, Montessori learners not only compute, write and read; they hold the fundamental knowledge about respect for the ecology (Edwards, 2003; Sutton, 2009). Some of the main activities in South Africa involve exploring with vegetation, playing with water, mud and sand, restoring and connecting with nature, climbing trees and hills, and running, recycling, and walking in nature (Sutton, 2009). Children also play with tree stumps, pebbles,

sand, grass, boulders and logs. Montessori education also involves teaching of complex topics such as, rain, water cycle, sculpting of animals, parks and bird life (Edwards, 2003: 36).

Sutton (2009: 18) confirms that “Montessorians are doing even deeper and more fundamentally to cultivate sustainability”. Reports show that Montessori practices and its related ecological sustainability philosophies have a possibility to foster new ways of creative and critical ways of thinking through its process and content (Sterling, 2008; Sutton, 2009; UNESCO, 2012). The Montessori approach as practised in schools in South Africa appear to:

- Produce socially and academically better results than conventional schools.
- Inculcate a culture of playing and working cooperatively.
- Develop children to be responsive and responsible in engaging in ecological activities (Bower, 2006: 212 in Holfester, 2008, Mabeba, 2012; van Niekerk, 2012).

### **3.4.2 Case study 2: Steiner Education in Finland**

Steiner education was propounded by Rudolf Steiner, an Austrian educationalist and scientist (EFYS, 2008; Vasagar, 2012). The approach first surfaced United States of America (USA) and the United Kingdom (UK) but has expanded to other countries. Existing examples of Steiner schools include Yandel Kindergarten, Katherine Steiner, in Australia and Fujino Steiner School in Japan (<http://www.steiner-australia.org/alphabet.html>), Jardim Micheals and Escola Waldorf Quantil Magico in Brazil (<http://www.sab.org.br/pedag-wal/lawaldir.htm#BRASIL>). Although I focus on Finland for my case study, it is important to mention that other countries such as Canada, Sweden and Australia have also embraced the Steiner approach. The Steiner approach is a humanist form of education that seeks to support children’s creative and imaginative thinking through interdisciplinary learning of subjects that promote the preservation of ecologies (Edwards, 2002; EYSF, 2008, Satori, 2012). The benefits of this approach to ecological awareness can be inferred from the following student review of Steiner education: “it’s about the subjects we study and the way we study them... its about getting information in between” (Vasager, 2012: 1). The approach thus seeks to improve the academic performance of learners and to promote the intellectual, physical, emotional, and spiritual development of the child (EFYS, 2008; Segovia, 2010). Steiner education creates foundations for young children to be morally and ecologically responsible citizens by matching their inborn nature regardless of cultural and social change (EFYS, 2008; Satori, 2012, Vasager, 2012). According to Vasger (2012: 1), Steiner education “is a school where an appreciation of nature is deeply embedded in children’s lives”. The approach is therefore recognised for educating

the heart, hands and head of children by integrating the intellect and will of young children (Vasager, 2012).

In one of his article entitled "*Beyond Ecophobia: Reclaiming the Heart of nature Education*" David Sobel argues that children must be first allowed to care and love nature for them to preserve it (Sobel, 1996). One of the major tenets of Steiner education is that children need to be connected with the world before they begin to value it (SWSF, 2008; EYFS, 2008; Satori, 2012). According to Charles (2009: 469-470) children with "... little or no personal connection to nature are unlikely to become passionate stewards of the earth". Steiner practices in Finland look for the best methods of making nature an understandable concept to children in developing their affinity with the earth (Satori, 2012). As such, children are exposed to nature; its exquisiteness and diversity (Satori, 2012).

In Steiner education, learning is best advanced in unhurried settings and calm environments that promote the sensory sensitiveness of learners (SWSF, 2008; Satori, 2012). The Steiner approach promotes the use of the child's mind and senses in exploring the spiritual and the physical worlds (Vasager, 2012). Learning is closely related to the daily experiences of the child (EYFS, 2008). Table 3.1 is a summary of the main guiding principles of Steiner education.

<b><u>Child development</u></b>	<b><u>Respect for others</u></b>	<b><u>Observation, planning and assessment</u></b>	<b><u>Play and exploration</u></b>
<p>Each child is unique to him/herself.</p> <p>Each child must be educated to promote his/her lifetime existence on the earth. As such, each child's development must be respected and understood by caregivers.</p> <p>The child should be perceived as whole (including his/her peers and family).</p>	<p>The child is a spiritual being who grows gradually.</p> <p>The responsibility of the educator is to create a secure, nurturing, warm and joyful setting.</p>	<p>ECD environment must be implemented in manners that promote children to develop holistically.</p> <p>Educators must regularly meet so as to exchange information.</p>	<p>Play promotes meaningful learning, it also shapes children's social techniques.</p> <p>Play is a way of exercise; it improves the concentration of children.</p> <p>The outdoors promotes children to explore and investigate.</p> <p>Play allows children to be adaptable and creative enduring learners.</p>

**Table 3.1: The guiding principles of the Steiner approach**

(Source: Adapted from EYFS, 2008).

In Finland, Steiner ECD centres regard the outdoor area as doing more good than harm to the children's learning about (and experiences with) nature. Outdoor time is allocated for children to engage in activities such as; organic gardening, bush adventures and playing in mud or sand (EYFS, 2008; Satori, 2012). Children also familiarise with water, food, and nutrient cycles. Pre-schoolers use natural objects such as branches and logs and do simple tasks such as raking or digging materials. This helps the children to familiarise with the natural world from which the objects are derived (EYFS, 2008, Satori, 2012; Vasager, 2012). Children are taken to parks to discover the exquisiteness of the earth.

In Steiner education learners are taught about the values of nature thus allowing them to understand its diverse elements (Vasager, 2012). "The beauty of nature, plants, insects and animals is brought to the children with the awe and wonder" (SWSF, 2008: 4). Children are

also taught to be responsible citizens, for instance; through washing linen, repairing breakages, and oiling toys and furniture (Satori, 2012; Vasager, 2012). Steiner education is thus a form of learning that allows children to play and work together and to develop a sense and culture of responsibility (Edwards, 2002; EYFS, 2008; Semetsky, 2010; Satori, 2012; Vasager, 2012).

#### **4.3 Case study 3: Forest Schools in Sweden**

Forest schools started in Scandinavia and are increasingly becoming successful in Sweden. Forest schools are a form of education whereby children of mixed age groups do most of their learning in outside settings (Littledyke, 2007; Robertson 2008a & b; Knight, 2009). Forest schools like conventional schools seek to educate, care and stimulate children by making nature a component of their life (Davis, 1998; Littledyke, 2007; Knight, 2009; Vasager, 2012). Forest schools advance topics that nurture children to construct sustainable futures by concentrating on the needs and interest of children whilst sharpening their knowledge (Knight, 2009).

In most cases, the location of a forest school is not permanent; they are situated close to woodlands or any other place that connects children with nature (Knight, 2009). Learners are given the liberty to decide on points of learning; and teachers make decisions based on distance, safety and the interests of the children (Robertson 2008a & b; Knight, 2009). Children learn, explore and play in natural or forest environments regardless of seasons, weather or time of the day (Robertson 2008a; Knight, 2009). Children are encouraged to put protective clothing that suits the weather.

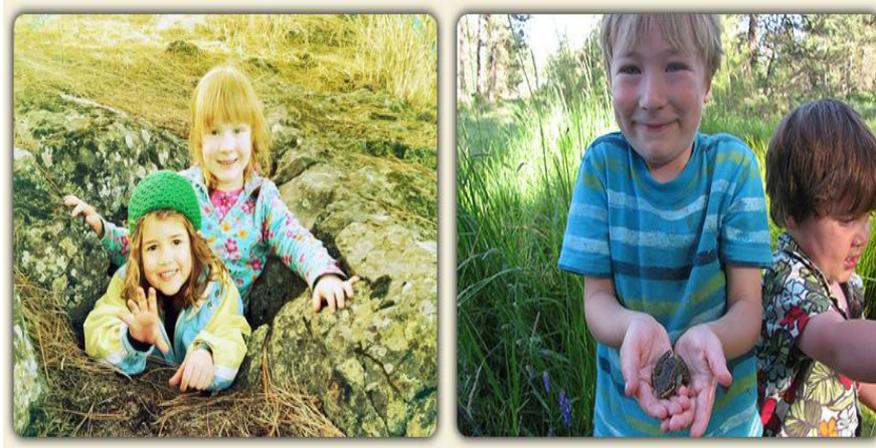
The pedagogy of forest schools rests on the idea "... that children's knowledge, activities and togetherness is fulfilled by nature" (Robertson, 2008a: 5). Swedish Forest schools reckon that children can significantly conserve nature when given sufficient opportunities to engage in it (Davis, 1998; 2009; Robertson, 2008a & b; Knight, 2009). Table 3.2 summarises some of the main activities of Swedish forest schools.

<u>Activity</u>	<u>Developmental advantages</u>
Using natural resources in playing creative games, constructing structures or shelters using tree branches with the help of peers or elders.	These assist children to develop their own thinking without any assistance
Constructing structures or shelters using tree branches with the help of peers or elders.	This promotes corporation skills and determination.
Role play	Build team work skills, and shared imagination
Meditation	Shapes one's character and self-awareness
Walking of the bushes and forests	Improves communication and planning skills
Tree climbing and forest explorations	Improves physical awareness and personal strength
Singing rhymes and songs and story telling	Improves children's concentration
Hide and seek activities	Boosts the mind of children through the development of exact anticipation and thoughts

**Table 3.2: Main activities of Swedish forest schools**

(Source: Adapted from Robertson, 2008 a & b; Knight, 2009).

Figure 3.1 shows images of children in forest schools education.



**Figure 3.1: Children in forest school education**

(Source: Adapted from <http://www.twineagles.org/forest-kindergarten.html>).

Although some scholars cite restrictions to outdoor education, for instance; the lack of suitable and desirable spaces for play (Littledyke, 2007 in Spies, 2010), there are a number of benefits associated with forest school education (Davis, 1998; 2009; Knight, 2009; Robertson, 2008a & b). Forest schools promote child-led learning, investigation and responsiveness to nature (Robertson, 2008a). Mentors in Sweden say that advancing the knowledge that concerns nature in infants allows them to form lasting affiliations with and nature and can result in enduring sustainable attitudes (Robertson, 2008a & b). According to NACC (2008) learning in nature deeply touches the instincts of infants, stimulates their imaginations, brings topics to real life situations and it improves children's senses and learning capabilities.

Forest school learning also promotes child development, particularly balance, alertness, tactile skills, and physical coordination (Knight, 2009; Moss, 2012). Studies reveal that children who go to forest schools are less expected to experience injuries in nature and in life (Robertson, 2008a; Knight, 2009). Such children can take risks that can profit them to handle situations, dangerous tools or fire (Moss, 2012). Swedish forest schools also demonstrate the following benefits: emergence of new themes, reduced stress, increased understanding and knowledge of the ecologies, improved concentration, motivation, communication, language, social skills, confidence, self-esteem, productive citizens and academic performance (Knight, 2009; Davis, 2010; Moss, 2012).

### 3.4.4 Case study 4: Place-based learning in California

There is a mounting distress over the diminishing sense of place, affection and belonging in young children (Louv, 2005; 2008; Robertson, 2008a & b; Stevenson, 2011; Moss, 2012). The lack of a sense of place “can engender both apathy and ignorance in children’s early perceptions of the world around them and their roles in enjoying, learning from, and protecting it” (NACC, 2008: 9). John Dewey proposed the need to advance ‘place based learning’ as it engages learners with their ecologies (Woodhouse & Knapp, 2000; Centre for Ecoliteracy, 2012b). In the article, “*Making sense of place: Exploring concepts and expressions of place through different sense and lenses*” Trigger (2008:301) argues that “emplacement is not something people choose ...”; it is an imperative part of every child (Louv, 2005; 2008; Pressior, 2008; Charles, 2009; Charles & Louv, 2009; Blatchford, 2009; Davis *et al*, 2009; Davis, 2010; Stevenson, 2011; Arnarson, 2011 ). There is however a number of examples of place based learning including Campus kindergarten in Australia and Mt View preschool in Zimbabwe.

Place-based learning is a form of education that links young children with their ecologies, culture and experiences (Lamers, 2008; UNESCO, 2008a; PEEC, 2010). The core objective of place-based learning is to promote local cultural and ecological sustainability by seeing children as an element of human culture and the natural world (Woodhouse & Knapp, 2000; IISD, 2012; UNESCO, 2012). The most salient principles involve the incorporation of the ethic of care when engaging in practical encounters and advancing learning that is grounded in a ‘sense of place’ by exploring the local human and ecological communities (Stevenson, 2011; Holmgren, 2012). As such children and teachers are obliged to know their position within the local bioregion in efforts to minimise the impact of humans on the local bioregion (Woodhouse & Knapp, 2000). David Orr’s idea of “ecoliteracy” hints at restructuring education so that it links place-based learning with the outside settings (Orr, 2004; Stone & Barlow, 2005; Stone, 2009).

In California for instance; children construct and learn techniques by surveying their localities and mixing communities (Chawla & Escalante, 2007; PEEC, 2010; Swilling & Annecke, 2012; Centre for Ecoliteracy, 2012b). Place-based learning demands one to ask the following: “where am I? What is the natural and social history of this place? How does this place fit into the larger world?” (Centre for Ecoliteracy, 2012b: 1). The ability to respond to such questions promotes children’s learning and assists in the documentation of history, foster change, identify identities and solve problems (Sterling, 2008; Blatchford, 2009). Moreover, the questions also promote children to appreciate and understand their ecologies (Woodhouse &

Knapp, 2000; Stevenson, 2011). Some of the main features and activities at Californian place-based learning schools involve:

- It seeks to promote interdisciplinary learning.
- It involves experiments.
- It links place with the society and the self.
- Experiences of learning outside classrooms.
- Connecting students in meaningful projects such as; habitat restoration, river reclamation re-vegetation and clean-up activities.
- Linking place-based projects with actual learning content.
- Orientation of children to be problems solvers through hands-on activities.
- Learners are seen as active participators in selecting sustainability projects that also profit the community.
- Students are taught to perceive their society as an integrated ecosystem in appreciating the connections and process that promotes sustainable living (Lamers, 2008; Stevenson, 2011; Centre for Ecoliteracy, 2012b).

Children should have the chance to grow a sense of their surroundings for them to realise the significance of nature (NACC, 2008; Arnarson, 2011; Stevenson, 2011). Research carried out in California shows that place-based education promotes learners to understand their own context, meaning of learning and to safeguard their ecologies (PECC, 2010). The following benefits are also confirmed: improved thinking skills, improved classroom behaviour and academic performance, active citizens, improved community-school relationships, lifelong environmental stewards, enhanced sense of place, improved relationships between learners and teachers, lower absenteeism, improved health (diabetes, obesity, mental and physical wellness) (Chawla & Escalante, 2007; Sutton, 2009; PEEC, 2010; Segovia, 2010; Centre for Ecoliteracy, 2012b). Although some condemn the approach for not fitting in the progressively consumer and technologically oriented society (Woodhouse & Knapp, 2000), place-based learning allows children to work and live in ways that preserve ecological and cultural sustainability (Sterling, 2008; IISD, 2012; UNESCO, 2012). This requires children to understand patterns that constitute the planet (Sterling, 2001; Stone & Barlow, 2005; Stone, 2009; Arnarson, 2011).

The section has reviewed the pedagogies that promote relationships with nature whilst citing examples of places where such practices are happening. It has been demonstrated that affiliation with the natural world is a vital element to ECD.

### 3.5 CHAPTER SUMMARY

The chapter explored the definition of ECD, expanding on its spheres with a review of emerging perspectives in ECD focusing on those that uphold childhood development such as the Developmentally Appropriate Learning, interdisciplinary learning, parental involvement and multicultural or anti-bias education as providing the starting point or platform for ecological learning. I have indicated that there are a number of pedagogies that aim at connecting nature to children. Four different approaches of ecological learning in practice (the Montessori Method, Steiner Schools, Forest schools and Place-Based Learning) were cited as examples and their nature and practice discussed with relevant brief case studies. The Montessori Method gives priority to the individual child and grants the child a proactive learning process in nature. Steiner education promotes the inborn ecological responsibility of children with nature by giving children the chance to love nature as a primary goal. The outdoor settings of Forest schools have been seen to promote children's love and stewardship for nature by exposing them to it for greater periods of time. Place-based learning ties children with their ecologies by making them engage with their surroundings. The examples provided in this chapter support the perspectives outlined in the literature review section, but add specifically and explicitly a connection with nature which removes the approach from purely an anthropocentric one (Blatchford, 2009; Bickford, 2012). The next chapter provides two comprehensive model case studies of ECD institutions that place ecological learning at the centre of their teaching and learning approaches with a view to understand the efficacy of ecologically-focused early childhood teaching and learning approaches.

## CHAPTER 4: CASE STUDIES

### 4.1 INTRODUCTION

The previous chapter applied the paradigm of ecological learning to the ECD sector and reviewed emerging themes in ECD that promote child-centred ecological learning. The basis, scope, theory and practice of such early childhood development-focused approaches to ecological learning were explored with relevant examples of four different pedagogical approaches (Montessori Method, Steiner education, Forest schools and Place-based learning). This chapter follows on the previous one and attempts to demonstrate the practice of ecological learning in ECD through a comprehensive study of two case studies. In view of the study's overarching objective to explore current trends, scope, content and methodologies involved in ecological learning in ECD, and how they help prepare a pro-ecological generation, this chapter seeks to discern from the case studies the major highlights of ecological learning in ECD, and will also pay attention to strengths and weaknesses of the teaching and learning approaches used. The information obtained from this undertaking is useful for recommendations to others attempting to build ecological learning in young children.

The chapter reviews two model case studies in which the benefits of ecological learning have been realised and shall be informed by the paradigm of ecological learning in ECD developed in the previous chapter. In reviewing the literature of the two model case studies, the chapter focuses on how each of the two institutions use ecological learning in their teaching and learning approaches as a platform for producing a generation of ecologically literate generation. The chapter demonstrates how the daily teaching and learning practices and thinking in both institutions have resulted in a culture of ecological sustainability. The historical background of both case studies shall be traced showing how both institutions (Lynedoch EcoVillage in South Africa that employs the Montessori Method and the Campus Kindergarten in Australia that promotes place-based-learning) are situated in once troubled communities facing sustainability challenges and how those problems are being transformed into potential for change through child-oriented ecological learning. I shall show how each of the examples have managed to transform from a unitary organisation into a society/community centred projects. The Lynedoch case study shall focus on the permaculture project, the daily learning experiences of reconnecting with nature, art and appropriate technology. The case study shall also show how the child is made the centre of sustainability development through ecological learning. The Australian case study, on the other hand, will explore the Campus Kindergarten's Sustainability Planet Project (SPP) – demonstrating how it has resulted in a

number of ecological projects emphasising on the role that children can play in promoting ecological initiatives.

## **4.2 CASE STUDY 1: THE LYNEDOCH CRÈCHE, LYNEDOCH ECOVILLAGE (SA)**

### **4.2.1 Introduction**

One way of building sustainable futures is through ecological learning. This point is confirmed by this case study of Lynedoch EcoVillage, described by Swilling & Annecke (2012: 282) as one of “the first ecologically designed and socially mixed intentional community in South Africa”. An EcoVillage is defined as a “human scale, full-featured settlement, in which human activities are harmlessly integrated into the natural world, in a way that is supportive of healthy human development, and can be continued into the indefinite future” (Gilman, 1991: 7). The Lynedoch Crèche is found within the Lynedoch EcoVillage and is one of the working examples of practical ‘integrated sustainable development’ that is fostered through ecological learning because it aims at striking balance between “growth, equity and sustainability...” (Swilling & Annecke, 2006: 315). The ecological learning practice at the Lynedoch Crèche is centred on the Montessori Method. Some areas of focus in the curriculum include world change, the adult, the child, the prepared environment and healing (Miller, 2004; Spies, 2010).

This study perceives the Lynedoch Crèche as one working example of ecological learning from which lessons on the efficacy of ecological learning for sustainable development in ECD can be learnt. The useful aspects of this institution shall be documented, focusing on everyday learning experiences and practical initiatives. The case uses primary and secondary data sources in meeting the objective of examining the practice of ecological learning within practical model ECD ecological institutions. The primary method used in this study included interviews and observations that were carried out on particular days stretching from May-June 2012. The interviews were carried out using structured and semi-structured questions. Key sources or respondents included Annecke, E. the Director of the Sustainability Institute; Mabeba, E who is also a board member of the Lynedoch Development Committee, Montessori professional, and dweller of the Lynedoch EcoVillage; van Niekerk R., a Montessori ECD trainer; Mnyaka, N and Mgubo, Z who are the ECD assistants. Other respondents include gardeners, recyclers, green building constructors, and the caretaker. The secondary sources included the Sustainability Institute website and articles about the EcoVillage that I was given by Naledi Mabeba.

The historical background and context of the Lynedoch EcoVillage incorporating the Lynedoch crèche shall be given followed by a delineation and analysis of its goals and visions. The permaculture project will be documented showing how it began, associated objectives, meaning, ethics, principles, benefits and suggestions for further improvements. I will show how ecological learning as part of the curriculum can reconnect children and restore nature, involve children in art, advance subjects around appropriate technology whilst promoting community development. My findings and conclusions will be presented at the end of the case study.

Table 4.1 shows the main informants of the Lynedoch Crèche.

<b>Eve Anneck</b>	She is the establisher of the Sustainability Institute, and is a co-founder of the Lynedoch EcoVillage and Lynedoch Development. She has for many years worked in ECD as a Montessori educationist. She is also engaged in leadership and dialogue facilitation.
<b>Naledi Mabeba</b>	She is the project coordinator of the ECD programme at the Lynedoch EcoVillage. She is also an enumerated Montessori professional. She has several years of working as an ECD teacher and trainer in Montessori education.
<b>Ross van Niekerk</b>	She is an ECD Montessori trainer and teacher. Ross is the former principal of the Lynedoch crèche.

**Table 4.1: Key Informants from the Lynedoch Crèche case study**

Source: (Adapted from SI, 2012).

#### **4.2.2 Historical background and context**

Historical background assists us in studying the present. Context helps us to understand the environment in which the case study is situated. This section is an overview of the historical background and context of the Lynedoch EcoVillage focusing on the physical and social aspects that resonate with its child-centred approaches.

The Lynedoch Crèche is part of the Lynedoch EcoVillage that is located on the historical site of the Drie Gewels Hotel. The Lynedoch EcoVillage used to be one of the most unwelcoming

sites with a corrugated iron shed. This shed was previously a party house for Stellenbosch University (SU) students (Swilling & Annecke, 2006: 315).

The Lynedoch EcoVillage is within a driving distance of 35 minutes from the main city and touristic destination of Cape Town (SI, 2012). It is adjacent to the main rail line that links Stellenbosch and other towns. It is within an estimated walking distance of 200 metres from the Lynedoch station. It is bordered by the spectacular Stellenbosch mountains "... the exceptional diversity of the 'fynbos' plant kingdom, the ancient history of local settlement, and the wild and windy coast" (SI, 2012). Stellenbosch is predominantly a white commercial viticulture area.

The black population in Lynedoch area grieved from economic, education, housing and tertiary education segregation (Swilling & Annecke, 2006; van Niekerk, 2012; Swilling & Annecke, 2012; Annecke, 2012). The '*dop system*' yielded social damage for the black and coloured population (Spies, 2010; Mabeba, 2012; van Niekerk, 2012; Swilling & Annecke, 2006; 2012). The '*dop system*' refers to the payment given to farm workers in the form of alcohol (Van Niekerk, 2012). The effects of the '*dop system*' are passed through generations; hence the area is rife with domestic violence, alcoholism, Foetal Alcohol Syndrome (FAS) and poverty (Scott, 2012; van Niekerk, 2012; Annecke, 2012). This affected children making them to enter primary school without adequate preparation (Annecke, 2012). The development of the ECD programme in 1998 with Naledi, Eve and Ross made significant changes by making children ready for school (Annecke, 2012; Mabeba, 2012). This has made the Lynedoch Crèche one of the safe environments that create sustainable mentalities of a younger generation. It distinguishes itself from the local community that is rife with social, ecological and economic problems.

The section has given an overview of the historical background and context of the Lynedoch EcoVillage in which the ECD programme is located. The physical setting and the social context that emanated from exclusion of the black population and their consequences have been highlighted. I have indicated that despite the historicity of social problems, the EcoVillage remains one place that distinguishes itself from other communities. The next section outlines the goals and visions of the EcoVillage.

### 4.2.3 The goals and visions of the Lynedoch EcoVillage

This section is an overview of the goals and visions of the EcoVillage. The section commences by indicating how the EcoVillage is run by a socially diverse group, the Lynedoch Development Company (LDC) highlighting some of the challenges that have been encountered and how they have been resolved resulting in the formulation of the Lynedoch EcoVillage guiding goals. Lastly the main features of the EcoVillage shall be outlined and linked to the goals of the EcoVillage's ECD programme.

The LDC runs the development of the 7 hectare land of the Lynedoch EcoVillage (Spies, 2010; Swilling & Annecke, 2012: 282; Mabeba, 2012). The LDC is a socially diverse group of professionals and local community leaders, the principal and the founders of the Sustainability Institute (SI) (Swilling & Annecke, 2006; 2012). The board was established in 2000 so as to advance sustainable living. It became a challenge for the board to gather enough resources, and the challenge was addressed by the SI funded by the Ford Foundation together with the School of Public Leadership and Management and Spier Leadership Institute (a non-profit trust) (Swilling & Annecke, 2012; Annecke, 2012). The SI is liable for community building, institutionalisation and innovation design (Swilling & Annecke, 2006: 316). Commitment by SI and SU resulted in the formulation of the Lynedoch EcoVillage guiding goals which are:

- The Lynedoch EcoVillage must be a socially integrated community (class and race inclusive) and should be structured in a child centred manner.
- The EcoVillage should be a functional example of an ecologically designed and liveable urban system.
- The EcoVillage should be an economically and financially sustainable community (Swilling & Annecke, 2006; 2012, Mabeba, 2012; van Niekerk, 2012).

The LDC envisaged the Lynedoch EcoVillage to be a safe community where SA Citizens from all backgrounds can live amicably with one another and with nature (Swilling & Annecke, 2006: 316). It is their hope that all people could visit and exchange the EcoVillage's way of living whilst learning, restoring and creating a better world. Swilling & Annecke (2006: 316) state that "it must ... be a place where all life is celebrated and beauty in all its forms treasured for this and future generations".

The main infrastructure at the Lynedoch EcoVillage includes:

- A primary school constituting of 400 pupils from local farm worker families
- An ECD centre of 45 children, 12 babies and a “Changes Youth Club” on the upper floor
- A huge all-purpose hall
- Classrooms and offices used by the SI
- Converted old and historical Drie Gewels Hotel and a house of 25 residence used as a conference venue and accommodation rooms for the SI programme participants
- 42 newly constructed residential sites
- Commercial area for crafts, small manufactures and offices
- An organic farm acquired through land reform by Spier
- Land for indigenous trees and a green village
- Restrictive traffic space that secures space for pedestrians and children (Swilling & Annecke, 2012: 289-290).

This section has provided a summary of the goals and visions of the EcoVillage. The section has indicated that the EcoVillage is run by a socially diverse group, the LDC and have highlighted some of the challenges that have been encountered and how they have been resolved. The commitment that led to the formulation of the Lynedoch EcoVillage’s guiding goals and lastly the main features of the EcoVillage were briefed. The following section introduces the Lynedoch crèche.

#### **4.2.4 An Introduction to the Lynedoch Creche**

The Lynedoch crèche is positioned in the middle of the Lynedoch EcoVillage. The crèche is running with the help of the Lynedoch Development Company management team that includes Naledi Mabeba who is also a Montessori Teacher at the Lynedoch EcoVillage (Mabeba, 2012). The crèche is registered with the Republic of South Africa’s Department of Social Development (Mabeba, 2012). The crèche gets its funding from the United Kingdom which assists in paying the children’s fees. Also, part of the Lynedoch EcoVillage ECD programme is the Montessori Training service offered by the Sustainability Institute and Learning for Sustainability Further Education that is based within the Lynedoch EcoVillage). The Lynedoch ECD centre enrolls children aged 0-5 and is run according to the guidelines of the Montessori approach. The care givers at the Lynedoch crèche include Mabeba, N. (also a recognised ECD trainer), van Niekerk R., (an ECD trainer and a dweller at the Lynedoch EcoVillage),

Mgubo Z., Mnyka, N., Gelant V., and Jansen C. At the present, the crèche has 45 Children and 12 babies from different incomes and racial groups (blacks, whites and mixed race children (Mabeba, 2012). The purpose of the Lynedoch ECD institution is to shape future sustainable societies that begin in the early years (SI, 2012). The ECD programme has been running since 2003 to present. Learning at the Lynedoch crèche concentrates on the application and integration of lessons (Mabeba, 2012). The next section proceeds to give some of the activities of the Lynedoch ECD ecological learning and curriculum, highlighting how these develop ecological awareness in children. The permaculture project shall be reviewed to demonstrate that ecological learning curriculums must be directly related to the practical realities of learners so as to connect children with the earth.

#### **4.2.4 Ecological learning and the curriculum**

##### **4.2.4.1 The permaculture project**

It seems one of the challenges of ECD ecological learning is the disengagement of subjects from the practical realities of learners (Spies, 2010). It is necessary that ECD centres teaches subjects and topics that directly connects children with the earth and permaculture is one them; (Annecke, 2012). The Lynedoch permaculture project began after the ECD educators were involved in a permaculture course at the SI, called the EcoVillage design course (van Niekerk, 2012; Annecke, 2012). The EcoVillage design course is a progressive training course that seeks to develop skills for practical learning with the objective of effectively improving sustainability initiatives (Global EcoVillage Network (GEN), 2006) The objectives of the project as summarised by one of the ECD teachers, van Niekerk (2012) are: to involve the children, to heal them from their unstable backgrounds and to restore the soil. The project began with a garden and compost which is still underway. The main activities of the permaculture project include planting, forestry, pruning, compost making, soil reclamation, biodiversity preservation, watering and harvesting.

The subsequent section explores the Lynedoch EcoVillage's permaculture project. To be discussed are issues around what is entailed by permaculture, permaculture ethics and design principles, benefits, challenges and suggestions in the context of ecological learning in ECD.

##### **What is permaculture?**

Permaculture was developed in the Australian Islands by David Holmgren and Bill Mollison in the 1970's (Holmgren, 2012: 2). It is defined as "the conscious design and maintenance of

agriculturally productive ecosystems which have the diversity, stability, and resilience of natural ecosystems” (PRI, 2012). Permaculture is based on the whole systems approach to design and ecological planning and is grounded on creative and positive solutions to enduring sustainability (SEED International, 2011; Holmgren, 2012). It assembles strategic, material and conceptual elements in a form of a pattern (PRI, 2012). Permaculture is a self-evolving perennial system that constitutes of economic and social structures, plants, animals, landscape, natural resources, energy and technologies for the benefit of the people (Holmgren, 2012; van Niekerk, 2012). As Naledi Mabeba, one of the trainers and ECD teachers at the EcoVillage asserts, permaculture is based on collaboratively working with nature, thoughtfulness and careful observation (Mabeba, 2012).

### **Permaculture ethics**

The increasing acknowledgment of agriculture ethics ensures long-term biological and cultural survival (Holmgren, 2012: 7). Ethics are “ ... culturally evolved mechanisms for more enlightened self-interest, a more inclusive view of who and what constitutes “us” and a longer-term understanding of good and bad outcomes” (Holmgren, 2012: 7). The ecological perspective about the functionality of ethics makes them foundational in the development of a permaculture design. The ethics of permaculture are broadly captured under the three maxims as described below:

- **Care for people:** Access to resources is a survival need (Semetsky, 2010; Mabeba, 2012). The EcoVillage community lives and works together in harmony (van Niekerk, 2012). Open communication, trust and respect are informs the social code of conduct. The health and wellbeing of people are a priority especially that of children (Swilling & Annecke, 2006; Mabeba, 2012). Children are given nutritious and balanced diet every day (Jansen 2012; Gelant, 2012). The children are inculcated with a culture that they belong to the community.
- **Care for the earth:** In ecological learning children are an integral a part of nature; they must understand that all life systems have the right to live and multiply (Capra, 1998; Herbert, 2008; Charles & Louv, 2009; Semetsky, 2010). Activities that destroy the natural system are avoided within the EcoVillage. Clean air and water, conservation and restoration of forests, soils and natural habitats, conserving energy (wind, solar and water) and natural resources are part of the children’s daily experiences (Davis, 1998; van Niekerk, 2012; Mabeba, 2012).

- **Fair share:** Communities should “set limits to consumption and reproduction and redistribute surplus” (Holmgren, 2012: 7). The deep ecology theory states that humans have the right to flourish but not at the cost of nature (Stone & Barlow, 2005). Everyone is given right to meet their own needs whilst reserving resources that promote the care for people and earth (Mabeba, 2012). This is achieved through cooperation, networking and sharing. Resources at the EcoVillage are equally apportioned amongst individuals and every child’s contribution is given value (van Niekerk, 2012).

## The 12 permaculture design principles

“The permaculture design principles are thinking tools, that when used together, allow us to creatively re-design our environment and our behaviour in a world of less energy and resources” (Holmgren, 2012: 9). The 12 principles are outlined below:

1. **Observe and interact:** According to the principles of ecological learning, a good design is one that promotes harmonious free and relationship between and people and nature (Sterling, 2001; Herbert, 2008; Mabeba, 2012). Mabeba (2012) says that this happens through reciprocal and constant interaction with nature. This promotes beneficial patterns, repertoire and inspiration (Stone & Barlow, 2005; Holmgren, 2012; Mabeba, 2012). Children are given space to spend much time in nature bringing about solutions that suit their own conditions and environment (Davis, 1998; Sterling, 2001; Gelant, 2012).
2. **Catch and store energy:** “We tend to ignore the opportunities and benefits of capturing non-renewable and renewable forms of energy” (Mabeba, 2012). Identifying these flows of energy provides energy that can meet local energy needs (Mabeba, 2012). Children are taught how to collect and store energy in the form of wind, solar and water. Since the Lynedoch crèche uses solar energy and practise water harvesting, children are allowed to watch the processes as part of their learning (Swilling & Annecke, 2012; Mabeba, 2012; Gelant, 2012). Resources are used in an effective manner so as to reduce fossil fuel and human energy use. The EcoVillage does not rely on outside resources. Manure is sourced from the local composts and is stored in rich soils (Qhinga, 2012; Arendse, 2012; van Niekerk, 2012). Water is transported by slope and gravity reducing electricity use (Swilling & Annecke, 2012).
3. **Obtain a yield:** Living enough for our children happens when we have enough to feed the present generation. Creativity and flexibility should be sought in finding innovative methods

of obtaining yields (Semetsky, 2010). “Without immediate and truly useful yields whatever we design and develop will tend to wither while elements that do generate immediate yield will proliferate” (Holmgren, 2012: 11). Systems must be used effectively so as to meet the needs of the community (van Niekerk, 2012). Yields inspire growth, success and reproduction; they are a reward; it comes as a result of hard work. Mabeba (2012) commented that sustainability requires that people get a reward for their work and “we can only get a reward if we can measure what we do” (Mabeba, 2012). This gives energy in future projects and encourage the generation of future yields. These are “positive feedback loops’ that every self-regulating system requires (Sterling, 2001; Capra, 2007; Stone, 2009; Semetsky, 2010; Holmgren, 2012). At the crèche, for example, children are involved in processing and consuming the yields.

4. **Apply self-regulation and accept feedback:** Holmgren (2012: 13) argues that “the development of behaviour and culture that is more attuned to feedback signals from nature to prevent overexploitation is one of the challenges of environmentalism”. Feedbacks encourage or discourage behaviour or growth (Sterling, 2008). It is therefore imperative to understand how negative or positive feedbacks work in a natural system (Stone & Barlow, 2005). This understanding helps us to design self-regulating systems (Sterling, 2001; Holmgren, 2012). According to Holmgren (2012: 12) a self-regulating system is what everyone aspires for, but hard to achieve. Untimely activities are discouraged so as to permit the system to regulate itself, helping to reduce repetitive work (Mabeba, 2012; van Niekerk, 2012). (Example). Negative feedback results in instability and scarcity that result from misuse or overuse of energy.
5. **Use and value renewable resources and services:** Holmgren (2012: 14) defines renewable resources as “those that are renewed and replaced by natural process over reasonable periods, without the need for non- renewable inputs”. They are a source of income in a permaculture design. Non-renewable resources are like capital assets and should not be used on a daily basis. A sustainable permaculture system makes use of renewable resources and natural processes to produce yields and achieve the desired tasks. A number of scholars share the view that the initial phase is to find meaning in nature (Wilson, 1996; Davis, 1998; 2009; Sterling, 2001; Herbert, 2008; Stone, 2009; Stevenson, 2011). In a consultation, Mabeba stated “instead of just feeding on nature, nature should also feed on human beings” (Mabeba, 2012). Lynedoch is one place that reduces its dependence on nature. Value is given to local natural resources, for instance; animals, plants and microbes. Compost worms for instance; are used to decompose organic matter. During the process, worms open spaces in the soil allowing the free

movement of water and air. Trees grow naturally like they are in a natural forest without any disturbance. They provide with shelter and shed without consuming energy. Children are involved in tree planting, and that helps them to know the different types of tree species and their importance (Sutton, 2009; Gelant, 2012; van Niekerk, 2012). Trees also help to develop children's senses through touching, feeling and smelling (Gelant, 2012).

6. **Produce no waste:** Waste reduction begins with consciousness of what we buy, use and reuse (Mabeba, 2012). A permaculture system should not produce any pollution or waste (SEED International 2011; van Niekerk; 2012). Waste is both an opportunity and a resource. At Lynedoch they reduce waste and pollution by making use of outputs. All local resources are reused and recycled within the system. Kiepie Arendse, one of the garden workers, confirmed that all nutrients are recycled onsite; for example, all waste from the kitchen is used for compost making (Arendse; 2012). Waste water from the kitchen is used to water and fertilise plants thereby reducing pollution from runoff.
7. **Design from patterns to details:** Holmgren (2012: 16) argues that “the commonality of patterns observable in nature and society allow us to not only make sense of what we see, but to use a pattern from one context and scale, to design in another”. The recognition of pattern comes as a result of observation and interaction with nature (Sterling, 2001; Stone & Barlow, 2005; Mabeba, 2012; Holmgren, 2012). This allows for the production of designs that form the foundation of a permaculture design. “A permaculture system requires simple basic designs that are impressive, purposeful but consumes less energy and resources” (Holmgren, 2012: 16). This can teach children to have basic principles about life and its relationship to resource consumption. In addition, the land use system in which people from different cultures are mixed provides new experiences that assist the people of the EcoVillage to see their community and land use in beneficial ways (Mabeba, 2012).
8. **Integrate rather than segregate:** Nature is a connection of organisms that survive on each other. Holmgren (2012) and van Niekerk (2012) encourages that we allow and foresee effective social and ecological relationships that result from growth and self-regulation. Elements in a self-regulating system have to be positioned in a way that each accepts and requires the produce of other elements (Capra, 2007; Mabeba, 2012; Holmgren, 2012). Naledi Mabeba (2012) notes that carefully integrated systems and advanced methods of designing people and plant have synergetic and beneficial relationships that result in mutual coordination, working together and limit human corrective input. This is because “each element performs many functions and each important function is supported by many elements” (Holmgren, 2012: 17).

9. **Use small and slow solutions:** Hastily designed large scale systems often result in failure. van Niekerk (2012) said that “the reason why our permaculture project was drawn back is because we wanted to start big”. They have learnt that quick returns are not viable in the long run. She stated that their indigenous tree species are slowly growing but are more valuable in the long run. In an interview, she stressed that permaculture systems should be designed at the smallest scale that is applicable and energy competent. She was backed by her colleague who stated that “starts small and take achievable steps to reach your goal successfully” (Mabeba, 2012). It has been proven that small and slow agricultural systems are easy to manage. Children are part of the system; they participate and are involved in decision making (Wilson, 1996; Davis, 2009; Mabeba, 2012). They make them to feel that that they are owners of the project hence increasing their connection with nature (Wilson, 1997; van Niekerk, 2012; Bickford *et al*, 2012).
10. **Use and value diversity:** For Holmgren (2012: 20), the “the great diversity of forms, functions and interactions in nature and humanity are the source of evolved systematic complexity”. The value and role of permaculture, culture and value of diversity are by nature conflicting, dynamic and complex. Van Niekerk (2012) acknowledges the fact that every system is liable to threats that may reduce productivity. Permaculture on the other hand reduces vulnerability but promote diversity. It lessens reliance on the community, households and the market by providing goods and services (van Niekerk, 2012; Mabeba, 2012; Holmgren, 2012). Diversity is not only that of nature or species only but also of culture, structures (built and living) and communities (Sterling, 2001; van Niekerk, 2012; Mabeba, 2012). Mabeba (2012) mentioned that the diversity in language and culture are also important in preserving biodiversity. Permaculture “is ... actively engaged in how to create new bioregional diversity from the melting pot of nature and culture ...” (Holmgren, 2012: 20). The diversity in culture at Lynedoch brings different ideas hence reduces vulnerability (van Niekerk, 2012). Reduced vulnerability and stability promote the needs of human and other species (SEED International, 2011). The permaculture project at Lynedoch seeks to provide with year round crops and food so as to contribute to the provision of healthy and balanced food.
11. **Use of edges and value marginal:** It has been proven that the overlapping of two systems results in them benefiting each other (SEED International, 2011). Permaculture systems access resources from both ends whilst natural patterns and edge effect create the best results in a system. The soil is the most important edge between the atmosphere and the earth; it promotes the health and the productivity of the plant. It is medium or

system where most events take place therefore should be seen as an opportunity. The contribution and value of edges and the unforeseen and marginal elements of the system are conserved and recognised so as to improve the stability and productivity of the system. van Niekerk (2012) mentioned they are planning to increase the edge between the trees and the land by planting a variety of tree species.

12. **Creative use and response to change:** We are living in constantly changing environments that are beyond our capacity to control. We need to make use of this change in a way that is adaptive, creative and cooperative (van Niekerk, 2012). Permaculture is concerned about the durability of human cultures and their natural living systems (Holmgren, 2012; van Niekerk, 2012; Mabeba, 2012). Sustainability, permanence and stability are achieved by acknowledging the changes that transpires in nature (Mabeba, 2012). An appropriate and systematic sense of change and stability promotes evolving designs that may become permanent (van Niekerk, 2012).

### **Benefits of a permaculture design**

Permaculture assists communities and people to develop ecological design skills, develop ecological literacy and to live sustainably (SEED, International, 2011). Permaculture can benefit the Lynedoch crèche by allowing them to:

- Observe nature and be ecologically conscious and responsible
- Restore local ecologies, waterways, forests, and land
- Grow food organically
- Improve and maintain soil fertility and avoid erosion
- Use water in a wise manner by cleansing, collecting, reusing and storing
- Plot and design sustainable human settlements
- Work comparatively, create local employment whilst strengthening the local economy
- Build on the abundance and strength of the bioregion
- To share knowledge
- It helps to promote planning skills
- It is a 'real leaning' practice to for the children at Lynedoch; they can have practical experiences of weather events, soil types and structure and the nutrient cycle and health eating (Semetsky, 2010; Mabeba, 2012; van Niekerk, 2012).

Despite the fact that there are a number of benefits that may come out of the Lynedoch permaculture project there are a number of unforeseen problems in a permaculture design for instance, weather predictions. As such, humans can only make an impact through proper planning and careful observation of events. Continuity may be hampered; for instance, during school holidays when monitoring becomes problematic. There is therefore need to understand that permaculture is a learning process that requires more skills and planning which may take time to perfect.

In my view, the Lynedoch ECD permaculture project needs to remain small so as to get the benefits of the economies of scale. There is a need to grow and monitor herbs, fruits and indigenous trees and to integrate animals for instance; a secured fish and frog pond, trees that attract birds and other small organisms. Although Ross, one of the educators mentioned that she sometimes take the children to her house where she keeps chickens, there is need to bring 'real learning' close to the children. As a way of motivating the children, there is a need to reward them for their participation, for instance; by giving them a 'take home' produce. The EcoVillage should also consider incorporating beneficial indigenous knowledge systems in their permaculture and ECD models.

The section has showed how the permaculture project at the EcoVillage helps to promote ecological learning and inculcate sustainable practices in children. The meaning of permaculture, the three ethical principles and associated design principles, benefits, challenges and suggestions have also been provided. The next section will show how reconnecting and restoring nature functions as part of the ECD curriculum.

#### **4.2.4.2 “Listening to and connecting with nature”**

The focus of this section is to show how reconnecting with and listening to nature some is part of the ecological learning practises at the Lynedoch crèche. The section demonstrates that interacting with nature is indispensable to creation growth of sustainability-minded future adults. This section reveals how the Lynedoch EcoVillage has attempted to reconnect and restore nature through its ECD programme.

As demonstrated in the literature review, one frightening reality is that children are progressively becoming disconnected from nature than has never been encountered before (NACC, 2008; Louv, 2005; 2008; Robertson, 2008a; Bickford *et al*, 2012). This continuous disconnection from nature is one of the root causes of the challenges we face today (MEA, 2005; UN, 2006; IPCC, 2007; IAASTD; 2008; Louv, 2008; Charles & Louv, 2009; Swilling &

Annecke, 2012). The civilisation of humanity and cultures is slowly replacing nature with artificially-made environments that do not prioritise human life but progressively bury the living ecologies whilst separating humanity from nature (Global Ecovillage Network (GEN), 2006; Spies, 2010). Labelling of human as superior to nature "... will eventually terminate human life on Earth" (GEN, 2006: 14). Given the extent of these consequences, "Listening to and reconnecting with nature would appear to be a matter of importance" (GEN, 2012: 14).

The essentiality of children's direct encounters with nature is inescapable (Orr, 1992; Capra, 1996; Louv, 2008; Stevenson, 2011; Bickford *et al*, 2012; Moss, 2012). Learning experiences in nature are developmentally applicable when nature is made available to children (NACC, 2008; Centre for Ecoliteracy, 2012a; Mabeba, 2012). It has been proven that "children grow healthier, wiser, and more content when they are more fully connected throughout their childhood to the natural environment ..." (NACC, 2008: 2).

At Lynedoch crèche children are taken outdoors as part of their daily activity whenever the weather is conducive. In an interview, Naledi Mabeba, one of the Montessori experts at Lynedoch EcoVillage mentioned that children have time out doors that is unstructured and spontaneous (Mabeba, 2012). In her statement, she said that "we ensure that we create opportunities for nature learning" (Mabeba, 2012). The surrounding forests allow them to learn and observe flora and fauna. They are also taken to the local river where they can observe frogs and other species that resides in the river and also learn about the river system (Gelant, 2012). A number of scholars indicate the need for young children to intermingle with nonhuman life (Sterling, 2001; Taylor & Zimmerman, 2005; Stone & Barlow, 2005). This helps children to connect with nature and appreciate its beauty (Moss, 2012; Mabeba, 2012). The ability of children to appreciate nature's beauty has the possibility of creating responsible adults who appreciate their relationship with nature and their role in sustaining ecological balance (Carson, 1965; Louv, 2008; Stevenson, 2011; Moss, 2012).

At Lynedoch crèche, nature is a source of learning and inquiry. The hands-on activities in nature assist children to integrate scientific knowledge and art (Gelant, 2012; Jansen, 2012). Art is one way of advancing interdisciplinary learning in holistic manners (Saracho & Spodek, 2000; Taylor, 1987; Fjortoft and Sageie, 2000; UNESCO, 2008a; Bell & Dymont, 2008 in Spies, 2010). Art encourages children to have fruitful imaginations and to be creative as they explore and make sense of different experiences (Saracho & Spodek, 2000; Annecke, 2012). It also raises children's observational and awareness skills.

One of the distinctive features of an EcoVillage is that it is a place where the activities of human beings are an integral part of the natural world in a harmless way (Sterling, 2001; GEN, 2006; Arnarson, 2011; Mabeba, 2012). The conditions that allow maximum co-existence of nature and children are made permissible. There is enough green space for natural functions and free play (Wilson, 1996; Louv, 2008; Charles & Louv, 2008). Children play with sand, mud and grass, without any restriction (Robertson, 2008a & b). This makes it easier for children to accept their responsibility to nature (Gelant, 2012). By accepting responsibility, they are inspired to embrace sustainable ways of preserving nature. They give them space and direction to explore and investigate with the toleration of dirtiness and safety (Charles & Louv, 2008; Gelant, 2012).

It is believed that nature is a therapy, healing component and a refuge for young children (NACC, 2008; Moss, 2012; van Niekerk, 2012). "Reconnecting with nature becomes part of the spiritual practice because life can be perceived as an indivisible whole, a unity whose integrity depends on the health and vitality of all parts" (GEN, 2006: 15). Children are taken to meditation nodes where they individually and peacefully meditate. They are involved in mindful walks within and outside the EcoVillage. van Niekerk (2012) stated this is particularly important for children as it helps to calm them down after the weekends. Eve Annecke one of the co-founders of the EcoVillage mentioned that children are interested in songs, poems and stories (Annecke, 2012). In nature they sing, have poems, and engage in storytelling whilst reflecting on nature. Undisturbed, untouched nature is a home of spiritual renewal to the children (Edwards, 2002; Miller, 2004; Stevenson, 2011). As noted in the previous chapter, sustainability education (ecological learning in particular) facilitates children to be critical thinkers (UNESCO, 2005; 2008a). Children can question and answer critical questions when engaged with nature, growing up with a sense of respect for nature (Capra, 1994; Sterling, 2001; Stone & Barlow, 2005; Arnarson; 2011; Stevenson, 2011). This respect for nature begins by respect for oneself and realising the interdependence of humanity and nature.

Reconnecting children with nature improves the physical and intellectual development of children (Knight, 2008; NACC, 2008). "These benefits are long term and significant and contribute to their future wellbeing and the contributions they will make to the world as adults" (NACC, 2008: 2). Connecting with nature reduces depression for both children and teachers (Robertson, 2008; Louv, 2008; Mabeba, 2012).

I came to conclusions that engaging children in nature assists them in developing fruitful and creative imaginations which are a source of inquiry and learning. Children were reported to have increased their observational, awareness skills and appreciation of beauty and have also

increased opportunities to develop a 'sense of place' that may later assist them in solving the complex problems (Gelant, 2012). There are high chances that nature improves the physical and intellectual development of children (NACC, 2008; Mabeba, 2012) However, it appears that children are taken outdoors on occasions that there is good weather. This may limit their exposure to endangered environments that may enhance their awareness of the irrationality of damaging the environment. My remarks are that one educator is not sufficient to control the children. In all cases; two or more educators must monitor the children as children are more vulnerable when they are outdoors. Moreover, children should also be constantly exposed to the damaged/corrupted environments so that they can experience the negative impact of environmental degradation. As such, outdoor education should not be limited to exposure to weather. Studies have proved that children from 'forest schools' have limited possibilities of injuring themselves or being involved in accidents (Borradaile, 2006). Knight (2008: 14-16) argues that some of the benefits of outdoor education includes development of new perspectives, improved concentration and motivation, improved physical motor skills, improved social skills and increased self-esteem and self-confidence.

The section has shown how reconnecting with and listening to nature are critical aspects of ecological learning at the Lynedoch crèche. I have attempted to demonstrate that interacting with nature is crucial to the establishment of ecologically and sustainability-minded future citizens and has focused on the daily initiatives. The next section will show how creativity and art are part of ecological learning curriculum.

#### **4.2.4.3 Creativity and Art**

"Art is not only for artists: It's a way of adding beauty, grace and festivity to everything we do" (GEN, 2006: 21). It is one way of touching the young minds' souls. Naledi Mabeba mentioned that "children naturally love art" (Mabeba, 2012). Selected plays and games complement and enhance the crèche's learning. Some of main activities in art include; constructing puzzles, free-form drawing, painting, dough rolling, cutting, threading and music (Mgubo, 2012; Gelant, 2012). The teachers make sure that arts and crafts materials are always accessible and available to all children. Teachers were noticed celebrating the children's art work by putting each child's work in a folder and displaying them on the walls. They also read artistic books for children. The children take their artistic work to their families at the end of each term. Zimkitha stated that the most important thing is to remind the children about the importance of art in their lives (Mgubo, 2012). The fact that a significant number of the children's art work sketched fauna and flora demonstrates an awareness of their situation in an ecological chain in which they (as humans) are part (Capra, 1996; Sterling, 2001; Stone & Barlow, 2005).

It can be concluded that art develops and encourages critical thinking and creative and cognitive skills which can improve learners' academic performance whilst allowing them to express their understanding of their place and relationship with the ecosystem. I observed that most children find art to be interesting, and this can increase their concentration capacity. It was reported that children feel empowered and talented when they finish their tasks (Mabeba, 2012). In addition, art promotes team building techniques. The Lynedoch Crèche promotes group work, making children get attracted to each other's work. This makes them develop mutual consciousness such as symbols, information and messages that arise from collectiveness. Collective creativity allows children to learn from other people's talents resulting in accumulated benefits. Artful and creative opportunities result in purposeful visions that can benefit individuals and the community through awareness of different languages and culture. Group expression has sprung through art. In addition to team building techniques, art promotes craftsmanship skills, goal setting skills, good task performance that can remain in the course of education. It is therefore a source of life skills that can assist in shaping confidence, perceptions, self-discipline and responsibility on subjects around nature. The repeating of songs, poems and stories helps to improve children's memories whilst also working as a therapy for children. It reduces emotional boredom for both teachers and children (UNESCO, 2008a; Mgubo, 2012; Gelant, 2012; van Niekerk, 2012). However, the art activities at the Lynedoch EcoVillage tended to be narrow – with more emphasis on drawing, painting and singing. This indicates that teachers need to develop a sense of cultural and personal identity in implementing imaginative and creative ways in the subjects. Teachers should be able to identify themselves as professional dancers, actors, artists and musicians. Moreover, there is also need to further promote creative art in ECD teacher training for the Lynedoch ECD training programme.

The section has indicated that creativity and art are an essential element of ecological learning. The key areas of the subject have been indicated. Some of the benefits of art to ecological learning were given. I have revealed that art should be an integral part of ecological learning and as such teachers need to associate the subject with cultural or personal identity whilst the ECD training programmes further advance the subject.

#### **4.2.4.4 Appropriate technology**

There are different interpretations of what is entailed by appropriate technology. In this research, appropriate technology is defined as “a science or technology considered reasonable and suitable for a particular purpose that conforms to existing cultural, economic,

environmental and social conditions” (<http://dictionary.reference.com/browse/appropriate+technology>). The main features of appropriate technology are that it has to be, safe, legal, low maintenance, low energy embodied, low cost and long-lasting, locally produced and have solutions that are implemented and found at the least possible energy–use levels (GEN, 2006; Swilling & Annecke, 2012). In this section, I explore the different types of appropriate technologies that are part of the ECD curriculum at Lynedoch. Areas of focus include; water, energy, waste recycling and waste water.

**Water:** South Africa is one water scarce nation and the consequences are expected to aggravate by the year 2020 (The Times, 14 February 2011). These challenges frequently affect poor children causing suffering and even death from water borne disease and poor sanitation.

The Lynedoch EcoVillage has succeeded in lessening the consumption of fresh water supplies from the municipality of Stellenbosch by forty per cent (Swilling & Annecke, 2012: 293). Research discovered that forty per cent of water usage at the EcoVillage is grey water from irrigation and flushing (Swilling & Annecke, 2012). It was reported that the EcoVillage has more grey water than needed, showing a reduction in municipality water usage. This is a clear sign of “minimising damage to a restorative approach” (Swilling & Annecke, 2012). The features that show the uniqueness of the water system at Lynedoch are numbered. These include the following elements:

- There is the use of a single meter for the water that is supplied by the municipality
- There is recyclable water and potable water for each family unit; recycled water is used for gardening and toilet flushing
- The waste water treatment plant treats all recycled water at source
- There are two water meters for recycled and potable water for each unit (van Niekerk, 2012; Swilling & Annecke, 2012).

One of the challenges is that water is not readily available at most children’s homes (Mabeba, 2012). One of the reasons is that most children live on the surrounding farms where water is apportioned and mainly used for irrigation (Gelant, 2012). In some cases, the children come from homes where there is restrictive water for flushing and gardening (van Niekerk, 2012; Mabeba, 2012). Mabeba (2012) adds that a number of children do not flush the toilets when

they join the school. This problem usually takes time before the children are taught and learn how to flush the toilets after use.

Children are taught and observe water-saving techniques. There is water saving showers and taps installed at the ECD centre. The children use low flushing and dual flushing toilet systems. Outside their classrooms are open channels made up of recycled bricks that collect runoff from the roof and ground. This water is collected at a small dam constructed in the garden area (Arendse, 2012). This water is meant to connect with the recycled water in the long run (Swilling & Annecke, 2012). Children are also educated about the percolation of water into the ground and the water cycle.

Water is a healing component for children (Mabeba, 2012). She mentioned that “children love water”. My observations are that children need freedom to play with water. The children are not restricted to play with water; they are taught to be responsible with it. They drink; wash their hands, windows and dishes without wasting (Jansen, 2012; Mgubo, 2012; Mnyaka, 2012; Gelant, 2012). I observed children reporting leaking taps – a clear sign of their awareness of the importance of water. The children were also observed closing the taps after the cleaning of dishes showing that the culture of responsibility being nurtured in them is bearing fruits.

I agree with Mabeba (2012) that children need freedom to play with water to experience its usefulness; however they need to learn how to act responsibly with it. Although water is a healing component for the children at the Lynedoch EcoVillage it may take time to change the children’s poor habits in water resources; this implies that educators need to be patient. Educators need to understand the children’s background and be patient about teaching children in relation to water issues.

**Energy:** South Africa has been hit by the energy crisis, and the condition is expected to deteriorate in the next 5 years (Daily News, 25 April 2012). This leaves the nation with restrictive options but to move to renewable energy sources.

The Lynedoch energy system aims to reduce consumption levels of each family unit by 60% (Swilling & Annecke, 2012: 296). The EcoVillage is ‘energy neutral’ because of the biogas and photovoltaic developments that produce more energy than wanted (Swilling & Annecke, 2012: 296). The Lynedoch Crèche is powered by solar energy. The crèche switches to electricity on occasions when there is inadequate sunlight. Solar water heaters are installed at the roof top and these reduce electricity consumption of the crèche. Electric cooking is not allowed at the crèche and within the EcoVillage. Effective design; such as, appropriate roof overhangs,

correct, north-south orientation, and thermal mass usage allows heating and cooling, reducing the consumption of resources whilst saving costs (Swilling & Annecke, 2012: 297).

Children at Lynedoch are taught about the different types of energy (van Niekerk, 2012). This includes solar, water, wind, and biogas. In assisting them learn; children are given cards that consist of the different types energy systems. I noticed there are little stoves that indicate that children do mock cooking.

Education about energy topics at Lynedoch is not constant. As mentioned by van Niekerk (2012) they have not done it with the current group. She explained that it is because they have younger children as compared to previous years. For her, children are not ready to engage themselves with such huge subjects.

According to van (Niekerk, 2012) children can grasp limited knowledge about energy sources and use. It is however, essential that children learn about energy topics when they are young as this helps them to save resources at home and when they become adults. One limitation in this area is that there is a lack of consistence amongst ECD educators to teach complex topics. Primary and secondary literature show the capacity of young children to understand complex topics hence trainers should not underestimate their learning capacities (Davis, 1998; Annecke, 2012, Young (2007). I recommend that ECD teachers should think highly about the capacity of children to grasp complex topics and subjects. According to Blatchford (2009:15) such an underestimation serves "... to inhibit curriculum development" also implying that ECD educators should ensure that there is consistency in all taught areas of the curriculum.

**Refuse:** It was in the Leadership and Environmental Ethics module of the BPhil programme in Sustainable Development, Planning and Management that the facilitator (Eve Annecke) took the class to the Stellenbosch landfill. Being one of the participants, I could remember very well that it used to be one of the ugly sites that can be found in Stellenbosch. At that time debates were raised about the landfill's capacity to continuously absorb waste. Conclusions were made that the landfill has passed its capacity. As far as I can envisage, there is no other readily available place for citing the next landfill without problems. We have already experienced pollution (air, water and noise included), loss of aesthetic value and immoral habits such as prostitution, violence and drug abuse at the site.

Solid waste recycling is another core objective of the Lynedoch EcoVillage (Swilling & Annecke, 2012: 298). Children are involved in solid waste separation at source point. Waste is put into three dissimilar bins; for recyclable (paper, tins, glass and plastic), non- recyclable and

organic waste (van Niekerk, 2012; Swilling & Annecke, 2012). It is boldly written on these bins recyclable, non-recyclable and organic waste. The children can visibly see and read.

The children collect organic waste from the kitchen used for compost making and garden manure (Vuke, 2012; Munyedza, 2012; van Niekerk, 2012; Swilling & Annecke, 2012). The teachers work with the children to pick up litter outside classrooms (Abrahams, 2012a). The “Swop shop” incentivises children to collect waste as they get little gifts in return (van Niekerk, 2012; Scott, 2012). Scott added that the swop shop assist children to make healthy choices in life as they are allowed to choose what they want from their tokens, for example; school uniforms, stationery or toys (Scott, 2012).

One of the challenges is that the children cannot work on their own in picking up litter (Mabeba, 2012; van Niekerk, 2012). “The children cannot spontaneously pick up litter by themselves - they continuously want to be monitored despite their signs of sensitivity about cleanliness” (Mabeba, 2012). Jefta Abrahams, the long serving caretaker, mentioned that he assists children not to throw their litter everywhere so as to keep the environment clean and free from pollution (Abrahams, 2012b).

On this subject; I came to conclusions that children can take a leading role in environmental/waste initiatives and that they are generally more sensitive to cleanliness than older people, thus educators need to equip themselves with exceptional skills in promoting good habits. One of the recyclers mentioned that there seems to be reluctance on the part of the elders themselves to place waste into correctly designated bins (Munyedza, 2012). It also takes time for children to master the designations of the bins (Mgubo, 2012). I propose that educators and elders should take a leading role by constantly promoting environmental initiatives. Moreover, the Lynedoch crèche should carry out educational and environmental campaigns within the EcoVillage so as to educate the older people on the right things to do.

**Green building:** The Lynedoch Crèche is one example of an ecologically designed building. It is designed in an ecologically sustainable manner. Children have the opportunity to study in the ecologically designed and refurbished building where they can experience and be educated about green building (Spies, 2010; Mabeba, 2012). Lynedoch crèche has the following features which children directly experience in their daily lives:

- It is a ‘low embodied energy’ - building that is constructed with fired adobe bricks, glass and wood.
- It is constructed with a north-south orientation.

- It has water saving taps and recycled water for flushing.
- It has a high roof that lives space for the youth club on the upper floor
- Windows are appropriately located.
- It is powered by solar for lighting and water heating.
- It has green paints that are environmentally friendly and less costly (Swilling & Annecke, 2012; Fushayi, 2012; Gelant, 2012).

Ross expressed her gratitude over the green building housing the Lynedoch Crèche. She stated that it is essential that children learn about the fundamentals of green building at pre-school level. According to Mabeba (2012) it is their duty as educators to teach children about the fundamentals of green building techniques. As part of their learning the children are taken to the residential areas where they can see finished and unfinished houses. She said that the most important part is the process of familiarising the children with houses under construction from foundation phase until they are finished. In this way, the children have knowledge of the foundation, body and roof of the house (Mabeba, 2012). This does not only help them with sustainable building knowledge but the technical aspects of life (UNESCO, 2008a). The children are taught about the different types of ecologically safe building materials. This includes perforated bricks, recycled bricks, adobe bricks, and wood among others. The children know what is entailed by environmentally-friendly houses.

The ability to solve technical ecological problems is a skill that can be nurtured in ECD. In addition, green building techniques can teach children resource saving techniques such as 'reducing, recycling and reusing'. Nonetheless, there seem to be restrictions in that heavy construction and other harmful objects at construction sites may disturb the children's attention and internalisation of concepts. This however, should not stop ECD educators to teach children about green building techniques so that children can appreciate the value of going green.

The previous section explored the different types of appropriate technology that are incorporated in the ECD curriculum at Lynedoch. Topics covered were water, energy, waste recycling and green building. The section has concentrated on how each is imparted and put in to physical experiences. The next section will show how the EcoVillage promotes community development.

#### 4.2.5 Community development

Most of the challenges faced at Lynedoch are a result of 'loss of community' (Swilling & Annecke, 2012: 299). The challenges involve substance abuse, school dropouts, crime, psychological depression, loss of biodiversity, violence among others (Swilling & Annecke, 2012; Mabeba, 2012; van Niekerk, 2012). This is because of most people in the community are from unstable family backgrounds (Scott, 2012). The solutions to these challenges lie in shaping or reconstructing a 'sense of community'. There are several ways in which this goal can be achieved, and these are briefly discussed below. The section contends that community development is central of an EcoVillage. It shall be shown in this section the efforts by the EcoVillage to focus on the child and to embrace social mix despite the milieu of the social problems.

**Focusing on the child:** Sustainability is concerned with putting children at the centre of development (UNICEF, n.d; Tilbury *et al*, 2002; Miller, 2004; UNESCO, 2008a; Annecke, 2012). Lynedoch is one place that experiences violence "between and against children" (Scott, 2012). Swilling & Annecke (2012) doubt the goal of achieving social integration without focusing on the children. In their words, Swilling & Annecke (2012: 303) state that "in a part of the world in which levels of violence against children and between children are amongst the highest in the world it is clear that unless children are placed at the centre of the development process, social integration will remain a chimera".

The Lynedoch EcoVillage consists of an ECD centre, an affordable primary school, a youth and soccer club that empowers children and are all focused on the child (Scott, 2012; Annecke 2012). This is aided by the ECD training programme that trains people from all over the world (Mabeba, 2012; van Niekerk, 2012; Annecke, 2012). Annecke (2012) added that because the Lynedoch EcoVillage focuses on the child, it strives to "build a sense of place" amongst all children from ECD to primary school.

**Embracing the social mix:** One of the ways to disown racism is by teaching children how to integrate and socialise with one another. Embracing the social mix is one stepping stool that can make the EcoVillage to realise its goals. Enrolment at Lynedoch does not discriminate between colour and language. Children are enrolled from different ethnic, races, tribes and cultures. There are black, coloured and white children from dissimilar languages including; English, Afrikaans, Shona, Xhosa, Pedi, and Sotho. The classes are a mix of children and teachers of different colours, culture and language.

There is zeal from both teachers and children to learn one another's language and culture. As witnessed, they interact and associate very well with each other. Children play, sing, dance, sleep and eat together. Children are also encouraged to work in clusters. This assists them to learn each other's language. The teachers do not favour children according to colour or language. My observations were that children are treated equally when they ask for assistance. However, achieving a social mix at Lynedoch is not a prompt act.

The young children on their own were observed to have few problems in interacting with one another. However, the children are instilled with racist behaviours that come from their parents (Mabeba, 2012; Mgubo, 2012). These racist behaviours are not only between blacks and whites but also between coloureds and blacks (Mabeba, 2012). It is crucial that social integration and racial and ethnic tolerance be imparted into the young children. The EcoVillage has engaged in several efforts in solving this challenge. Children are involved in integrative activities such as sports, mixing them during class and sleep time. This helps them to see no difference in one another and to avoid looking down upon each other.

The greater EcoVillage creates space for diversity (Annecke, 2012). It consists of people from mixed classes, jobs and religions, different races (blacks, white and coloured) (Annecke, 2012). She added that the EcoVillage has different participants; the students from the SI and a women's group. However, there is a need to find more ways that can promote interaction amongst adults (Mabeba, 2012).

#### **4.2.6 Suggestions for furthering ecological learning**

The previous sections revealed the main functional practical and learning experiences of the Lynedoch Crèche. This section gives suggestions for furthering ecological learning in the spirit of promoting and extending the significant and relevant work at the Lynedoch Crèche. The findings came as a result of observations, interviews and critical analysis of SI documents. I therefore suggest the following for the Lynedoch ECD:

##### **Incorporating matters of the heart**

My analysis of the Lynedoch EcoVillage has revealed that there is a need for people who live in the community to increasingly integrate their spirits, souls and emotions, in finding common solutions. They need to find time for creative expression, decision making, practical talk and visionary work. This gives space for people to work together intimately. In working together, individuals should find cultural and social contexts for themselves and one another. Daily times

for reflection and sharing and storytelling are brilliant ways of connecting with one another. “Dreams shared or acted out may illustrate the unconscious stirrings of collective issues” (GEN, 2006: 33).

### **Parental involvement**

Studies have shown that one way of improving the student’s achievement is through parental involvement (Martinez, 2004; Kamerman, 2010). Children whose parents are actively engaged seem to have better scores regardless of their racial/ethnic or socio-economic status (Martinez, 2004). Interviews have shown that there is too little parental commitment and involvement at the crèche. Zimkitha, one of the ECD teachers stressed the need to enlighten parents and guardians of children attending the crèche about the Montessori Method and its particular emphasis about the role of outdoor learning to the children’s mastering of ecological learning (Mgubo, 2012). It seemed that some of the parents are not comfortable with their children engaging in cleaning activities and other outdoor activities. It is therefore important that the parents are conscientised about the Montessori Method before they enrol their children. The staffs at the Lynedoch crèche also needs to feel comfortable in discussing pressing matters with the parents so that a mutual understanding of the crèche’s goals is attained.

The Lynedoch EcoVillage does not exist in isolation, it exists within a community. Besides the internal problems at the EcoVillage, some of the problems come from the outside community. Mabeba (2012) mentioned that “the Lynedoch EcoVillage itself has little problems, but most of the problems we face come from the greater community”. History shows the Lynedoch area as a place that is prevalent with drug and alcohol abuse, school drop-outs, teenage pregnancies and violence (van Niekerk, 2012; Mabeba, 2012). These issues should be ceaselessly discussed in parents’ meetings. It is one of the duties of the EcoVillage to build “a sense of community”. Swilling & Annecke (2012: 299) mention that “a sense of community emerges only when there is a purpose for a ‘sense of community’”. This helps them to establish concrete and clear visions between the crèche and the parents.

Mgubo (2012) said that one of the challenges is that most parents work in the farms where they do not have enough time to spare for parents’ days. She added that parents who attend meetings are usually the same faces. There should also be adequate information on the role that parents or families can play for their children and for the crèche. For this to be achieved there has to be regular two-way communication between the school and the families. In addition the EcoVillage needs to find ways that encourage parents to attend and participate in

meetings and discuss issues that relate to children in relation to their learning. In this case, the Lynedoch community should consider instituting a social club with the mandate of ensuring continuous interaction between the EcoVillage and the parents or community in general.

#### **4.2.7 Conclusion**

The case study has established the Lynedoch EcoVillage as one functional examples of ecological learning. It has shown how the EcoVillage has evolved by tracing its history and background and the context in which it is found and operates. I have detailed one of the recent developments; the permaculture project, focusing on the meaning, ethical and design principles, benefits, challenges, suggestions and implications for the EcoVillage's Montessori oriented ECD programme. The main practical learning issues such as reconnecting and restoring nature and creativity and art have been stressed. I have indicated the importance of teaching children the importance of appropriated technology and the following topics were reviewed; water, energy, waste and green building. The case study has also highlighted the importance of community development focusing on the child and embracing the social mix. I have cautiously presented my suggestions which are mainly concerned with incorporating matters of the heart and parental involvement.

### **4.3 CASE STUDY 2: CAMPUS KINDERGARTEN (AUSTRALIA, BRISBANE)**

#### **4.3.1 Introduction**

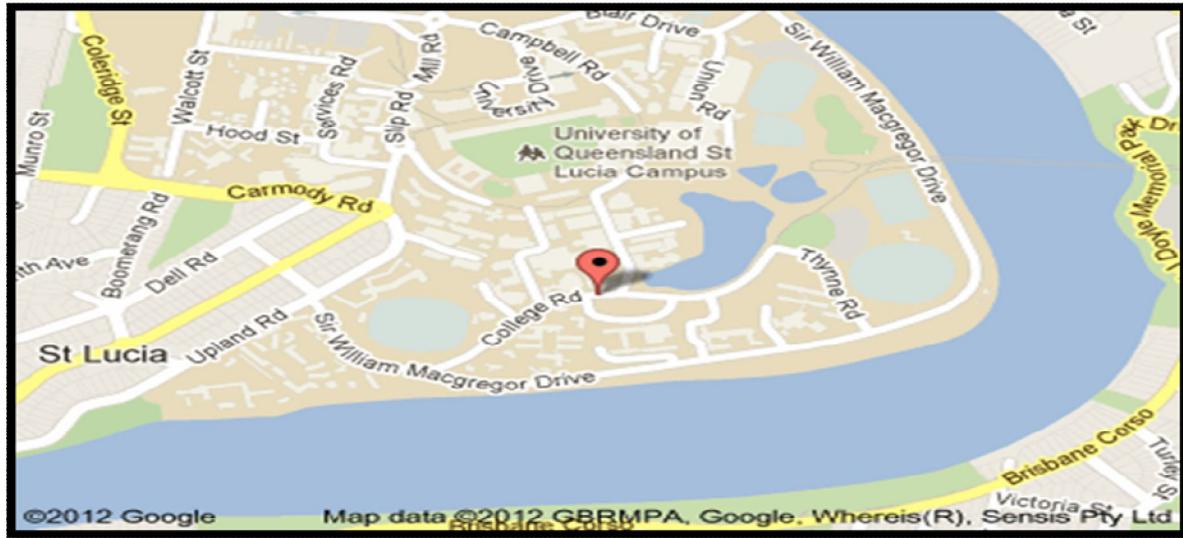
I was impressed by the presentations on Brazil's transport system by Professor Mark Swilling in the Sustainable Cities module of my BPhil studies in Sustainable Development. At that point, I regarded Brazil as one nation that is taking the leading role in Sustainability transitions. During that time, I thought of taking Brazil as one of my case studies on ECD and ecological learning. It was however during the research process that I figured out that most of the vital documents about Brazil and its Sustainability ECD learning are in Portuguese. That made me to shift my focus to a country that is comparable to Brazil in promoting ECD ecological learning. A search of countries on the World Wide Web saw Australia coming up second best amongst countries like Canada, Sweden and the Netherlands. As indicated in the introductory chapter, this case study used a desktop research in reviewing the practice of ecological learning. In chapter 3, I defined place-based learning to be a form of education that links young children with their ecologies, communities culture, heritage, and their experiences in nature (Lamers, 2008; UNESCO, 2010). In my view the Campus Kindergarten fits in very well in this approach.

The Australian National Action Plan acknowledges the need for promotion, motivation, capacity, values, skills and knowledge that responds whilst adapting to the complexity and sustainability challenges (Department of the Environment, Water, Heritage and Arts, 2009: 3 in Lewis *et al*, 2010: 96). There has been noticeable attention and commitment to ecological learning in Australia (Hughes, 2007 in Lewis *et al*, 2010; Queensland Government, 2012). CK is an ECD centre that is future oriented, holistic and prioritises the child (Gibson & Davis, 2006; CK, 2013). Trust, rights and respect are the main guiding elements of the curriculum (Gibson & Davis, 2006; CK Prospectus, 2004 in Pratt & Moore, 2007; CK, 2013). Citizenship, empowerment, active listening, critical reflection and democracy are also central (Pratt & Moore, 2007: 3). Daily activities at CK are incorporated by valuing the built and the natural environments. In the succeeding sections, the underpinning aspects at CK will be documented focusing on activities, initiatives and thinking. The background and context of CK shall be given. The case study also discusses how the SPP resulted in other mini-projects and initiatives. In analysing this case study, it shall be shown that young children are critical to the realisation of ecological sustainability.

#### **4.3.2 Background and context**

This section gives an overview of the background and context of CK. The social and the physical setting are highlighted followed by how CK came into existence, its functions and lastly the enrolment structure.

CK survives in a culturally diverse community where a majority of the population are educated. It is situated at St Lucia campus to the south of University of Queensland in Brisbane (Davis, 2005: 2; Gibson & Davis, 2006: 1; Pratt & Moore, 2007: 2; National Childcare Accreditation Council (NCAC), 2009: 3; Queensland Government, 2012: 1). Figure 4.1 shows the location of CK in Brisbane. CK is accessed via bus or ferry, green bridge or road. CK is enclosed by a diversity of fauna and flora (<http://www.uq.edu.au/campuskindy/Map.htm>).



**Figure: 4.1 Location of Campus Kindergarten**

(Source: Adapted from <http://www.uq.edu.au/campuskindy/Map.htm>).

CK was originally a cottage owned by one of the university caretakers (<http://www.uq.edu.au/campuskindy/Our%20history.htm>; CK, 2013). This cottage was moved by the university management in 1971 from its former location. The university now leases land to CK. CK was initially intended to accommodate 36 children of the age two to five and was licensed to accommodate 65 children (Gibson & Davis, 2006: 1). CK was supposed to comply with the Child Care Centre Rights of 1993, and that led to the renovation of the buildings (<http://www.uq.edu.au/campuskindy/Our%20history.htm>; CK, 2013). Moreover, the growing demand for EfS resulted in the expansion of the structures and a pre-kindergarten was added. An administration block, a preschool, kindergarten rooms, toilets, kitchen and storage facilities were also constructed (<http://www.uq.edu.au/campuskindy/Our%20history.htm>). Funds were sourced from the Student Union, Administration, and the University Staff Association.

CK functions as a long day care centre (Pratt & Moore, 2007; Queensland Government, 2012; Early Childhood Australia, 2012; CK, 2013). School starts at ten minutes to eight in the morning until half past five in the afternoon during working days (CK, 2013). Children are enrolled from two and a half to six years (Pratt & Moore, 2007: 2). There are three classrooms available; one consisting of 16 children and the other two are kindergarten classes with 22 children.

This section has given an overview of the background and context of CK. The social and the physical setting were highlighted followed by how CK originated the operations and lastly its

enrolment. The next section shows the fundamentals of the SPP and how it has resulted in other small projects.

#### 4.3.4 The Sustainable Planet Project (SPP)

The previous section has given an overview of the background and context of CK. This section briefs the SPP, commencing by its goals and origins. The section shall also show how the SPP resulted in the emergence of other small projects that form part of CK's daily routines. It shall be stressed that the SPP thrives on exposing children to the natural environment.

SPP is a description of CK curriculum elements in relation to EfS (Pratt & Moore, 2007; Early Childhood Australia, 2012; Queensland Government, 2012). The goal of the SPP is to educate young children about sustainability through learning encounters and activities (Queensland Government, 2012). SPP originated in 1997 after a team building initiative by the ECD educators (Davis, 2005; Davis & Pratt, 2005; Gibson & Davis, 2006; Pratt & Moore, 2007; UNESCO, 2008a; Early Childhood Australia, 2012). The educators wanted to merge their working and personal lives (Davis, 2005; Gibson & Davis, 2006; Early Childhood Australia, 2012). In the words of one of the educators: "I felt that I wasn't putting enough of my own personality into the room. It was delightful to give towards the children, but there was none of me in there" (Gibson & Davis, 2006: 4). The educators had a common vision which was 'the ecology' (Davis & Pratt, 2005; Queensland Government, 2012; Early Childhood Australia, 2012). Fullan (1999), writing on the importance of shared commitment and capacity building advanced the idea of a common vision. The outcome was that all the educators shared a common vision by protecting children and the ecology and by adding value to their lives, and work under the broad name "*Sustainable Planet Project* "Saving our planet" (Gibson & Davis, 2006; UNESCO, 2008; Pratt & Moore, 2007; Early Childhood Australia, 2012).

In the beginning, the ECD educators worked with children in different mini-projects that addressed several ecological matters (Pratt & Moore, 2007; Early Childhood Australia, 2012). These included litter-less lunches, vegetable garden, native plant regeneration, environmental aesthetic, efficient use of natural resources, frog ponds, chooks<sup>2</sup>, reusing and recycling, responsible cleaning and practise, composting, worm farm, and possum boxes (Davis, 2005; Queensland Government, 2012). This is shown in Figure 4.2 illustrating a holistic approach to EfS.

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<sup>2</sup> Chooks refers to an Australian chicken.



**Figure 4.2: SPP mini-projects**

(Source: Adapted from CK teachers, 1997 in Gibson & Davis, 2006: 5).

Some of the challenges of the project involve the dissimilar levels of environmental skills, knowledge and commitment (Gibson & Davis, 2006; Early Childhood Australia, 2012). In some instances; some projects demanded prioritisation and time (Early Childhood Australia, 2012). The projects were withheld by insufficient parental involvement, for instance; the litter-less lunches that require a lot of parental commitment (Gibson & Davis, 2006: 6). However, the project has evolved, and other projects were added as part of the daily activities (Early Childhood Australia, 2012). "The centre operates with an environmental ethic that has become part of its culture" (Davis, 2005: 4; Davis & Pratt, 2005: 2). Ecological behaviours and thinking permeate all activities of life at CK (Queensland Government, 2012; Early Childhood Australia, 2012). The ethical foundations at CK perceive children as active participants in making ecological decisions (Davis, 2009; Early Childhood Australia, 2012). Children are the communicators, investigators, provocateurs and inventors.

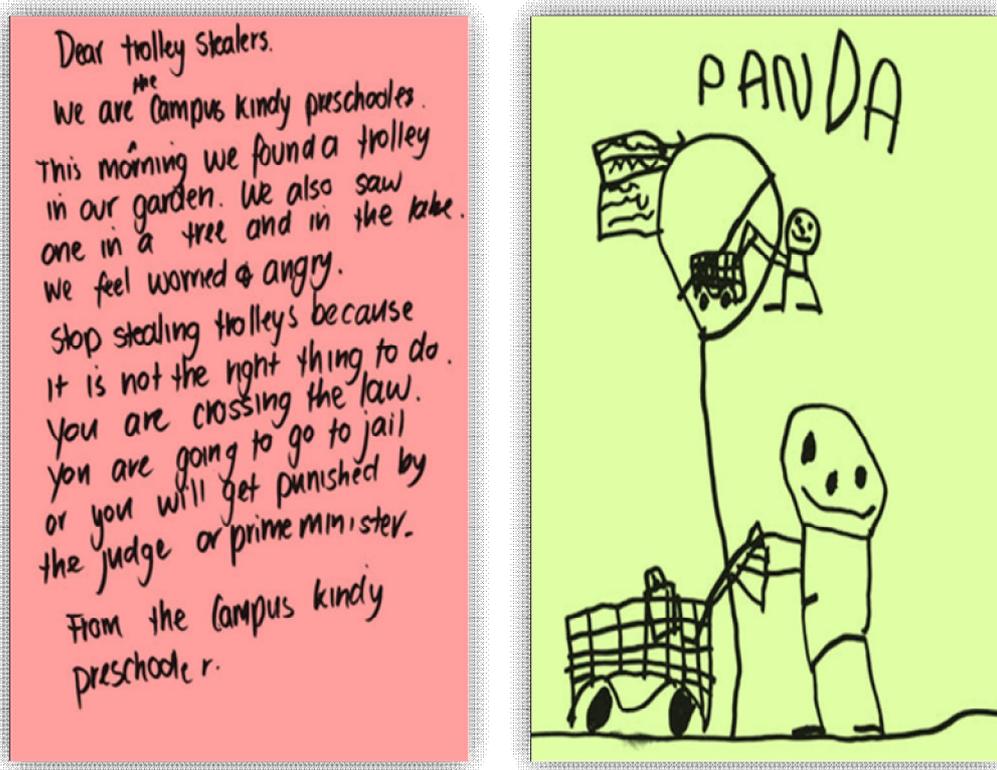
The SPP shows that the sharing of a common vision is essential for successful ECD projects. The project also shows that children can be champions and role models of environmental protection and awareness. The project demonstrates that sustainability projects demand a lot of focus and energy for continuous existence. However, coordination and consensus amongst parents, children and educators may be difficult to attain. The project also reveals that focusing on many projects may result in the prioritisation of other projects at the expense of others. In future, each individual within the Campus Kindergarten needs to be encouraged to find his or her own role in the SPP. Parents should also be integral and contribute in various ways to the attainment of the SPP's goals.

The section has given a summary of the SPP. It began by showing the SPP's goals and origins. I have traced how the SPP resulted in the emergence of other small projects which are inclusive of CK's daily practices. The section has emphasized on the need of sharing a common vision for better outcomes. In the next section, the shopping trolley project will be reviewed, showing how it has resulted in child empowerment.

#### **4.3.5 The shopping trolley project**

The preceding section has given a summary of the SPP indicating how it relates to EfS at CK. In the coming section, I give an example of the shopping trolley project focusing on how it has managed to empower children through their initiatives.

The shopping trolley project demonstrates child empowerment pedagogies and sustainability at CK (Davis, 2010; Early Childhood Australia, 2012). Observation by children raised alarms about stealing and the impact on the environment (Gibson & Davis, 2006; Pratt & Moore, 2007; Early Childhood Australia, 2012). The children wrote a letter listing their suggestions to the local supermarket about the stealing of trolleys (Davis, 2005; UNESCO, 2008a; Early Childhood Australia, 2012). They also wrote to the community newspaper aiming at stopping the habit of trolley stealing (Pratt & Moore, 2007; Early Childhood Australia, 2012). In their letter, they highlighted that they had found trolleys in their vicinity therefore are angry and concerned (Early Childhood Australia, 2012). Their letter was seen as important by the local newspaper and was put on the front page (Early Childhood Australia, 2012). The letter showed the children's aesthetic and ethical concerns over stolen trolleys (Early Childhood Australia, 2012). The editor of the story wrote praising the children for their exceptional responsibility saying that "young teach us a worthwhile lesson," (Davis, 2005: 8). In addition, the children volunteered to take the trolleys to the site of the supermarket. The supermarket was approached, where children put signs with a message that people should stop stealing trolleys or take them outside the supermarkets premises (Davis, 2005; Pratt & Moore, 2007; Early Childhood Australia, 2012). Signs were put on the main doors trolley where it was noticeable by all stealers or rule breakers. They urged the community to observe the law. Figure 4.3 will show a letter written by the preschool children to the community newspapers.



**Figure 4.3: Letter to the community newspaper and example of signage**

(Source: Pratt & Moore, 2007: 4).

The project shows that children have the ability to make actions and decisions that promote environmental, social and political literacy (Early Childhood Australia, 2012). The project addressed economic, political, social and ecological issues that include; stopping of trolley stealing, shaping of active citizenship, connections and cooperation in the local community and the reducing of pollution. It appeared in the project that initially the children were less respected in the community thus making their initiatives to be underrated. However, everyone should hold a sense of obligation within the community; it must be the duty of the community to give moral support to children. The duty of the supermarkets should be that of educating customers on good and bad behaviour through environmental campaigns as exemplified by the children's project.

The section has given an appraisal of the shopping trolley project. The section has concentrated on how the project has managed to empower children who in-turn empower the society through their initiatives. The section has also stressed that children have the capacity to lead community change. Forthcoming are CK's activities and initiatives that result in the conservation of natural resources. It shall be argued that conservation of resources begins by

reconnecting with nature. The section then moves to energy and water conservation, waste management and green cleaning.

#### **4.3.6 Conservation and use of natural resources**

The foregoing section has given a summarised overview of the shopping trolley project and its related benefits to children's acquisition and practice of ecological awareness. The following section shows how CK orients children to sustainable and conservative uses of natural resources. The section starts by indicating that conservation and use of natural resources are not worthwhile without a deep connection with nature (Arnarson, 2011). Issues to be reviewed include; reconnecting with nature, conservation of energy and water and lastly how green cleaning reduces resource consumption. The practises of each initiative will be listed.

There are increasing concerns about the state of the world in the near future. The Stern report (2006) and Al Gore (2006) in his article entitled *An Inconvenient Truth* have warned us about the matter. It is reported that "Australians are using three to four times more resources than the earth can sustain" (Davis, 2010: 128). It is essential that ECD provides platforms that promote children's capabilities, knowledge and understanding (McCain, Mustard & Shanker, 2007; Pressior, 2008; Davis, 2009). CK teaches children about conservation practises and encourages children to take the message into their communities (Davis, 2010; Moss, 2012).

##### **4.3.6.1 Connecting with nature**

Conservation of natural resources is unfruitful without a connection with nature (Arnarson, 2011; Stevenson, 2011). Connection with nature is an everyday learning and practice at CK (Queensland Government, 2012). Practices that help to reconnect nature and children include:

- Studying and investigating local wildlife
- Plant regeneration within and outside the community
- The use of natural materials as products and toys
- The development of a frog pond
- Installing and building bee and bird boxes
- Rearing chickens
- Growing an organic vegetable garden (Davis, 2010; Early Childhood Australia, 2012).

The results out of this practice are that reconnecting children with nature results in accrued ecological benefits (Knight, 2008; EYFS, 2008; Queensland Government, 2012; Moss, 2012). The limitations are that there seem to be a misguided belief in parents that 'real learning' can only occur in class settings. It seems that parents are more troubled about the dirtiness and safety of their children in outdoors. According to Littledyke (2007) this can be a major problem in connecting children with nature. Littledyke argues that the effectiveness of nature learning rests in shared discoveries and encounters with parents. This indicates that parents need to be involved, educated and be involved in outdoor activities on parents' days. I share the same view with Littledyke (2007) that if parents are involved in nature activities of their children, they may be in a position to realise the benefits of nature on their children. The forest school movement is one example where involving parents is bearing fruit (Knight, 2009).

#### **4.3.6.2 Conservation of energy**

"In education for sustainable development, young children's perspectives and meanings are listened to, considered and shape the content and approaches of learning" (Davis, 2010: 128). The statement shows the indispensability of engaging young children in concrete ecological activities (Davis, 1998; 2009 & 2010; UNESCO, 2008c; Davis *et al*, 2009; Stevenson, 2011; Early Childhood Australia, 2012; Queensland Government, 2012; Moss, 2012). There are many techniques in which young children can be involved energy saving practises. Some practices at CK include discussions, models and practises of energy saving techniques with children through storytelling and art (Queensland Government, 2012). The institution also involves families by educating them through children and newsletters (Early Childhood Australia, 2012). They also discuss the possibility of alternatives energy sources with children (Davis, 2010; Queensland Government, 2012).

It can thus be concluded that children can address issues in proactive and progressive ways, and if children's voices are socially and ecologically beneficial, they can be accepted at higher social levels. Children can also be the carriers of vital ecological awareness information. It however appears that there is a lack of moral support from community members (Davis, 2010). It should also be acknowledged that green energy is an emerging topic. There is a need for more education on the community focusing on the current energy trends and the advantages of green energy. There is also need to look for ways that incentivise people to adopt green energy.

#### 4.3.6.4 Water

The increasing demand for agriculture water and global warming and associated effects has resulted in serious water shortage in Australia. "Australia is the Earth's driest inhabited continent" (Davis, 2010: 134). Areas around CK have recently encountered serious water shortages (Queensland Government, 2012). This signifies the fundamentality that children must be incorporated in decision making processes and dialogues pertaining water conservation (Davis, 2010; Early Childhood Australia, 2012). "Central to curriculum practice at Campus Kindergarten is the belief that children can be active, informed learners, capable of impacting positively on their local environment" (Davis, 2005: 5; Gibson & Davis, 2006: 6).

The insufficiency of water raised concerns among teachers and children. Since 2002 adults and children were involved in projects and dialogues about water preservation and drought (Gibson & Davis, 2006; Early Childhood Australia, 2012). CK children noticed that there was serious water misuse at the centre (Water Conservation Project, 2002; UNESCO, 2008a). The group meeting held showed children's ability to understand water issues. Important questions such as, "*Where my water does comes from?* and *What do we use it for?*" were raised (Davis, 2010: 136-137).

Answers to these discussions were built from the teachers and children's knowledge leading to water saving practices and actions (Davis, 2010; Gibson & Davis, 2006). Some of the water conservation techniques at CK include:

- Discussions with families, workers and children on the appropriateness of water saving strategies.
- Writing of messages, drawing of pictures, signals and displays and newsletters around water issues.
- The provision of investigation resources; for instance, role play groups, games, reference books and story books.
- Growing of natural species to promote water retention.
- Encouraging staff and children to throw water in the garden.
- Purchasing of water efficient products.
- Installing dual flush toilets, water saving taps, and grey water treatment systems.
- Water harvesting through water tank.
- Researching on present literature around water (Davis, 2010; Queensland Government, 2012).

The water conservation project is an indication that children can be practical learners who can translate their learning to positively impact on the community. Moreover, good water conservation practices can develop in children and can be transposed into their homes and communities. One challenge is that research and scientific inquiries needs special skills and financial resources which may be unavailable. It is crucial for the CK to source non-paid volunteers from the university to carry out researches. Their school website may also be used to seek funds from well-wishers.

#### **4.3.6.5 Waste management**

Waste management is also part of CK's learning experiences. Waste and resource management skills include recycling and the litter-less lunch programme (Davis, 2005; Early Childhood Australia, 2012; Queensland Government, 2012). Recycling initiatives resulted reduction in the use in A4 papers (UNESCO, 2008a: 22). Research proves that the number of waste bins reduced to half a bin from two bins a day (Davis, 2005; UNESCO, 2008a; Early Childhood Australia, 2012). The litter-less lunch programme at CK resulted in condensed waste and carbon levels (Davis, 2010). Some of the initiatives of the litter-less lunches programme include:

- Replacing plastic packing with reusable containers.
- Use of compartmentalised containers.
- Placing photos on model practises at public notice boards and fridges.
- Giving statistics and information about the effects of excessive packing and related health and environmental benefits.
- Talking about litter-less lunches with the children during enrolment periods.
- Selling fabric wrapping, reusable containers and divided lunch boxes.
- Seeing children as the best advocators through discussions (Pratt & Moore, 2007; Sutton, 2009; Early Childhood Australia, 2012; Queensland Government, 2012).

It could be concluded that improved waste management skills results in economic, environmental, health and nutritional benefits. However, chances could be that parents are offended or challenged when they are told about the suggestions by teachers for instance, packing appropriate food for the children. There is therefore need to increasingly engage parents in ecological initiatives and to give children 'take home' pamphlets with vital ecological information.

#### 4.3.6.7 Green cleaning and safe chemical use

Chemical usage in manufacturing, food production and cleaning has increased than ever been experienced (Davis, 2010; Queensland Government, 2012). Hazardous chemicals are moved from one place to another risking the environment and people (especially children). “The advertising industry presents the media viewer with a mind boggling array of cleaning and hygiene products that are ‘essential’ for ensuring our homes are ‘clean, ‘hygienic’ and safe for children” (Davis, 2010: 140). CK, however, presents the possibilities of green cleaning in ECD. CK searches for and develops cleaning standards and methods that guard the environment and human health (Davis, 2010; Queensland Government, 2012; Early Childhood Australia, 2012). Some of the green cleaning practises include:

- Seeking for EfS support from local organisations.
- Visiting of other ECD centres so as to exchange knowledge.
- Use of internet sources to add on their knowledge.
- Review of existing teaching resources and materials.
- Gatherings with parents and staff members so as to share knowledge.
- Learning from mistakes.
- Reading labels for instructions.
- Bulk purchasing of green cleaning materials.
- Use of microfiber cleaning products (Davis, 2010; Queensland Government, 2012).

The practices on green cleaning and safe chemical use highlights that it is essential to engage children in topics that relates to human and environmental health (Queensland Government, 2012). However, it appears to me that there is a general thinking that the use of green cleaning is not effective. This may make educators to be reluctant in giving the children appropriate instructions. Moreover, there is no clear definition of ‘safe or green’ cleaning (Davis, 2010). My other observation is that green products are less accessible and costly for the poor people. There is need for more advanced research on green cleaning practices and material and to find out the types of green materials practises incorporated by others.

The section has presented the attempts by CK to involve children in sustaining natural resources. I have specified that conservation and use of natural resources are not worthwhile without a close affiliation with nature. The reviewed efforts included; reconnecting with nature, conservation of energy and water and green cleaning and safe chemical use. The main

practises of each attempt were listed. The subsequent section presents some of the findings at CK.

#### **4.3.7 Way forward**

In 2005 Julie Davis wrote an article entitled, *Educating for sustainability in the early years: Creating a cultural change in a child care setting*. In her article, she made it explicit that a culture of change needs to be instilled into people. The case has documented the exceptional ways in which ecological learning in ECD is promoted through change at CK. Most articles about CK reveal the fact that that “a culture of change’ is CK’s everyday practise. However, I feel that there is more to be done by progressively embracing or re-emphasising change within and outside the organisation. The research also suggests that CK should understand that change is an evolving process and therefore the institution should stick to the ‘small wins’ whilst they tirelessly work on scaling up.

#### **Understanding change as an incremental and evolving process**

As evidenced by the review of this case study that CK upholds a culture of change as part of their daily practices. However, it has also been proven in the previous sections that change is an incremental process; it evolves over a long period of time (Davis, 2005; Early Childhood Australia, 2012). It took CK almost a decade to be an exemplary centre of sustainability practice (Early Childhood Australia, 2012). Theorists on educational change, “influenced by chaos complexity theory applied to social systems, explain this by recognising that (in this case) the child-care centre is a complex, adaptive system, rather than a stable, rigid organisation” (Davis, 2005:10). Larson (1999) in his book *Changing Schools from the Inside Out* believes that change is a result of organisation history and how people mingle with one another. He says that, it is a combination of creativity and culture and is bounded by the existing relationships.

The creation of cultural change in organisations creates “small wins” that may be beneficial in the future (Larson, 1999; Early Childhood Australia, 2012). This results in the understanding of critical areas such as educator’s behaviours and skills, pedagogy and curriculum. Change account for the emergencies that result from complexities in a self-regulating system, calling for group learning in meeting the desired goals (Sterling, 2001; Stone & Barlow, 2005). It is through inclusive, dynamic and developed process that can sustain CK.

## **Leadership**

Creating a culture of change demands strong and creative leadership (Semetsky, 2010). As revealed by the review of the SPP, most projects demand creative and strong leadership which I feel should increasingly be cultured in the day to day operation of their institution. According to Davis (2005: 11) “learning organisations require patterns that develop self-organisation and ownership, rather than top-down hierarchical processes”. In his book, *The New Meaning of Educational Change*, Fullan (2001) states that effective leaders seek for consensus, create harmony and set achievable standards. There is therefore need to establish good communication skills. This helps individuals to have an understanding of the nature of the projects, teaching and encouraging people to think. It is also beneficial to regard every individual as a leader in implementing change. Such self-regulating, and democratic ideas of leadership are grounded on shaping collaborative and trusting relationships among individuals (Stone, 2009). At CK mentoring and teamwork should be a normal routine.

The educators must inspire the children and society at large to act sustainably by (supporting) them and by (engaging) them in community and professional activities. It is crucial that I acknowledge that CK is remarkably assisting in changing environmental practices, values and attitudes of the community. This is an outcome of accepting complexity in transformation, criticism and creativity (Gibson & Davis, 2006; Early Childhood Australia, 2012).

## **Professional development**

“Leadership based on an understanding of complex systems also shapes approaches to staff development” (Davis, 2005: 12). Leaders must set standards, create consensus and harmony whilst putting enough effort into the projects (Gibson & Davis, 2006; Lindberg, 2012). Staff members at CK must be given the platform to reflect on their learning and teaching (NCAC, 2009: 3). They must progressively invite and share knowledge with visitors, regularly attend workshops and conferences, upgrade their qualifications by engaging in new courses and expand their networks with professionals (Davis, 2010). During periods of staff meetings matters of pedagogy and curriculum must be constantly debated and discussed (NCAC, 2009: 3). Informal meetings during breaks should assist teachers to improve their system. Informal and formal approaches must create “a collaborative learning culture’ that stems from a grass root level” (Davis, 2005: 12).

### **'Small wins and scaling up'**

The SPP indicates that instilling a culture of change is a process. It is necessary to appreciate that change is slow and therefore initiatives improve with time. Such changes are fundamental in regenerating and reviving the organisation (Larson, 1999). Small wins are in most cases critical for organisational renewal and change. "Chaos-complexity theory informs us that at some indefinable, critical point, small changes become magnified and cascade upwards through the system" (Davis, 2005: 12). Small wins paves way for other benefits in a way that reinforces the capacity and ability to solve tougher and bigger problems (Larson, 1999: xxiii). This occurs by having the capability to solve complex challenges and through inspiration that creates new situations and settings. CK can tackle its problems by growing confidence and knowledge in people. The educators at CK must progressively engage in outreach activities where they can inspire whilst orienting themselves towards a culture of sustainability. Regular workshops, lectures and conferences based on their practises and philosophies must be constantly held (Davis, 2005: 13; Gibson & Davis, 2006: 15). General people and student teachers must be given the platform to visit the site so as to observe their activities. Moreover, experiences must be persistently shared in local newspapers, magazines and websites where a larger population can read the messages (Early Childhood Australia, 2012). They should also start with their own context whilst creating a "collaborative learning culture" that promotes teamwork as part of the daily social practices (Early Childhood Australia, 2012). Small wins should be consolidated together whilst building on their scale within and outside the community

#### **4.3.8 Conclusion**

This case study acknowledges CK as a centre that emerged from a community facing sustainability challenges. I have indicated that the institution is a place-based learning institution and have defined place-based learning as a form of education that links young children with their ecologies, communities, culture and heritage, and experiences. It has been shown that ecological learning can help young children to facilitate and foster change. I have demonstrated that ecological learning creates the values practices and attitude that are need for sustainable living (Segovia, 2010; Manteaw, 2012). I have highlighted that the ecologically-centred activities of the CK (the SPP) is showing signs of developing children's ecological awareness and literacy as the children showed the capacity to understand the community in which they reside in. The Shopping Trolley Project is a practical example of ecologically mindful children. Change was achieved because sustainability was placed at the centre of CK through their teaching and philosophies. Children are seen as 'active participants' in promoting

a generation of active citizens. The initiatives reviewed above showed that children raised the concerns and solutions within their local context. This reveals that children's participation is crucial in achieving significant and long-term sustainability through teamwork and trust. I acknowledge that although CK is regarded as a learning community that has a culture of involving people in "pro-people, pro-environment, pro-futures education for sustainability" (Davis, 2005: 13), there is need to tirelessly instil a culture of change through the entire community whilst focusing on small scale projects (Semetsky, 2010).

#### **4.4 CHAPTER SUMMARY**

The chapter reviewed two model case studies in which the benefits of ecological learning are bearing fruit. The information gathered was related to the literature on ecological learning presented in previous chapters. Through two case studies of ECD institutions in South Africa and Australia, the chapter demonstrated the practicality of ecological learning in ECD paying particular attention to teaching and learning approaches used and how these can potentially lead to the development of ecologically minded minds of children as they grow into future citizens of the planet. The major strengths of ecological learning in ECD in each of the two case studies have been identified and listed as recommendations to others attempting to build ecological learning in young children. In the same vein, the weaknesses of each model case was criticised and highlighted as warning to future similar projects. In reviewing the literature of these two model case studies (particularly focusing on the day to day activities of the ECD programme) it was demonstrated that teaching and learning approaches are tailor-made to reconnect children with nature as an integral part of their mental, behavioural and social development. Thus in line with this study's major objective to understand current trends, scope, content and methodologies involved in ecological learning in ECD and how they help prepare a pro-ecological generation, the chapter concentrated on how the daily teaching and learning practices and philosophies of both institutions have been formulated and structured to propagate a culture of ecological sustainability in children.

The historical background and context of both case studies were drawn, highlighting how they both existed in communities that were facing sustainability challenges. I have shown how the Campus kindergarten's SPP has led to the emergence of other mini ecological projects and children's increased and demonstrable sense of environmental and social responsibility. I have suggested that CK must consider that change is an evolving process and as such there is need for progressive staff development and gradual extension of their ECD programme. I have also (through the example of the Lynedoch EcoVillage's ECD permaculture project) stressed the importance of learning methodologies which directly attach children to nature in developing

their understanding of its indispensability to their own lives and the future generations. I have shown how the Lynedoch crèche integrates children's reconnection with nature, art and appropriate technology as part of their ecological learning curriculum. It has been recommended that there is need to incorporate matters of the heart, personal empowerment and further parental involvement for the Lynedoch crèche. The next chapter provides the links, interpretations and conclusion to this study.

## CHAPTER 5: CONCLUSIONS

### 5.1 INTRODUCTION

My research in this thesis was guided by my major objectives, as set out in section 1.2 of the introductory chapter:

- Building a paradigm of ecological learning through its exploration in a literature review, including four examples;
- Examining the application of the ecological learning paradigm to the ECD sector;
- Examining the practice of ecological learning through 2 case studies; and
- Concluding remarks and suggested key areas to be taken into account in building a new strategy.

In this concluding chapter, I present the major highlights of my learning path walked in doing this research. My aim is to use the information gathered in my literature review to build on the creative work of the Lynedoch ECD ecological learning and training and other like-minded ECD institutions like the Campus Kindergarten. The literature review and the two case studies have illuminated the importance of an ecological foundation in communities undergoing deep, massive transitions. These concluding remarks are culled from the literature review on the subjects of ecological learning, sustainable development and ECD in the first three chapters of the study. In addition, my research was also driven by the need to give live examples of ecological learning happening as demonstrated by the Lynedoch crèche and Campus Kindergarten in order to balance theory and practice of ecological learning in ECD. This study was inspired by the Sustainability Institute's call to promote a strategy to articulate and explicitly focus on building strategies of ecological learning within the Sustainability Institute, the Lynedoch Crèche and Learning for Sustainability Further Education and Training College. I was motivated (as indicated in Chapter 1) by the sense of determination to inculcate the message of sustainability in young children as they are likely to suffer the brunt of today's action or inaction. I also felt the essentiality of contributing to Africa and especially my home country (Zimbabwe) where ecological issues are not as imperative as political and social matters, despite the country's evident suffering from ecologically-induced problems such as pollution and climate change.

I will present this study to the Sustainability Institute Leadership Team at the end of 2012. Below, I revisit each of the research objectives and detail how these were dealt with in the preceding chapters. At this point, it is vital to summarise the focal concept of the study; that is, the meaning of ecological learning, before I respond to my last objective, i.e. concluding remarks and suggested key areas to be considered in building a new strategy.

## **5. 2 ECOLOGICAL LEARNING IN SUMMARY**

Reviews of primary and secondary data in preceding chapters informs my conclusion that ecological learning in ECD is a form of education that attempts to support sustainable development through allowing children to be critical thinkers, discoverers, creators and imaginers of sustainable ecological futures. As Charles (2009); Stevenson (2011) and Moss (2012) contend (and as revealed by the two comprehensive case studies in Chapter 4 of this study), ecological learning intertwines humanity and the earth through ecological consciousness, comprehension of the interconnection of humans and nature and a sense of reverence and awe. However, ecological learning must be advanced within the context of systems thinking as this will enable educators and learners to learn from previous mistakes, think in terms of relationships and to seek answers from nature that unite all life activities (Semetsky, 2010; Sterling, 2001; Arnarson, 2011). The methodology and content of ecological learning are and should be influenced by the historical, social, economic and ecological context.

At this point I re-visit the next research objectives, outlining how these have been realised in the course of the study.

## **5.3 EXAMINING THE APPLICATION OF THE ECOLOGICAL LEARNING PARADIGM TO THE ECD SECTOR**

In this research; ECD was defined as the process of socio-emotional, physical, linguistic and cognitive development of children from 0-9 years (UN, 2006 in WB, 2011:5). The study revealed that ECD is already identified as a critical time for any useful educational intervention (in matters of ecological awareness and sustainable development) by international agencies and national education policies alike (UNESCO, 2005; 2008a & b). Therefore, adding the notion of ecological learning to ECD makes sense, as it is this period that is the most sensitive to learning at all levels (UNESCO, 2008a). This study identified ECD to be a foundational stage whereby one's personality is determined and constructed thus as an imperative phase to

cultivate an ecologically mindful generation (Heckman, 2006; McCain, Mustard & Shanker, 2007; Pressior, 2008).

The research noted that there are a number of emerging themes in ECD that promote child development that also form the basis for ecological learning. Cited were developmentally appropriate learning, interdisciplinary learning, parental involvement and anti-bias or multicultural education. Developmentally appropriate learning stressed on the need to advance education taking into account the knowledge that is readily available to children. I discredited the 'teacher directed education' that seems to be widespread in most ECD institutions (Tilbury *et al*, 2002). On this note, it was argued that there is need to advance interdisciplinary education. The division of disciplines was noted as a challenge to child development and learning outcomes. Interdisciplinary education was noted to be associated with the following benefits: improved understanding, improved brain development, the transfer of skills form one subject to another (Saracho & Spodek, 2000).

Parents were identified as the primary and foundational mentors of children as they have the most effect in determining the attitudes, values, and skills that may foster ecological sustainability in their children (UNESCO, 2012). However, one of the challenges is that parents seem not to have ample time to pay attention to their children due to increased professional commitments and lack of relevant skills or knowledge. It was therefore suggested that it is essential to significantly involve parents in aspects that deal with the learning and mental and physical growth of their children. The section also indicated the difficulty that educators are facing due to children's different backgrounds and has mentioned that it is not easy to attain meaningful development in the absence of equity.

It was revealed that there is growing confirmation of increasing disassociation of children with nature due to growing scheduled and planned time, lack of support, time and resources. In order to demonstrate the practicality of ecological learning in ECD, the literature review in this section of the study used examples of 4 approaches in education that bring ecological learning to children whilst connecting them with nature at ECD level. The brief case studies seeking to highlight some of the teaching and learning approaches in ecological learning-focused ECD explored the Montessori Method, Steiner Schools, Forest Schools and Place-based learning citing examples where they are in practice across the globe. The Montessori Method has been seen to prioritise the individual child and his/her attachment with nature (Miller, 2004). Steiner education attempts to support children's creative thinking through interdisciplinary education and perceives children as integrated, moral and ecologically responsible beings (EYFS, 2008). Forest education seeks to capacitate and care for learners by educating children in outside

settings (Knight, 2008). Place-based education on the other hand was seen to potentially connect young children with their ecologies and surroundings by promoting the development of a sense of place in young children (Centre for Ecoliteracy, 2012a & b; Stevenson, 2011).

Judging from the evidence gleaned from the literature reviewed in this chapter, this study concludes that affiliation with nature is a vital component of every being because it is associated with benefits that involve improved physical development, ecological consciousness, academic performance and an enhanced sense of place.

#### **5.4 EXAMINING THE PRACTICE OF ECOLOGICAL LEARNING THROUGH 2 CASE STUDIES (THE LYNEDOCH ECOVILLAGE CRECHE AND CAMPUS KINDERGARTEN)**

Chapter 4 sought to explore, with the help of two comprehensive case studies of ecological learning in ECD institutions, the nature of ecological learning and its usefulness in promoting ecological awareness in children. The two case studies (from South Africa and Australia) demonstrated and confirmed the potential of ECD-centred ecological learning in promoting ecological awareness and literacy in young children and flagged the major strengths and weaknesses in such kind of approaches. A review of the day to day experiences of the two institutions (the Lynedoch EcoVillage and the Campus Kindergarten) revealed their prioritisation of reconnecting with nature, engaging in art, learning about appropriate technology (water, energy, refuse, green building, conservation and use of natural resources, green cleaning and safe chemical use) in developing a sense of ecological awareness in the children. The major outcome of these experiences is that ECD institutions that promote ecological learning must not underestimate the capability of children in grasping concepts and that there is need for consistence in teaching in an interdisciplinary manner.

The permaculture project of the Lynedoch EcoVillage revealed that although there may be a number of beneficial outcomes such as improved ecological responsibility, restoration of local ecologies, sharing of knowledge (Mabeba, 2012; van Niekerk, 2012), there is need to bring real learning closer to children. Moreover, it was noted that such projects are a learning process and require close observation and proper planning. The major outcome of the review of the Campus Kindergarten's Sustainability Planet Project and the Shopping Trolley Project is that children, in their own ways, can grasp ecological concepts and have the potential to act as agents of ecological transformation hence should be granted the platforms and be involved in matters pertaining to sustainability.

A major observation from a critical review of the two case studies is that the scale at which such ecological learning is happening is so small. However, while the scale of ecological learning maybe insignificant in terms of numbers, its significance may, at this stage, be in that examples of ecological learning are forerunners of appropriate education in a world that is in poly-crisis that include the eradication of animal and plant species, loss of forest cover, habitats, top soil, aquifers and fisheries, climate change (CC)-(global warming, ozone depletion and droughts) and peak oil (MEA, 2005; IPCC, 2007; UN, 2006; IAASTD; 2008; Lockhart, 2011; Swilling & Annecke, 2012). Although there are only a few places/live examples of real ecological learning in practice, what is happening seems to be of deep value.

## **5.5 CONCLUDING REMARKS AND KEY AREAS TO BE TAKEN INTO ACCOUNT IN BUILDING NEW STRATEGIES**

The purpose of this section is to make concluding remarks, suggestions and recommendations towards the building of new strategies in ECD-focused ecological learning. It is important at this stage to underline the fact that this study was guided by the SI's request that in its enquiry into the usefulness of ECD-focused ecological learning in creating an ecologically conscious citizens, the study do not go into details of the strategy, but to attempt to articulate core philosophical ways of seeing that may underpin their unfolding strategy. The section therefore infers from the preceding chapters (dealing with focused literature review and case studies), the efficacy, strengths and or weaknesses of ecological learning in ECD in promoting ecological awareness. In light of this, I came up with the following three observations and recommendations for inclusion:

- The need to underpin ECD with transdisciplinary ecological learning within local contexts.
- Linking ecological learning to ECD as core to “just transitions” to sustainable futures; and
- Attending to the growing need of new ways of being that can generate connectedness and belonging in a post-consumerist society.

### **5.5.1 Underpinning ECD with transdisciplinary ecological learning within local context**

Achieving ecological transformation requires humanity to tackle the complex ecological challenge in systematic and transdisciplinary manners (Jucker, 2002; UNESCO, 2005; 2008c; Segovia, 2010; Semetsky, 2010; Manteaw, 2012; Gaziulusoy & Boyle, 2012).

Transdisciplinary learning refers to the advancement of more than one discipline in ECD curriculum without restricting to one area (Saracho & Spodek, 2000; Cone *et al*, 2009; Semetsky, 2010; Constanza & Kubiszewski, 2012; Gaziulusoy & Boyle, 2012). The concept of transdisciplinary education was identified in this study as an emerging theme.

It is necessary for ECD institutions to explore the real meaning of transdisciplinarity and how it can be advanced or structured (Semetsky, 2010; Constanza & Kubiszewski, 2012). What is vital is for the world to appreciate that there is no solitary “blue print” (Canter & Brumer, 2011; Gaziulusoy & Boyle, 2012) or standards in advancing transdisciplinary learning. Nonetheless, educational processes must progressively seek for solutions that have the potential to adapt and venture into new areas, and opportunities (Constanza & Kubiszewski, 2012). This calls for ECD institutions to look across the disciplines such as art, science, sociology and anthropology (Saracho & Spodek, 2000, Centre for Ecoliteracy, 2012b; Mabeba, 2012; Annecke, 2012). In this present study, Chapter 2 and 3 in particular, highlighted the benefits of art in ecological learning in ECD. Chapter 4, on the other hand, used case studies to demonstrate the nature and benefits of a transdisciplinary approach to ecological learning in ECD. The Lynedoch case study, for example, revealed that art allows children to comprehend the ecological patterns that surround them in beneficial ways. The Lynedoch EcoVillage and the Campus Kindergarten have been shown to incorporate a number of disciplines in a contextual manner in their curriculum (art included).

### **5.5.2 Linking ecological learning in ECD to ‘just transitions’**

According to Swilling & Annecke (2012) ‘just transitions’ is a framework that can lead to the realisation of an equitable and sustainable planet. Because of its capacity to create a generation of social, economically and ecologically mindful citizens, ECD ecological learning should be a major tool in facilitating ‘just transitions’. The current ecological crisis is partly due to development models that concentrate on economic growth while neglecting ecological and social impacts (Davis, 1998; Morin, 1999; Harding, 2006; Segovia, 2010; Lockhart, 2011; Swilling & Annecke, 2012; Manteaw, 2012). This has seen us experiencing the loss of the exhaustive natural resources and the destabilisation of the ecosystem (MEA, 2005; Swilling & Annecke, 2012). The study associated ecological sustainability within the framework of systems thinking and has advanced that systems/holism will help humanity to move towards sustainable futures by promoting them to perceive the necessity of maintaining ecological balance (Cilliers, 1998; Capra, 1998; Hawken, 2007; Pressoir, 2008; Sterling, 2008; Sutton, 2009; Arnarson, 2011; IISD, 2012). This argument is supported by Sutton’s belief that “sustainability requires systems thinking” (2009: 19). In the process of transition towards a

sustainable society, I suggest that ecological learning must be advanced within the context of Sustainable Development and Education for Sustainability that will promote lifelong learning (UNESCO, 2005; 2008a; Blatchford, 2009; Nsanzimana & Tushabe, 2010; Segovia, 2010; Canter & Brumer, 2012; IISD, 2012; Swilling & Annecke, 2012; UNESCO, 2012; Manteaw, 2012). It was furthered that humanity cannot shift to a sustainable society without an ecologically literate generation hence it is imperative to begin shaping this generation from childhood ages (Orr, 2004; Sterling, 2008).

Realising that ecological learning advanced in ECD is important and strategic (as it is this period that is the most critical to learning), the study examined the application of the ecological learning paradigm to the ECD sector, using four brief examples (in Chapter 3) of places where ECD ecological learning is happening in developing and developed nations and which have the capacity of facilitating just transitions. It was concluded that the approaches to ecological learning that includes; Montessori Method, Steiner Schools, Forest schools and Place-Based Learning contribute to 'just transitions' by promoting children to live with consciousness of their indispensability with nature. The benefits of ecological learning in ECD towards a transition to an ecologically conscious society were listed as follows: improved thinking capacity, improved classroom attentiveness and academic performance, active citizens, improved community-school relationships, lifelong ecological stewards, enhanced sense of place and belonging, improved relationships between learners and teachers, lower absenteeism, improved health (diabetes, obesity, mental and physical wellness) (Chawla & Escalante, 2007; Sutton, 2009; PEEC, 2010; Segovia, 2010; Centre for Ecoliteracy, 2012b).

In examining the practice of ecological learning through 2 case studies by means of interviews, as well as primary and secondary literature reviews (Chapter 4); I sought to explore, with the help of comprehensive case study of ecological learning in these ECD institutions, the nature of ecological learning and its aptitude to stimulate ecological understanding in children and enables transitions to an ecologically balanced world. The two case studies (from South Africa and Australia) demonstrated the usefulness of ECD-centred ecological learning in upholding ecological responsiveness and literacy in young children as shown in the day to day practices, teaching and learning approaches used by the two institutions. The daily encounters of the two institutions (the Lynedoch EcoVillage and the Campus Kindergarten) revealed their prioritisation of reconnecting with nature, engaging in art, learning about appropriate technology (water, energy, refuse, green building, conservation and use of natural resources, green cleaning and safe chemical use. The major result of these experiences is that ECD centres that advance ecological learning help grow children who have the capacity to grasp subjects or concepts and can transfer the knowledge to the community thus intensifying the

chances of a change in societal mindset about ecological questions (Young, 2007; Pratt & Moore, 2007, Davis, 2010; Mabeba, 2012; Annecke, 2012).

It must be noted that by default ecological learning in ECD assumes ecological literacy within the adults connected with the ECD centre, staff and parents. This needs clearly to be an on-going area of concentration for staff capacity building, experience and training within the Sustainability Institute strategy for further developing ecological learning at all levels. It simply may not be possible to generate the reverence and awe in children without the same in their caregivers.

The permaculture project of the Lynedoch EcoVillage revealed a number of benefits resulting from real practical education that can facilitate a transition to an ecologically-conscious generation. Such benefits include; enriched ecological accountability, restoration of local environments, exchange information of knowledge (Mabeba, 2012; van Niekerk, 2012). While traditional teaching and learning approaches prioritise the role of ECD teachers in shaping children's knowledge, the Lynedoch EcoVillage case study revealed that improved ecological awareness may actually come with the children's exposure to (and learning from) nature itself. This point was buttressed by the Campus Kindergarten's Sustainability Planet Project and the Shopping Trolley Project case study (also in Chapter 4) which revealed evidence of transitions to ecological sustainability; the children's enthusiasm and initiatives in "saving the planet" (Davis, J., M. & Pratt, R. 2005).

### **5.5.3 The growing need of new ways of being that can generate connectedness and belonging in a post-consumerist society**

I have identified (in chapter 2) one of the major shortcomings to sustainability and the advancement of an ECD-oriented ecological education is the increasing technological advancement and increasing consumerism in contemporary society (Woodhouse & Knapp, 2000; Louv, 2005; 2008; Charles & Louv, 2009; Segovia, 2010; Moss, 2012). According to Moss (2012: 20) "parents are trapping their children in a cycle of 'compulsive consumerism'". According to Louv, nature has thus become an "... abstraction than reality ..." in young children (Louv, 2005: 2). As a result, most young children's understanding of nature is narrow and limited to what is necessary to their consumerist attitudes (Louv, 2008; Moss, 2012). It was also indicated in Chapter 2 that the escalating technological influx promotes children to use most of their time on play stations, computers, phone, iPods, or the television (Louv, 2008; Charles & Louv, 2009; Moss, 2012).

As indicated prior in Chapter 2, children in turn are suffering from “nature deficit disorders” hence are failing to demarcate between healthy and unhealthy systems as well as to identifying genuine global ecological consequences (Sterling, 2001; Stone & Barlow, 2005; Herbert, 2008; Stone, 2009; Segovia, 2010). In addition to failure to comprehend the earth’s systems, children are growingly suffering from health, physical and mental problems (Louv, 2008; Charles & Louv, 2009; Moss, 2012). This may make it difficult to promote ecological learning and to generate a sense of belonging and connectedness in young children (Moss, 2012). This situation demands humanity to develop new pro-ecology ways of being that do away with consumerism, and lack of affiliation with the earth.

The study highlighted that humans are a fragment of nature and have inherent feelings for nature. I have supported Wilson’s concept of ‘biophilia’ as an entry point to conserve nature and to generate a sense of belonging by demonstrating (in Chapter 4), the potential in children to grasp and practice ecological concepts. To lessen the mounting culture of consumerism behaviour, children and elders need to love nature so as to protect and be attached to it. I have argued in chapter 2 that children have an innate sense of wonder, discovery and exploratory skills (Carson, 1965). It is therefore vital for elders and teachers to discover the children’s inherent sense of awesomeness so to promote children’s love for nature in order to promote sustainable living. However, one challenge with modern education is that it prioritises the production of knowledgeable and responsible children before it inculcate the adoration for nature in children (Sobel, 1996). Wilson suggests the need to inculcate the love for nature in children before we expect them to preserve it (Wilson, 1994). As such, relentless interaction with nature allows children to be ecologically mindful and this can potentially curtail the growing consumerism and ecological challenges (Segovia, 2012; Stevenson, 2011).

The study indicated that in linking with nature, children amplify their possibilities to be critical thinkers, problem solvers and this can potentially influence their ecological and consumerism attitudes (Moss, 2012). The Forest school case study revealed that in nature, children encounter various problems such as injury, untidiness and complexity which prepare them for real life challenges (Knight, 2009). Nature boosts the learning aptitude of the children (informally and formally) as it improves children’s grasping of ecological topics and subjects which they can easily relate to due to their close proximity to nature (Moss, 2012). This has a capacity to inculcate in children, teamwork, leadership, communication, values and attitudes needed to shape a sustainable human being and society. As such, relating children with nature does not only advantage them only but the community in its totality (Moss, 2012; UNESCO, 2008a). Children who have more time in nature are likely to be part of the

community and ecosystem and are likely to be aware of the adverse consequences of impulse consumerism (Charles & Louv, 2008; Moss, 2012).

The following are suggestions culled from pointers in the reviewed literature and the case studies in the preceding chapters:

- Nature enhances children's physical and mental being and as such children must be exposed to it as much as possible, for their sake and that of their communities and the planet at large.
- There is need to create opportunities for habitual and positive encounters with the outdoors. As confirmed by the four approaches to ecological learning (in brief case studies of the Montessori Method, Steiner education, Forest school education and Place based learning) cited in Chapter 3, the learning of young children is best advanced through concrete and direct encounters with the outdoors/nature (Louv, 2008; Knight, 2009; Stevenson, 2011). Thus, children must be engrossed with the outdoors so that they learn, understand, intermingle and explore the exquisiteness of nature in developing the competence to sustain it. However, adults need to refrain from fears and restrictions that may inhibit children's direct involvement with the earth and to promote practices that re-connect children with the earth (Louv, 2008; Moss, 2012). As safety of children was indicated as one challenge that inhibits outdoor learning (Louv; 2008; Charles, 2009; Charles & Louv, 2009), precautionary and safety measures need to be sought in improving the children's experiences with the ecologies in school and non-school environments such as parks.
- There is need to improve the accessibility of nature to young children outside the school setting so as to give children the opportunity to explore the benefits of nature. ECD educators, parents and the communities should seek and advocate for sufficient green spaces for young children so that children have free and unstructured time to attach with nature.
- Connecting children with nature begins with the parents as they are the primary mentors of their children (Segavio, 2010). They determine the values, knowledge, skills and knowledge that are need to promote ecological mindfulness (UNESCO, 2008a). There are a number of ways that parents can utilise in connecting their children with nature. This may involve taking their children to waterways, parks,

mountains. Parents may also show their children green consumerism/mannerisms in their children in promising sustainable behaviours. The challenge in more vulnerable communities remains within the ECD centre - to provide experience to all children of being in nature, and not confusing this only with being in the wild. Growing beautiful flowers and vegetables have a similar effect on children to extended periods of play in nature.

While I have attempted to outline core ways of thinking to underpin a strategy highlighting ecological learning in ECD, it must be noted that the following questions would require special attention in order to create a solid framework:

- 1) The capacity of ECD staff themselves to facilitate ecological learning i.e. what type of capacity building would be required that enables the connectivity between the child and nature to emerge and do the deeper work?
- 2) May ecological learning be yet another approach that is laid at the door of the middle-class, and labelled something to which the poor, urban communities might never aspire?
- 3) How does ecological learning link to deep ecology, in direct opposition to a simplistic 'green' agenda which retains the notion that ecological learning ways of being resided only in an approach that assumes recycling waste is enough?

At this point I would like to suggest wider areas for further scholarship in ECD and ecological learning, which I hope may be useful beyond the Sustainability Institute and Lynedoch Crèche context:

## **5.6 AREAS FOR FURTHER STUDY**

The primary and secondary data from the case studies revealed the restrictive scale of ecological learning in practice. I therefore propose that interested scholars or groups pursue the following areas:

### **5.6.1 Possibilities for replication of model cases at larger scales**

I have concluded that the scale of ecological learning and sustainability practices is low hence the need to research on the reasons for such a scenario and possible remedies, that is, the ways in which the case study models (for instance; the Lynedoch EcoVillage in South Africa and Campus kindergarten in Australia) can be replicated and further improved at a larger scales.

### 5.6.2 ECD ecological learning curriculums

While this study has demonstrated the efficacy of ECD-centred ecological learning in the creation of ecological conscious children, it is apparently difficult to transform every ECD centre into expertly run ECD-centred ecological learning institutions such as the Lynedoch EcoVillage and Campus Kindergarten. There is need, therefore, to research into ways of restructuring ECD curriculums so that they at least capture the basics of ECD-focused ecological learning that can be taught or practiced. Sevigovia (2010: 751) says that if the existing ECD ecological curriculum is "... reviewed, rethought and reformed ..." there are chances that the mores, thought patterns, and knowledge essential to advance sustainable futures may be formed. It is also imperative to steep such a curriculum restructuring process in local contexts and to take locally available indigenous knowledge systems into consideration.

## 5.7 CHAPTER SUMMARY

I have provided the learning path that I have walked through during the course of my research. The major objective of the chapter was to give concluding observations, remarks and suggestions in building new strategies to ecological learning in ECD. I have revisited to the research objectives with the broad intention of building a paradigm of ecological learning through its exploration in a literature review, including four examples. My conclusions and suggestions about key areas to be taken into account in building new strategies towards improving ECD-centred ecological learning therefore summarily responded to the set objectives; that is, to exploring the applicability of the ecological learning paradigm to the ECD sector as well as examining the practice of ecological learning through 2 case Studies (The Lynedoch EcoVillage and Campus Kindergarten).

I end with two quotes on childhood from Ben Okri, the African literary genius, that perhaps articulate the potentialities of childhood best from *A Time for New Dreams* (2012):

"Childhood is the father and mother of humanity. In its mysterious estate lie our greatest secrets, our hopes, our redemption, the cures to our malaise." (Kindle Loc 972 of 1300).

"Through certain artists flows the childhood of the world, the forgotten angles, the golden ages of the spirit. In their best works we catch glimpses of the wondrous kingdom that childhood hints at. And we know that what we have glimpsed is not magic, or art, or enchantment. We know, in some obscure way, that the kingdom is real. This is what haunts us forever." (Kindle Loc 993 of 1300).

**APPENDIX A: INTERVIEWS AT THE LYNEDOCH ECOVILLAGE CRECHE**

<b>Name</b>	<b>Role</b>	<b>Interview Type</b>	<b>Date of Interview</b>
<b>Annecke, E</b>	Founding director of the SI, Co-founder and resident of the Lynedoch EcoVillage, Montessori ECD expert and board member of the LDC	Structured	19 June 2012
<b>Mabeba, N</b>	Resident of the Lynedoch EcoVillage, ECD trainer and Montessori expert and board member of the LDC.	Semi-structured	28, 29, and 31 May 2012 6, 15 and 19 June 2012
<b>Van Niekerk, R</b>	Former principal of the Lynedoch Crèche, co-trainer of the accredited ECD training programme and resident of the Lynedoch EcoVillage; board member of the LDC.	Semi-Structured	28, 29, and 31 May 2012 6, 15 and 19 June 2012
<b>Gelant, V</b>	Teaching assistant at the Lynedoch Crèche and resident of the Lynedoch EcoVillage.	Semi-structured	15 and 19 June 2012
<b>Mnyaka, N</b>	ECD assistant	Semi-structured	15 and 19 June

<b>Mgubo, Z</b>	ECD Assistant	Semi-structured	15 and 19 June
<b>Jansen, C</b>	<i>ECD Teacher</i>	Semi structured	15 June 2012
<b>Abrahams, C</b>	ECD assistant	Semi-structured	19 June 2012
<b>Scott, C</b>	Youth learning co-ordinator.	Semi-Structured	15 June 2012
<b>Vuke, M</b>	Home Owners Association Recycler	Semi-Structured	15 June 2012
<b>Munyedza, N</b>	Home Owners Association Recycler.	Semi -structured	15 June 2012
<b>Abrahams, J</b>	Caretaker at Lynedoch EcoVillage	Semi-structured	15 June 2012
<b>Arendse, K.</b>	Gardens and Grounds	Semi-Structured	19 June
<b>Fushayi, M</b>	Builder	Semi-Structured	19 June

## **APPENDIX B: Selected quotes from the Lynedoch EcoVillage case study**

### **Naledi Mabeba (Montessori expert)**

*“Children need to understand the concept of water and how to take care of water; we show them how to use and save water and not to leave the tap running”.*

*“We show the children what to do (through our own role modelling) and they do exactly what we show them to do”.*

### **Eve Annecke (The director of the sustainability Institute)**

*“Children are interested in stories of real life in experiencing alternative ways of living... from waste recycling to use of energy to picking up litter or just out door playing.”*

*“Any crèche or ecological learning institution need to be located within its context and the context of the earth and permaculture is a great approach that can make real learning possible”.*

*“Art is who we are”.*

### **Ross Van Niekerk**

*“Our vision is for the children to get involved in nature”*

*“Nature tells us something; it tells us what to do”*

*(Annecke, 2012, Mabeba, 2012; van Niekerk, 2012).*

**Appendix C: SELECTED IMAGES of the LYNEDOCH ECOVILLAGE**



**Image C.1: Children exploring nature outdoors**



**Image C.2: Children playing with sand and tyres outdoors**



**Image C. 3: Children cleaning their own dishes**



**Image C.4: Children Cleaning tables after use**

## BIBLIOGRAPHY

Abrahams, C. 2012. *ECD Assistant*. [personal interview]. 19 June.

Abrahams, J. 2012. *Caretaker at Lynedoch EcoVillage*. [personal interview]. 15 June.

Al Gore, A. 2006. *An Inconvenient Truth: The Planetary Emergency of Global Warming and What We Can Do About It*. Emmaus, Pa.: Rodale.

Arnarson, P. O., 2011. *Biomimicry*. [Online]. Available at: <http://olafurandri.com/nyti/papers2011/Biomimicry%20%20P%C3%A9tur%20%C3%96rn%20Arnarson.pdf> (1 October 2012).

Annecke, E. 2012. *Co-founder and resident of the Lynedoch EcoVillage, Montessori ECD expert and board member of the LDC*. [personal interview]. 19 June.

Arendse, K. 2012. *Gardens and Grounds*. [personal interview]. 7 & 19 June.

Babbie, E. 1998. *The Practice of Social Research*, 8<sup>th</sup> ed. Belmont: Wadsworth.

Babbie, E. & Mouton, J. 2001. *The Practice of Social Research*. Oxford: Oxford University Press.

Banks, J. 2008. *An Introduction to Multicultural Education*. 4th. edition. Pearson: Allyn/Bacon.

Bickford, D., Posa, M. R., Que, P., Campos-Arciez, A., & Kudavidanage, E. P., 2012. Science communication for biodiversity conservation. *Biological Conservation*. 151: 74-76.

Blatchford, J. 2009. *Education for Sustainable Development in Early Childhood*. [Online]. Available at: [http://www.omep.org.gu.se/digitalAssets/1320/1320257\\_ijec-vol-41-no](http://www.omep.org.gu.se/digitalAssets/1320/1320257_ijec-vol-41-no) (18 January 2012).

Blaxter L., Hughes C., & Tight M. 1996. *How to research*. Open University Press, Buckingham.

Borradaile, L. 2006. *Forest School Scotland: an evaluation*. [Online]. Available at: [www.forestry.gov.uk](http://www.forestry.gov.uk).

Brown, A. 2011. *The Thread. Resurgence*, 267. July/August 2011. Devon: The Resurgence Trust.

Burdette, H. L., Robert C., Whitaker, M. D., 2005. *Resurrecting Free Play in Young Children Looking Beyond Fitness and Fatness to Attention, Affiliation, and Affect*. University of California – Berkeley.

Campus Kindergarten. 2002. *Water Conservation Documentation*. Brisbane.

Campus Kindergarten. 2013. *Campus Kindergarten Information*. [Online]. Available at: [http://www.uq.edu.au/campuskindy/Campus\\_Kindy\\_waitlist\\_2012.pdf](http://www.uq.edu.au/campuskindy/Campus_Kindy_waitlist_2012.pdf). (6 January 2013).

Canter, M. & Brumer, C. L., 2011. Transdisciplinary niches fostering Lifelong Learning. *Procedia –Social and Behavioural Sciences*. 28. 636-639.

Capra, F. 1994. *Ecology and Community*. California: Centre for Ecoliteracy.

Capra, F. 1996. *The Web of Life*. London: HarperCollins.

Capra, F. 1997. *Creativity and Leadership in Learning Communities*. California: Centre for Ecoliteracy.

Capra, F. 1998. *Ecology, Systems Thinking and Project-Based Learning*. California: Centre for Ecoliteracy.

Capra, F. 1999. *Ecoliteracy: The Challenge for Education in the Next Century'* Centre for Ecoliteracy. [Online]. Available at: <http://www.ecoliteracy.org> (20 September 2012).

Capra, F. 2005. *Theory, Culture & Society*. Nottingham: Sage publications.

Capra, F. 2007. *Complexity and Life*. California: John Wiley & Sons, Ltd.

Carson, R., L. 1956. *The Sense of Wonder*. New York: Harper & Row Publishers.

Charles, C. 2009. *The Ecology of Hope: Natural Guidelines to Building a Children and Nature Movement*. Santa Fe, NM, USA: Children and Nature Network.

Charles, C. & Louv, R. 2009. *Children's Nature Deficit: What We Know- and Don't Know*. [Online]. Available at: <<http://www.childrenandnature.org/downloads/CNNEvidenceoftheDeficit.pdf>>. (15 August 2012).

Chawla, L. 1998. Significant life experiences revisited: A review of research on sources of environmental sensitivity. *Environmental Education Research*. 4(4): 369-383.

Chawla, L. & Escalante, M. 2007. *Students Gains from Place-Based Education*. Colorado: University of Colorado:

Cheng, L. 2005. *Changing language teaching through language testing: A wash back study*. Cambridge: Cambridge University Press.

Center for Ecoliteracy, 2012. *Explore ecological principles*. [Online]. Available at: <<http://www.ecoliteracy.org/nature-our-teacher/ecological-principles>> (25 May 2012).

Center for Ecoliteracy, 2012. *Place-Based Learning*. [Online]. Available at: <<http://www.ecoliteracy.org/strategies/place-based-learning>> (25 May 2012).

Chitwood, D. 2011. *Top 10 Montessori Principles for Natural Learning*. [Online]. Available at: <<http://livingmontessorinow.com/2011/03/08/top-10-montessori-principles-for-natural-learning/>> (20 October 2012).

Clough, P. & Nutbrown, C. 2002. *A Student's Guide to Methodology*. London: Sage.

Cilliers, P. 1998. *Complexity and Postmodernism*. New York: Routledge.

Cilliers, P. 2000. "Knowledge, Complexity and Understanding". *Emergence*. 2 (4): 7-13.

Cilliers, P. 2001. "Boundaries, Hierarchies and Networks in Complex Systems". *International Journal of Innovation Management*. 5 (2): 135-147.

Coldwell, D. & Herbst, F. 2004. *Business Research*. Cape Town: Juta.

Cone, T.P., Werner, P., Cone, S. L. 2009. *Interdisciplinary Elementary Physical Education: Connecting, Sharing & Partnering*. Human Kinetics.

Constanza, R. & Kubiszewski, I. 2012. The authorship structure of “ecosystem services as a transdisciplinary field of scholarship. *Ecosystems Services*. 1: 16-25.

Courtney, J. 2010. *Earth Science Therapy*. [Online]. Available at: [http://www.janetcourtneyphd.com/stone\\_therapy.htm](http://www.janetcourtneyphd.com/stone_therapy.htm) (17 March 2012).

Crain, W. 2004. *Montessori. Encounter*. [Online]. Available at: <http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=13936267&site=ehost-live> (20 March 2012).

Cutter-Mackenzie, A, & Smith, R. 2003. Ecological literacy: the ‘missing paradigm’ in environmental education (part one). *Environmental Education Research*. 9 (4): 497-524.

Daily News, 2011. *No power crisis, says president*. [Online]. Available at: <http://www.iol.co.za/dailynews/news/no-power-crisis-says-president-1.1283588> (15 June 2012).

Davis, J. 1998. "Young Children, Education and the Environment". *Early Childhood Education Journal*. 26 (2): 117-123.

Davis, J., M. 2005. Educating for sustainability in the early years: Creating cultural change in a child care setting. *Australian Journal of Environmental Education*. 21: 47- 55.

Davis, J., M. & Pratt, R. 2005. Creating Cultural Change @ Campus Kindergarten: The Sustainable Planet Project. *In Every Child*. 11 (4): 10-11.

Davis, J., M. 2007. Climate change and its impact on young children. *In Every Child*. 13 (4): 6-7.

Davis, J. M., 2009. *Playing With Life: Ways of Fostering Environmental Education in the Early Years*. [Online]. Available at: <http://eprints.qut.edu.au/4386/1/4386.pdf> (20 February 2012).

Davis, J. 2009. Revealing the research ‘hole’ of early childhood education for sustainability: a preliminary survey of the literature. *Environmental Education Research*. 15 (2): 227-241.

Davis, J., Enghdal, I., Otieno, L., Pramling-Samuels, I., Siraj-Blatchford, J. & Vallabh, P. 2009. "Early Childhood Education for Sustainability: Recommendations for Development". *International Journal of Early Childhood*. 41 (2): 113-117.

Davis, J., M. & Elliott, S. 2009. Exploring the resistance: an Australian perspective on educating for sustainability in early childhood. *International Journal of Early Childhood*. 41(2): 65-77.

Davis, J. 2010. *Young Children and the Environment: Early Education for Sustainability*. Australia: Cambridge University Press.

Department of Social Development (RSA), 2005. *Position Paper on Early Childhood Development Care and Development*. [Online]. Available at: <http://www.hsrc.ac.za/Document-1648.phtml> (18 January 2012).

Dresner, S. 2002. *The Principles of Sustainability*. London: Earthscan.

Early Childhood Australia, 2012. *The Sustainable Planet Project: Creating cultural change at Campus Kindergarten*. [Online]. Available at: [http://www.earlychildhoodaustralia.org.au/every\\_child\\_magazine/every\\_child\\_index/the\\_sustainable\\_planet\\_project.html](http://www.earlychildhoodaustralia.org.au/every_child_magazine/every_child_index/the_sustainable_planet_project.html) (7 January 2013).

Edwards, C.P., 2002. "Three Approaches from Europe: Montessori, Waldorf and Reggio Emilia". *Early Childhood Research and Practice*. 4 (2).

Edwards, C.P., 2003. "'Fine Designs' from Italy: Montessori Education and the Reggio Approach". [Online]. Available: <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1019&context=famconfacpub> (14 October 2012).

Elliott, S. 2006. *Beyond patches of green: A turning point in early childhood environmental education*. Paper presented at the biennial conference of the NZ Association of Environmental Education, January 22-26, in Auckland, New Zealand.

Early Years Foundation Stage (EYFS), 2008. *Guide to the Early Years Foundation in Steiner Waldorf Early Childhood Settings*. [Online]. Available at:

<[http://www.steinerwaldorf.org/downloads/earlyyears/EY\\_Foundation\\_Stage\\_Guide.pdf](http://www.steinerwaldorf.org/downloads/earlyyears/EY_Foundation_Stage_Guide.pdf)> (2 August 2012).

Feng, J. 1994. *Issues and Trends in Early Childhood Education*. United States of America: ERIC.

Fien, J. 1995. *Teaching for a Sustainable World*. UNESCO-UNEP: Brisbane.

Fiksel, J. 2012. A systems view of sustainability: The triple value model. *Environmental Development*. 2: 138-141

Fullan, M. 1999. *Change Forces: The Sequel*. London: Falmer Press.

Fullan, M. 2001. *The New Meaning of Educational Change* (3rd ed.). New York: Teachers College Press.

Fushayi, M. *Builder at the Lynedoch EcoVillage*. [personal interview]. 19 June

Gambino, A., Davis, J., M. & Rowntree, N., E. 2009. Young children learning for the environment: Researching a forest adventure. *Australian Journal of Environmental Education*. 25: 83-94.

Gaziulusoy, A. I., & Boyle, C. 2012. Proposing a heuristic reflective toll for reviewing literature in transdisciplinary research for sustainability. *Journal of Cleaner Production*. xxx: 1-9.

Gelant, V. 2012. *Teaching assistant at the Lynedoch Crèche and resident of the Lynedoch EcoVillage*. [personal interview]. 15 & 19 June.

Gibson, M. & Davis, J., M. 2006. Embracing complexity: Creating cultural change through education for sustainability. *International Journal of Knowledge, Culture and Change Management*. 6 (2): 93-102.

Gilman, R. 1991. "The Eco-village Challenge". *In Context*. Accessed: (9 April 2008).

Global EcoVillage Network (GEN), 2006. *EcoVillage Design Education*. Available at: <[www.gaiaeducation.net](http://www.gaiaeducation.net)>.

Grisham-Brown, J. L., Hemmeter, M. L., & Pretti-Frontczak, K. 2005. *Blended Practices in Early Childhood Education*. Baltimore: Brookes.

Hattingh, J. 2001. "Conceptualizing Ecological Sustainability and Ecologically Sustainable Development in Ethical Terms: Issues and Challenges". *Annale*. 2.

Hart, C. 1998. *Doing a literature review: Releasing the social science research imagination*. London: Sage.

Hautecoeur, J., P. 2002. *Ecological Education in Everyday Life*. Toronto: University of Toronto Press.

Hawken, P. 2007. *Blessed unrest: How the largest social movement in history is restoring grace, justice and beauty to the world*. New York: Penguin Books.

Heckman, J. J., 2006. "Investing in Disadvantaged Young Children is an Economically Efficient Policy". *Building the Economic Case for Investments in Preschool*> Committee for Economic Development. New York: January 10<sup>th</sup>.

Hemingway, P. 2009. *What is a systematic review?* [Online]. Available at: <<http://www.medicine.ox.ac.uk/bandolier/painres/download/whatis/syst-review.pdf>> (20 March 2012).

Herbert, T. 2008. "Eco-intelligent education for a sustainable future life". In Pramling-Samuelsson, I & Kaga, Y. (eds). *The contribution of early childhood development to sustainable societies*. Paris: UNESCO. 63-66.

Holfester, C. 2008. *The Montessori Method*. [Online]. Available at: <[http://www.williamsburgmontessori.org/wpcontent/uploads/2010/08/The\\_Montessori\\_Method.pdf](http://www.williamsburgmontessori.org/wpcontent/uploads/2010/08/The_Montessori_Method.pdf)> (20 March 2012).

Holmgren, D. 2012. *Essence of Permaculture*. [Online]. Available at: <<http://cemusstudent.se/wp-content/uploads/2012/05/Holmgren-Essence-of-PC-2007.pdf>> (15 June 2012).

International Assessment of Agricultural and Technology for Development (IAASTD), 2008. *Global Summary for Decision Makers: International Assessment of Agricultural Knowledge, Science and Technology for Development*. Washington DC: Island Press.

International Institute for Sustainable Development (IISD). 2012. *What is Sustainable Development?* [Online]. Available at: <<http://www.iisd.org/sd/>> (20 February 2012).

International Montessori Society (IMS), 2009. *List of Montessori Schools*. [Online]. Available at: <<http://imsmontessori.org/list-of-montessori-society-schools.htm>> (22 October 2012).

Inter-Governmental Panel on Climate Change (IPCC), 2007. *Climate Change 2007: Synthesis Report*. Geneva, Switzerland.

International Union for Conservation of Nature (IUCN), United Nations Environment Programme (UNEP), World Wildlife Fund for Nature (WWF). 1991. *Caring for the Earth: A Strategy for Sustainable Living*. IUCN, UNEP, WWF: Gland, Switzerland.

Jansen, C. 2012. *ECD Teacher*. [personal interview]. 15 June.

Jucker, R. 2012. "'Sustainability? Never heard of it!' Some basics we shouldn't ignore when engaging in education for sustainability", *International Journal of Sustainability in Higher Education*. 3 (1): 8 –18.

Kammerman, S. B., 2010. *Early Childhood Care and Education: The Family, The Market, and The State*. New York: Columbia University.

Katz, L. G., 1996. Early Childhood Development Child development knowledge and teacher preparation: Confronting assumptions. *Early Childhood Research Quarterly*. 11: 135–146.

Kellert, S. 2005. *Building for Life: Designing and understanding the human nature connection*. Washington: Island Press.

Kelly, C. 2010. *Types of Literature Review Methodology*, Unpublished Extract from Thesis for Research Workshop, School of Public Management & Planning. South Africa: University of Stellenbosch.

- Kimberly, T. 2010. *Define Physical Development*. [Online]. Available at: <http://www.livestrong.com/article/96678-define-physical-development/> (22 July 2012).
- Knight, S. 2008. The Wild Side of Learning: Forest School for the Early Years, *Early Years Educator*. 10 (2): 14-16.
- Knight, S. 2009. *Forest Schools and Outdoor Learning in the Early Years*. London: Sage Publications Inc.
- Kostelnik, M. J., 1993. *Developmentally appropriate programs*. Eric Digest, Urbana.II. Eric Clearinghouse on Elementary and Early Childhood Education.
- Krcmarova, J. 2009. *E. O Wilson's concept of 'biophilia' and the environmental movement in the USA*. [Online]. Available at: <[http://www.klaudyan.cz/dwnl/200901/01\\_Krcmarova\\_pdf.pdf](http://www.klaudyan.cz/dwnl/200901/01_Krcmarova_pdf.pdf)> (15 October 2012).
- Krippendorff, K. 1980. *Content Analysis: An Introduction to Its Methodology*. Newbury Park, CA: Sage.
- Lamers, N. 2008. "Cochabamba and Colorado Conjoined: place-based education for a global perspective of environmental issues" In Gonzalez-Gaudiano, E. and Peters, M.A. (eds.). *In Environmental Education: Identity, Politics and Citizenship*. Rotterdam: Sense Publishers.
- Larson, R., L. 1999. *Changing Schools from the Inside out* (2nd ed.). Lancaster, PA: Technomic Publishing.
- Laszlo, K., C. 1998. *Dimensions of Systems Thinking*. [Online]. Available at: <[http://archive.syntonyquest.org/elcTree/resourcesPDFs/Systems\\_Thinking.pdf](http://archive.syntonyquest.org/elcTree/resourcesPDFs/Systems_Thinking.pdf).> (25 June 2012).
- Lewis E., Manfield, C., Baudains, C. 2009. Going on a turtle egg hunt and other adventures: *Education for sustainability in early childhood*. Australian Journal of early childhood. 35 (4): 95-100.
- Littledyke, R. 2007. "Making a difference: Outdoor education in early childhood education" In Filho, W.L., Manolas, E.I., Sotirakou M.N. & Boutakis G.A. (eds). *Higher Education and the*

*Challenge of Sustainability: Problems, Promises and Good Practice*. Environmental Education Center of Soufli: Greece.

Lindberg, P. 2010. *Early Childhood Education and Care Staff Support: Mentoring and Professional Development in Finland*. Finland: National Institute for Health and Welfare.

Lockhart, H. 2011. *Spirituality and Nature in the Transformation to a Sustainable world: Perspectives of South African Change Agents*. Stellenbosch: Stellenbosch University. MPhil Thesis.

Lopota, C., Wallace, N. & Finn, K. 2005. *Comparison of academic achievement between Montessori and traditional educational programs*. *Journal of Research in Childhood Education*. 20 (1): 5-13.

Louv, R. 2005. *Last child in the woods: Saving our children from nature-deficit disorder*. New York: Algonquin Books.

Louv, R. 2008. *Last child in the woods: saving our children from nature deficit disorder*. New York: Algonquin Books.

Mabeba, N. 2012. *Resident of the Lynedoch EcoVillage, ECD trainer and Montessori expert and board member of the LDC*. [personal interviews]. 28, 29 & 31 May; 6, 15 & 19 June 2012.

Macy, J. & Young-Brown, M. 1998. *Coming Back to Life*. British Columbia: New society

Manteaw, O. O., 2012. Education for sustainable development in Africa: The search for pedagogical logic. *International Journal of Education Development*. 32: 376-383.

Martinez, J. 2004. *Parental Involvement: Key to student achievement*. Chicago: Illinois.

Mayoux, n.d. *Qualitative methods*. [Online]. Available

at:<[http://www.google.co.za/#hl=en&sugexp=frgbld&gs\\_nf=1&cp=27&gs\\_id=39&xhr=t&q=Mayoux++qualitative+methods&pf=p&scient=psyab&oq=Mayoux++qualitative+methods&aq=f&aql=&gs\\_l=&pbx=1&bav=on.2,or.r\\_gc.r\\_pw.r\\_qf.,cf.osb&fp=65ce8583a9492f74&biw=1024&bih=491](http://www.google.co.za/#hl=en&sugexp=frgbld&gs_nf=1&cp=27&gs_id=39&xhr=t&q=Mayoux++qualitative+methods&pf=p&scient=psyab&oq=Mayoux++qualitative+methods&aq=f&aql=&gs_l=&pbx=1&bav=on.2,or.r_gc.r_pw.r_qf.,cf.osb&fp=65ce8583a9492f74&biw=1024&bih=491)> (23 March 2012).

McCain, N. M., Mustard, J.F., & Shanker, S. 2007. *Early Years Study 2: Putting Science into*

Action. Toronto: Council for Early Child Development. [Online]. Available at: [www.councilecd.ca/files/downloads/Early\\_Years.pdf](http://www.councilecd.ca/files/downloads/Early_Years.pdf) (15 September 2011).

McCallum, I. 2010. *Untamed Exhibition*. Kirstenbosch Gardens. Cape town.

Millennium Economic Assessment (MEA), 2005. *Ecosystem and Human Well-being: Synthesis*. [Online]. Available at: <http://www.millenniumassessment.org/documents/document.356.aspx.pdf> (2 February 2012).

Mebratu, D. 1998. "Sustainability and Sustainable Development: historical and conceptual review". *Environment Impact Assessment Review*. 18: 493-520.

Mgubo, Z. 2012. *ECD assistant*. [personal interview]. 15 & 19 June.

Miller, J.P., 2004. "Nourishing the Spiritual Embryo: The Educational Vision of Maria Montessori". *Encounter: Education for Meaning and Social Justice*. 17 (2): 14-21.

Mnyaka, N. 2012. *ECD assistant*. [personal interview]. 15 & 19 June.

Moss, S. 2012. *Natural childhood*. [Online]. Available at: <http://www.nationaltrust.org.uk/servlet/file/store5/item823323/version1/Natural%20Childhood%20Brochure.pdf>. (24 October 2012).

Mouton, J. 2001. *How to succeed in your master's and doctoral studies: a South African guide and resource book*. Pretoria: Van Schaik.

Morin, E. 1999. *Homeland Earth- A manifesto for the New Millennium*. Cresshill: Hampton Press.

Munyedza, N. 2012. *Home Owners Association Recycler*. [personal interview]. 15 June.

Nature Action Collaborative for Children (NACC), 2007. *The Nature Action Collaborative for Children's mission and vision*. [Online] Available at: <http://www.worldforumfoundation.org/wf/nacc/mission.php> (22 April 2008).

Nature Action Collaborative for Children (NACC), 2008. *Re-connecting the World's Children to Nature*. [Online]. Available at: <<http://www.slideshare.net/KlausGroenholm/reconnecting-the-worlds-children-to-nature>> (20 July 2012).

National Association for the Education of Young Children (NAYEC), 1996. *Developmentally Appropriate Practice in Early Childhood Programs Serving Children from Birth through Age 8*. Washington, DC: National Association for the Education of Young Children.

National Association for the Education of Young Children (NAYEC), 2009. *Developmentally Appropriate Practice in Early Childhood Programs Serving Children from Birth through Age 8*. Washington, DC: National Association for the Education of Young Children.

National Childcare Accreditation Council (NCAC), 2009. Extract from *Putting Children First*, the magazine of the National Childcare Accreditation Council (NCAC). Issue 29 March 2009. 12-15.

Nsanzimana, D. & Tushabe R. 2010. *Guidelines for infusing Education for Sustainable Development into Schools in Rwanda*. Rwanda: Rwanda Environmental Management Authority (REMA).

Okri, B. 2012. *A Time for New Dreams*. Johannesburg: Rider

Orr, D. 1992. *Ecological Literacy: Education and the transition to a postmodern world*. New York: State University of New York Press.

Orr, D. 1994. *Earth in Mind: On Education, Environment and the Human Prospect*. Washington, DC: Island Press.

Orr, D. 2004. *Earth in Mind: On Education, Environment, and the Human Prospect*. Washington, DC: Island Press.

Overbay, L., Post, B., & Newman, D. 2005. *Interdisciplinary learning through dance: 101 MOVEntures*. Champaign, IL: Human Kinetics.

Page, J., M. 2000. *Reframing the Early Childhood Curriculum: Educational Imperatives for the future*. Florence, KY, USA.

Permaculture Research Institute (PRI). 2012. *What is permaculture?* [Online]. Available at: <http://permaculture.org.au/what-is-permaculture/> (14 June 2012).

Petticrew, M. & Roberts, H. 2006. *Systematic reviews in the Social Sciences: a practical guide*. Malden: Blackwell.

Petty, N. J., Thomson, O. P., Stew, G. 2012. Ready for a paradigm shift? Part 2: Introducing qualitative research methodologies and methods. *Manual Therapy*. 17: 378-384.

Pezzoli, K. 1997. Sustainable Development: A Transdisciplinary Overview of the Literature. *Journal of Environmental Planning and Management*. 40 (5): 549-574.

Place-based Education Evaluation Collaborative (PEEC), 2010. *Place-based Education Evaluation Collaborative. 2010. #e Benefits of Place-based Education: A Report from the Place-based Education Evaluation Collaborative*. [Online]. Available at: [http://www.peecworks.org/PEEC/Benefits\\_of\\_PBE-PEEC\\_2008\\_web.pdf](http://www.peecworks.org/PEEC/Benefits_of_PBE-PEEC_2008_web.pdf) (7 August 2012).

Pratt, R. & Moore, N. 2007. *Green is the new black Education for sustainable development in the early years*. Australia: Spring. 13 (2): 1-5.

Pressoir, E. 2008. "Preconditions for young children's learning and practice for sustainable development". In Pramling-Samuelsson, I. & Kaga, Y. (eds). *The contribution of early childhood development for sustainable societies*. Paris: UNESCO.

Pyle, R. 2002. *Eden in a vacant lot: Special places, species and kids in community of life*. In: *Children and Nature: Psychological, Sociocultural and Evolutionary Investigations*. Kahn, P. and Kellert, S. Cambridge, MA: MIT Press.

Qhinga, F. 2012. *Gardener at Lynedoch EcoVillage*. [personal interview]. 7, 19 June.

Queensland Government. 2012. *Case studies – Childcare centres and kindergartens*. [Online]. Available at: <http://www.ehp.qld.gov.au/sustainability/sector-guides/child-care/case-studies.html> (11 January 2013).

Robertson, J. 2008. *I Ur och Skur. Mullenborg and Skogsknattarna. Forest Kindergartens*. [Online]. Available at:

[http://www.friluftsframjandet.se/c/document\\_library/get\\_file?groupId=14903&folderId=2138138&name=DLFE-8264.pdf](http://www.friluftsframjandet.se/c/document_library/get_file?groupId=14903&folderId=2138138&name=DLFE-8264.pdf)> (2 August 2012).

Robertson, J. 2008. *I UR "Rain or Shine. Swedish Forest schools.* [Online] Available at: [http://www.friluftsframjandet.se/c/document\\_library/get\\_file?folderId=39265&name=DLFE-5521.pdf](http://www.friluftsframjandet.se/c/document_library/get_file?folderId=39265&name=DLFE-5521.pdf)> (2 August 2012).

Robson, C. 2011. *Real world research.* 3<sup>rd</sup> ed. Chichester: Wiley

Rogers, P., Jalal, K. F., & Boyd, J. 2005. *An introduction to sustainable development.* Canada: Harvard University and Glen Education Foundation.

Rubin, A., & Babbie E. E., 2008. *Research Methods for Social Work.* (6<sup>th</sup>ed). Belmont, CA: Thomson Brooks/Cole.

Saracho, O., N. & Spodek, B. 2002. *Contemporary Perspectives on Early Childhood Curriculum.* United States of America: INFORMATION AGE PUBLISHING.

Satori, C. 2012. *Steiner School: 'Nature Deficit Disorder' the modern child disease.* [Online]. Available at: <http://virtual-lancaster.blogspot.com/2012/04/steiner-school-nature-deficit-disorder.html>> (25 April 2012).

Schalteger, S. 2012. Transdisciplinary research for environmental literacy. *Ecological Economics.* 74: 177-178.

Schumacher, E., F. 1999. *Small is Beautiful, Economics as if People Mattered, 25 years later ... with commentaries,* Hartley & Marks Publishers, Inc., Point Roberts.

Scott, C. 2012. *Youth learning co-ordinator.* [personal Interview]. 15 June.

SEED International, 2011. *What is Permaculture?* [Online]. Available at: <http://www.seedinternational.com.au/pc.html>> (15 June 2012).

Segovia, V. M., 2010. *Transforming Mindsets through Education for Sustainable Development.* Philippines: Elsevier Ltd.

Semetsky, I. 2010. "Ecoliteracy and Dewey's educational philosophy: implications for future leaders", *Foresight*. 2 (1): 31-44.

Sobel, D. 1996. *Beyond Ecophobia: Reclaiming the Heart of Nature Education*. Great Barrington, MA: The Orion Society.

Spies, M. 2010. *Early Childhood Development as a pathway to sustainable community development*. Stellenbosch: Stellenbosch University. MPhil Thesis.

Stemler, S. 2001. *An overview of content analysis. Practical Assessment, Research & Evaluation*. [Online]. Available at: <<http://pareonline.net/getvn.asp?v=7&n=17>> (11 April 2012).

Sterling, S. 2001. *Sustainable education: Re-visioning learning and change*. First UK: Green Books.

Sterling, S. 2008. *Sustainable education: Towards a deep learning response to unsustainability*. [Online]. Available at: <<http://www.developmenteeducationreview.com/issue6-perspectives1>> (21 October 2012).

Stevenson. R. B., 2011. Sense of Place in Australian Environmental education Research: Distinctive, Missing or Displaced. *Australian Journal of Environmental Education*. 27 (1): 46-54.

Stone, M. & Barlow, Z., 2005. *Ecological Literacy: Educating Our Children for a Sustainable World*. Seira Club Books.

Stone, M. K., 2009. *Smart by Nature: Schooling for Sustainability*. California: Watershed Media.

Sustainability Institute (SI), 2012. [Online]. Available at: < [www.sustainabilityinstitute.net](http://www.sustainabilityinstitute.net)> (13 June 2012).

Sutton, A. 2009. *Educating for Ecological Sustainability: Montessori education Leads the Way*". *Montessori Life*. 21 (4): 18-26.

Stern, N. 2006. *Executive Summary*. In *The Economics of Climate Change* .London: British Government. p. i-xxvii.

Sturdavant, D., W. 1993. *From thinking like a machine to thinking like a mountain: educational restructuring or ecological literacy*. Oregon: University of Oregon.

Swilling, M. & Annecke, E. 2006. "Building sustainable neighbourhoods in South Africa: learning from the Lynedoch case". *Environment and Urbanization*. 18 (2): 315 – 332.

Swilling, M. & Annecke, E. 2012. *Just Transitions: Explorations of Sustainability in an Unfair World*. Cape Town: Juta and London: Earthscan.

Taylor, B. & Zimmerman, M. 2005. *Deep Ecology*" in Taylor, ed., *Encyclopedia of Religion and Nature*. London: Continential International.

The International Montessori Index, 2006. *Montessori*. [Online]. Available at: <http://www.montessori.edu> (20 December 2006).

Theron, F. & Saunders, J. 2009. "Scientific writing skills and social research methodology: an introduction of basic techniques." In Davids, I., Theron, F & Maphunye, K.J. (eds.). *Participatory Development in South Africa: a development management perspective*". 2nd edn. Pretoria: Van Schaik.

The Times 2011. *Water crisis by 2020*. [Online]. Available at: <http://www.timeslive.co.za/local/article913892.ece/Water-crisis-by-2020> (14 February 2011).

Tilbury, D., Stevenson, R.B., Fien, J., Schreuder, D. 2002. *Education and Sustainability: Responding to the Global Challenge*, Commission on Education and Communication, IUCN, Gland, Switzerland and Cambridge, UK. p. xii - 206.

Trigger, D. 2008. Place, belonging and nativeness in Australia. In F. Vanclay, M. Higgins, & A. Blackshaw ( Eds.) *Making sense of place: Exploring concepts and expressions of place through different sense and lense*. Canberra: National Museum of Australia.

United Nations Educational, Scientific and Cultural Organisation (UNESCO), 2005. *UN Decade of education for Sustainable Development 2005-2014*. [Online].

Available at: <http://unesdoc.unesco.org/images/0013/001399/139937e.pdf> (7 July 2012).

United Nations Educational, Scientific and Cultural Organisation (UNESCO), 2007. *The UN Decade of Education for Sustainable Development: 2005-2014: The First Two Years*, Paris, UNESCO.

United Nations Educational, Scientific and Cultural Organisation (UNESCO), 2008. *The contribution of early childhood education to a sustainable society*. [Online]. Available: <<http://unesdoc.unesco.org/images/0015/001593/159355e.pdf>> (18 January 2012).

United Nations Educational, Scientific and Cultural Organisation (UNESCO), 2008. *EFA-ESD Dialogue: Educating for a sustainable world*. Paris: UNESCO.

United Nations Educational, Scientific and Cultural Organisation (UNESCO), 2008. *Regional Guiding Framework of Education for Sustainable Development in the Arab Region*. [Online]. Available at: <[http://www.esd-world-conference2009.org/fileadmin/download/general/Arab\\_ESD\\_regional\\_strategie.pdf](http://www.esd-world-conference2009.org/fileadmin/download/general/Arab_ESD_regional_strategie.pdf)>(25 June 2012).

United Nations Educational, Scientific and Cultural Organisation (UNESCO), 2010. Education for Sustainable Development. [Online]. Available at: <<http://www.unesco.org/en/esd/>> (15 October 2012).

United Nations Educational, Scientific and Cultural Organisation (UNESCO), 2012. *Education for Sustainable Development (ESD)*. [Online]. Available at: <<http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/education-for-sustainable-development/>> (20 October 2012).

United Nations Children's Fund (UNICEF), 2006. *Programming experiences in Early Childhood Development*. [Online]. Available at:<<http://www.unicef.org/earlychildhood/files/programming%20experiences%20in%20early%20childhood.pdf>> (27 July 2012).

United Nations Children's Fund (UNICEF), n.d. *Early Childhood Development*. Harare: Government of Zimbabwe.

United Nations (UN), 2006. *State of the World's Cities 2006/7*. New York: United Nations.

United Nations (UN), 2007. *The Human Rights Impact of Climate Change*. [Online]. Available at: <

<https://docs.google.com/viewer?a=v&q=cache:3kSlkjoAm7oJ:www.ohchr.org/Documents/Press/HumanRightsImpactClimateChange.pdf+that+the+most+vulnerable+...+will+suffer+earliest+and+most+...> > (23 February 2012).

van Niekerk, R. 2012. *Former principal of the Lynedoch Crèche, co-trainer of the accredited ECD training programme and resident of the Lynedoch EcoVillage; board member of the LDC.* [personal interview]. 28, 29 & 31 May; 6, 15 & 19 June 2012.

Vasagar, J. 2012. *A different class: the expansion of Steiner schools.* [Online]. Available at: <<http://www.guardian.co.uk/education/2012/may/25/steiner-state-funded-free-schools>> (25 May 2012).

Vuke, M. *Home Owners Association Recycler.* [personal interview]. 15 June.

World Bank (WB)/United Nations Children's Fund (UNICEF) / Joint United Nations Program on HIV/AIDS (UNAIDS), n.d. *Operational Guidelines for Supporting Early Child Development (ECD) in Multi-Sectoral HIV/AIDS Programmes in Africa.* [Online]. Available at: <[http://data.unaids.org/una-docs/joint\\_guidelines\\_ecd\\_africa\\_en.pdf](http://data.unaids.org/una-docs/joint_guidelines_ecd_africa_en.pdf)> (17 July 2012).

World Bank (WB), 2011. *Investing in Young Children. An Early Childhood Development Guide for Policy Dialogue and Project Preparation.* World Bank. Washington , D. C.

Weber, R. P. 1990. *Basic Content Analysis*, 2<sup>nd</sup> ed. Newbury Park, CA.

Weissglass, J. 1999. *Curriculum and Society.* Education Week, 18(32): 45-47. [Online].

Available at:

<<http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=1811742&site=ehost-live>>

(2 January 2007).

World Health Organization (WHO), 2011. *Role of the Health Sector in promoting Early Childhood Development. A Strategic Framework.* WHO: India.

Wilson, E. O., 1984. *Biophilia.* Cambridge: Harvard University Press.

Wilson, E.O., 1994. *Naturalist.* Washington D.C: Shearwater Book,

Wilson, R., A. 1996. *Starting Early: Environmental Education during the Early Childhood Years*. Columbus, OH: ERIC Digest.

Wilson, R. (1997). A sense of place. *Early Childhood Journal*. 24 (3): 191-194.

World Commission on Environment and Development (WCED), 1987. *Our Common Future*. Oxford: Oxford University Press.

World Health Organization (WHO), 2005. *ECOSYSTEMS AND HUMAN WELL-BEING*. [Online]. Available at: <<http://www.who.int/globalchange/ecosystems/ecosys.pdf>> (19 February 2012).

Woodhouse, J. L., & Knapp, C. E., 2000. *Place-Based Curriculum and Instruction: Outdoor and Environmental Education Approaches*. [Online]. Available at: <[http://scholar.google.co.za/scholar?q=placebased+learning&btnG=&hl=en&as\\_sdt=0%2C5](http://scholar.google.co.za/scholar?q=placebased+learning&btnG=&hl=en&as_sdt=0%2C5)>. (20 October 2012).

Young, T. 2007. 'Why do young children need to know about climate change?' *Early Childhood Australia*. [Online]. Available at: <[www.eca.org.au](http://www.eca.org.au)>. (25 February 2008).

### **Websites**

<http://dictionary.reference.com/browse/appropriate+technology>

<http://www.sab.org.br/pedag-wal/lawaldir.htm#BRASIL>

<http://www.uq.edu.au/campuskindy/Our%20history.htm>

<http://www.twineagles.org/forest-kindergarten.html>

<http://www.steiner-australia.org/alphabet.html>

<http://www.uq.edu.au/campuskindy/Map.htm>



