On my watch: a review of the environmental education literature with particular reference to South Africa, and South African teenagers

by
Robin Anne Murray

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Supervisor: Ms Eve Annecke
Director of the Sustainability Institute
School of Public Leadership and Management at Stellenbosch University

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Declaration

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

March 2015

Stopping by Woods on a Snowy Evening by Robert Frost

Whose woods these are I think I know.

His house is in the village though;

He will not see me stopping here

To watch his woods fill up with snow.

My little horse must think it queer

To stop without a farmhouse near

Between the woods and frozen lake

The darkest evening of the year.

He gives his harness bells a shake

To ask if there is some mistake.

The only other sound’s the sweep

Of easy wind and downy flake.

The woods are lovely, dark and deep.

But I have promises to keep,

And miles to go before I sleep,

And miles to go before I sleep.

Abstract

About half a million students matriculate from South African high schools each year, with limited environmental education and an underdeveloped capacity to live sustainable lives. This does not seem to be the case in some other parts of the world, where many high school students appear to be receiving education that is relevant to the socio-ecological crisis.

The rationale of this thesis was to understand this phenomenon and explore what could be done to improve the situation for South African teenagers. This was a desktop study based upon systematic literature review methodology. The primary research objectives were to describe the local context of the study, explore emerging environmental education theoretical themes and detail a number of practical initiatives from around the world. The research process culminated in the fourth objective, which was to consolidate the work into key learnings for South Africa, with particular reference to South African teenagers.

A backdrop to environmental education was provided that included a discussion on the global socio-ecological crisis, development and sustainable development in South Africa. The definition and use of the term “environmental education” was justified. In this instance, it is an inclusive definition that incorporates eco-literacy, ecological learning and education for sustainability. In addition to this, a brief comparative history of sustainable development and environmental education has been tabulated.

Key theoretical themes in environmental education cluster around the centrality of place. Six themes are presented, namely space and place, trans-national education and third-culture kids, claims of transformation, principles of environmental education, institutional innovation, and the sustainability researcher.

Three kinds of practical initiatives emerged in the literature review. These are “green fields” environmental education (brand new institutions), “moving train” environmental education (adaption of existing organisations) and “plug-in” environmental education. Eight initiatives are described, providing examples for all three of these groups.

The key learnings for environmental education in South Africa and South African teenagers conclude this thesis. Among other key learnings, the value of the radical perspective is presented, as well as the benefit of perceiving environmental education through different lenses, including a historical one. The link between environmental education and food is explored. It is suggested that the theory and praxis of place-based education exerts a gravitational pull on many aspects of this work. It seems that place-based education provides a “holding space” for environmental education in South Africa, and a starting point for future research or practical application.

Keywords: Environmental education, eco-literacy, ecological learning, education for sustainability, place-based education, teenagers, South Africa, high schools.

Opsomming

Ongeveer ’n halfmiljoen studente matrikuleer jaarliks aan Suid-Afrikaanse hoërskole. Hierdie leerders beskik oor beperkte omgewingsopvoeding en ’n onderontwikkelde vermoë om volhoubare lewens te lei. Dít blyk nie die geval te wees in ander wêrelddele nie, waar baie hoërskoolleerders oënskynlik onderrig ontvang wat met die sosio-ekologiese krisis verband hou. Die beweegrede vir hierdie tesis was om hierdie verskynsel te verstaan en te bepaal wat gedoen kan word om die stand van sake vir Suid-Afrikaanse tieners te verbeter. Die navorsing het bestaan uit ’n lessenaarstudie op grond van ’n stelselmatige literatuuroorsig. Die hoofnavorsingsdoelwitte was om die plaaslike konteks van die studie te beskryf, ontluikende teoretiese temas op omgewingsopvoedkundige gebied te verken, en ’n aantal praktiese inisiatiewe van oor die hele wêreld te beskryf. Die navorsingsproses het uitgeloop op die vierde doelwit, naamlik om die studieresultate in kernlesse vir Suid-Afrika, bepaald met verwysing na Suid-Afrikaanse tieners, te verwerk.

Eerstens word die agtergrond van omgewingsopvoeding geskets, wat onder meer bestaan uit ’n bespreking van die wêreldwye sosio-ekologiese krisis sowel as ontwikkeling en volhoubare ontwikkeling in Suid-Afrika. Die omskrywing en gebruik van die term ‘omgewingsopvoeding’ word ook geregverdig. In hierdie geval word die term inklusief gebruik om ook na eko-geletterdheid, ekologiese leer en onderwys vir volhoubaarheid te verwys. Daarbenewens bied die studie ’n bondige vergelykende geskiedenis van volhoubare ontwikkeling en omgewingsopvoeding in tabelvorm.

Die vernaamste teoretiese temas op omgewingsopvoedkundige gebied draai om die kernrol van plek. Ses temas word aangebied, naamlik ruimte en plek, transnasionale onderwys en derdekultuurkinders, bewerings van transformasie, beginsels van omgewingsopvoeding, institusionele innovasie, en die volhoubaarheidsnavorser.

Drie soorte praktiese inisiatiewe het uit die literatuuroorsig na vore getree, naamlik “braakland”-omgewingsopvoeding (splinternuwe instellings), “bewegende trein”-omgewingsopvoeding (aanpassing van bestaande organisasies) en “inprop”-omgewingsopvoeding. Agt inisiatiewe word beskryf, wat voorbeelde van ál drie hierdie groepe bied.

Die tesis bied ten slotte die belangrikste lesse vir omgewingsopvoeding in Suid-Afrika en vir Suid-Afrikaanse tieners aan. Dit sluit onder andere in die waarde van die radikale perspektief, sowel as die voordeel daarvan om omgewingsopvoeding deur verskillende lense, waaronder ’n historiese een, te beskou. Die koppeling tussen omgewingsopvoeding en voedsel word verken. Die studie kom tot die gevolgtrekking dat die teorie en praktyk van plekgebaseerde onderwys ’n soort ‘beweegruimte’ vir omgewingsopvoeding in Suid-Afrika, sowel as ’n wegspringplek vir toekomstige navorsing of praktiese toepassing, bied.

Trefwoorde: omgewingsopvoeding, eko-geletterdheid, ekologiese leer, onderwys vir volhoubaarheid, plekgebaseerde onderwys, tieners, Suid-Afrika, hoërskole

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- To my God, who stands behind me.

This thesis was a team effort, so many parts to make the whole, I am deeply grateful. I dedicate this work to my parents in acknowledgement of their deep love and commitment towards the girls and me. I trust my work will bring life to some of the people I enjoy and admire the most – teenagers. You're the bomb.com.

Robin Murray, October 2014

Contents

Abbreviations and acronyms

EE	Environmental education
EEPI	Environmental Education Policy Initiative (EECI)
FET	Further Education and Training
GDP	Gross Domestic Product
ICT	Information and communication technology
NGO	Non-governmental organisation
UNCED	UN Conference of Environment and Development
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organisation
SADC	Southern African Development Community
STRAW	Students and Teachers Restoring a Watershed
USA	United States of America

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Chapter 1: Introduction

"Glaciers have been melting faster than education
has been changing to meet serious new crises."
(Greenwood 2010:1)

Although the Decade of Education for Sustainable Development draws to a close at the end of 2014 (UNESCO, 2014), the work is far from over. This thesis explores the literature pertaining to education for sustainable futures, with particular reference to South African teenagers. The intention is to provide a firm theoretical foundation for future pedagogy and practice. It explores both theoretical and practical contributions to environmental education (EE), with literature drawn from local and international sources. This thesis aims to provide a "thick understanding" of the topic; i.e. one that reveals the richness of multi-faceted social complexity and makes visible the invisible web of interconnections and intra- and interpersonal relationships (Muller, 2008) of the roots, trends, themes, opportunities and challenges of this emergent education field. It does this through a qualified systematic literature review that looks both into the past and the future, without letting go of the present. Chapter 1 provides a context for the study.

1.1 Background and motivation

I drew my inspiration for this work from four sources. The first was a module on corporate governance I completed at the Sustainability Institute, Stellenbosch in 2010. I realised that EE is incorporated in primary and high schools in the global North,[1] but does not seem to appear in South African schools until post-graduate level at institutions of higher learning. As 78% of South Africans stop their education at high school level (Steyn, 2007), most youth complete their formal education without receiving the capabilities required to live well in the future, given the multi-faceted, global socio-ecological crisis. The effects of this crisis are described in section 1.3.1.

[1] The global North refers both to geographical places as well as socio-economic strata. It is considered to be the region above the Brandt Line.

In a peculiar twist, a great deal of aid and attention is given to materially disadvantaged teenagers in South Africa, as it should be; however, privileged youth lead less sustainable lives and are less eco-literate (Pilgrim, Smith & Pretty, 2007). Scant attention is paid to the EE of wealthy teenagers because they are seen to already have more than they require in material terms and thus an unconscious incompetence grows. As adults they will have the propensity to do more ecological harm than their poorer counterparts. If increased attention was paid to the "eco-literally disadvantaged" rich youth, perhaps they would become conscious and equipped to lead sustainable lives. In addition to this, EE needs to overcome the anxiety evidenced in research that shows that many South African children are afraid of nature for a number of reasons, for example, crime or superstition (Adams & Savahl (2013).

Secondly, between 2010 and 2012, I had the privilege of interviewing the principals from three different schools: Pinelands High School, Cape Town, Western Cape; Southern Cross School, Hoedspruit, Limpopo; and St Mark's College, Jane Furse village, Limpopo. All of them are or were attempting to incorporate principles of EE into their curriculums, facilities and school routines (De Boer, 2010; Anderson & Anderson, 2012; Gibbon, Prevost & Franck, 2012). I came to understand just how tough it is to implement such a project in South Africa. One of the main challenges is that the South African public education system is in a developmental phase of "control and compliance" (Gibbon, Prevost & Franck, 2012; DBE:CAPS, 2014). This means that there is very little institutional space for innovation. Teachers are also suffering from change fatigue as the curriculum has been revised frequently, at least twice over the past two decades, and the administration burden is considerable. The most recent change is the phased implementation, 2012–2014, of the Curriculum Assessment Policy Statements, which is a revision of the National Curriculum Statement (DBE:CAPS, 2014)

My third source of inspiration arose from home-schooling my daughters for many years, which was a life-changing experience for all of us. My desire was to develop a relationship of fascination between each child and knowledge and thus plant the seeds for life-long, delight-driven learning. I used Charlotte Mason's (Schaeffer Macauley, 1984; SCM, 2014) principles in my teaching and we immersed ourselves in the nature all around us.

I was astounded at the wealth of our experience and the cognitive, affective and creative capacity of young people. At the time, we lived in small village, Greyton, in the Western Cape. We had many villagers join us for lessons or ask if they could teach us – we were all educated by the community. At the time of writing, my daughters are 15 and 17 years old and attend the local state 1 000-strong high school. The challenge of educating teenagers to live and breathe sustainability is a daily reality for me.

Fourthly, during the module on Leadership and Ethics, also at the Sustainability Institute, I was introduced to the work of Fritjof Capra (Capra, 1996) and the Centre for Ecoliteracy (CFE, 2014), which has made a deep and lasting impression on me. I regularly come across examples of EE interventions that give me a glimpse of what is possible. In my preliminary reading, I came across this particular story; and I was struck by the educational efficiency of the approach and the benefit to the community. The story has been paraphrased in my own words.

Out of the building and into the classroom?

The community in the “boom and bust” town of Laytonville in the United States of America (USA) harvested their natural heritage of redwood trees, destroyed potential future earnings as many residents were lumberjacks by trade and sunk into poverty. The local school leaders, motivated teachers and students, took a decision to be part of the solution and resisted the sense of hopelessness that had immobilised the townspeople. The school embarked on an environmental-education project focused on finding a sustainable crop to generate much-needed revenue. After researching the possibilities, the students decided to cultivate mushrooms. They built and powered mushroom houses, experimented with different varieties of mushrooms, took the project to scale, added value to the harvest by preserving the mushrooms and sold the product into the neighbouring communities and beyond. Both money and hope began to flow within the town again. There was a “back-wash” of education as the knowledge around mushroom cultivation and the commercial potential of the crop passed from children to parents, many of whom were ex-lumberjacks by trade. From an education point of view, the students learnt maths, technology, biology, economics, food science and negotiation skills through the project (Potter, 2012)

My thinking and experiences, between 2010 and 2012, aggregated into a focal question that I wish to attempt to answer in this thesis: How are the adults "on watch", including myself, preparing and educating teenagers, particularly in South African schools, to engage in the 21st century reality evolving before them and what opportunities lie before us to do this?

1.2 Research problem, objectives and significance

A researcher must choose among a number of options as s/he formulates her/his research questions (Alvesson & Sandberg (2013). I have translated these questions into a research project using Machi and McEvoy's three-step process that refines the research problem, objectives and significance (2012). I adopted this particular approach because it translates an everyday problem into a defined research interest, informed by a specific academic discipline knowledge base (Machi & McEvoy, 2012). The three steps are outlined below.

Step 1: Research problem

Two interrelated research problems propel this work. Firstly, while EE in schools appears to be well established in the USA, the United Kingdom and Europe (Pilgrim et al., 2007; Pretty et al., 2009; Capra, 2012), this opportunity is not being fully realised in South Africa. This implies the deliberate perpetuation of a public and private education system that enables economic, social and ecological injustice within the dominant social paradigm of a post-apartheid neo-liberalism to flourish (Rozema, 2001; Kelly & Kelly, 2013).

The emerging discourse on EE suggests an alternative that could educate youth while simultaneously capacitating them to create mitigation and adaptation strategies to cope with the mounting polycrises (Hessel, 2012).

Secondly, EE appears to be a far more complex activity than initially perceived from its 1970s nature conservation roots. For example, among other questions, current researchers are examining the efficacy of EE; identifying the barriers that prevent learning and pro-environmental behaviour; and testing the assumption that this is a linear process, i.e. that increased knowledge leads to an attitudinal change that translates to positive behavioural change (Krasny & Dillon, 2013).

At the heart of this research are the concerns that ecological destruction has increased despite EE being proffered since the 1970s and that the most educated on the planet are leading the most unsustainable lives. In the light of these interrelated research problems, perhaps if EE was both better theoretically and practically understood, key ideas would emerge that could unlock the theoretical aspects and practical pedagogical approach of the South African high schooling system, propelling it towards producing young eco-literate adults.

Step 2: Research objectives

The research objectives that arise are to:

1. Explore the current and historical context of EE (see chapters 1 and 3).
2. Synthesise published and unpublished material to distil key themes emerging within the field of EE (see chapter 4).
3. Gain insight into the practical application of EE (see chapter 5).
4. Consolidate the context, theory and practice of EE into key learnings relevant to South Africa, and South African teenagers (see chapter 6).

Step 3: Significance of study

Current contribution

At the proposal stage of this thesis I conducted a preliminary literature search to determine whether or not the envisaged study duplicates other research and if similar research has been undertaken. The search terms – eco-literacy, ecological literacy, environmental education, sustainability education, high schools, South Africa – were used to search the following data bases:

- NISC (previously the Africa-wide Nipad)
- NEXUS
- Sunscholar – Economics & Management – School of Public Leadership.

Although similar research has been conducted, it focuses on specific case-studies, young children, examining the effect of EE projects, wilderness experiences and schools in the global North.

There does not appear to be a broad synthesis of the contributions in the field of EE. Neither, does there appear to be an examination of the challenges of introducing EE to South African high schools.

Future contribution

Drawing from a broad base of local and international literature to distil dominant theoretical themes and practical initiatives within the discourse about EE and how these might pertain to the EE of South African teenagers represents an original contribution.

1.3 The real-life context of the study

"We may have plundered and polluted our planet,
but our children's education should be a vital tool
to help repair the damage
– to the great benefit of their and future generations"
(Karl Jaeger, 1999 in Arnold-Baker, 2011:12–13)

This section attempts to sketch some of the themes of EE, with particular reference to South Africa.

1.3.1 The polycrisis

The polycrisis, a term coined by Edgar Morin (Hessel, 2012), refers to the complex interplay of dangerous social, economic and ecological trends currently unfolding on a local, national and global scale. These trends are substantiated by mainstream documents, a list of which can be found in appendix 1.1, which focus on ecosystem degradation, global warming, peak oil, inequality, urban poverty, food insecurity and material flows (Swilling & Annecke, 2012; Swilling, 2012). In addition, consideration must be given to peak waste[2] (Hoornweg, Bhada-Tata & Kennedy, 2013); and the possibility of a nuclear winter[3] (Loubser, 2014).

[2] Peak waste arises when a region's generation of waste outstrips its ability to process the waste without incurring detrimental ecological and social consequences.

[3] The term "nuclear winter" refers to the cumulative degradation of the environment caused by the light, heat, blast and radiation of multiple nuclear explosions. A particular concern is the depletion of the ozone layer due to exposure of nitrogen oxide, a by-product of nuclear explosions (Encyclopaedia Britannica, 2013).

In South Africa, other trends should be acknowledged, such as the loss of cultural identity (Marshall, Coleman, & Reason 2011:4); the highest world-wide incidence of HIV/Aids (HSRC, 2014); the prevalence of multi-drug resistant tuberculosis – while this is lower in the Western Cape than other provinces, the disease remains a significant local factor in the province DoH, 2014); and high levels of social violence and violence in schools .

Being presented with the polycrisis may be daunting, distressing and depressing for students. EE educators can play a key role in ameliorating this vulnerability by providing students with the ability to explore the options and to find an individual "place to stand" (Marshall, Coleman & Reason, 2011:6).

1.3.2 The dominant social paradigm

Since the 2008 financial crash the world has hung, like a pendulum out-of-kilter, between two orbs. One is an ailing neo-liberal paradigm embodied by the Washington Consensus and the Washington security agenda[4] (Held, 2004) and the other is an emerging earth-democracy paradigm, promoted by Vandana Shiva (2005:205) and Warren (1998), Paulo Freire (in Gadotti & Torres, 2009), Khan (2010) and Gadotti (2011), among others. She describes earth democracy as "the people's project [which] is unfolding in an atmosphere of dialogue and diversity, of pluralism and partnerships, of sharing and solidarity" (Shiva, 2005:4).

One of the societal norms promoted by the global North and challenged by the earth-democracy paradigm is the notion of private ownership. Shiva argues that corporate globalisation has enclosed the commons, privatising and commodifying public goods for private profit (Shiva, 2005:1–4).

The commons or public goods refer here to ecosystems' goods and services bequeathed to all living beings, for example, land and forests. Shiva contends that initially only land was enclosed, but this practice has now been extended to include knowledge, culture, water, biodiversity and public services, for example, health and education (Shiva, 2005:3).

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4 In addition to supporting the narrow security interests of the USA, the Washington Consensus seems to favour the political and socio-economic interests of the global North, over the global South. The 2008 financial crash illuminated the weakness of the neo-liberal paradigm and provoked a critique of this perspective and a search for an alternative (Gowan, 2009:25–27).

It is her view that “[T]he ‘ownership’ of the rich is based on the ‘dispossession’ of the poor ...” and “The rise of extremism and terrorism is a response to the enclosures and economic colonisation of globalisation” (Shiva, 2005:2–3). Earth democracy is not a new concept, nor strictly a southern one. Chief Seattle of the Suquamish Tribe of North America enunciated this concept in 1848 using words that still resonate today...“How can you buy or sell the sky, the warmth of the land? The idea is strange to us. If we do not own the freshness of the air and the sparkle of the water, how can you buy them?” (Shiva, 2005:1). Earth democracy principles can be found in appendix 1.2.

Which dominant social paradigm does education serve, the Washington Consensus or Earth Democracy? A parallel may be drawn with the environmental ethics debate described in chapter 3, which argues that a particular paradigm is already being taught, whether implicitly or explicitly (Benton, 2004). As those on watch, we should be clear about which one it is.

1.3.3 Industrial education

Industrial education can be likened to a self-perpetuating machine that creates identical parts to keep itself going, even though it no longer serves a valid purpose in a world that needs critical thinkers. In Grecian times, the slave that took the children of the elite to school was known as the pedagogue. Pedagogy is of Greek origin and means to “guide or lead children” and the classic pedagogies are all considered anthropomorphic (Gadotti, 2011) and dominated by a human-centred versus eco-centric approach. Professor Antonia Darder, a critical eco-pedagogist, who articulates a “pedagogy of beauty”, states that “Anchored upon such a perspective [neoliberal, anthropomorphic] of schooling, classroom curriculum socialises students into full-blown identities as entitled consuming masters and exploiters of the earth, rather than collective caretakers of the planet.” (Khan, 2010:xv; LMU-LA, 2014). The education we are supplying to our children trains them to meet the needs of development, mal-development or under-development rather than sustainable development (Gallopin, 2003). This type of education reinforces a post-modern, neo-liberal economic ethos and prepares young people to operate in such a model (Greenwood, 2010; Khan, 2010; LMU-LA, 2014).

Greenwood makes a distinction between schooling and education and argues that even the confusion in understanding the difference between these terms is evidence of the influence of institutions on our thinking patterns (2010). He suggests that this narrow thinking leads to a "homogenised curriculum that is unresponsive to the diversity of place, culture, and geography, unresponsive to the fast changing social and ecological environments in which we live, and more responsive to the desires and assumptions of the corporate sector" (Greenwood, 2010:1). Achievement is competitive, and narrowly defined. Only state-sanctioned education is seen as legitimate. Conventional schooling reflects a reductionist view of a mechanistic organisational structure, where each part plays its prescribed role, within strictly patrolled boundaries. As an educator raised and schooled in the system, it is difficult to break the mould and challenge the norm. Education is frequently the subject of media critique and attention, making changes even trickier to implement (Greenwood, 2010:1–3).

Maruggi, in a review of Palmer and Zajonc's work (2010), succinctly articulates a view of the irrelevancy and out-datedness of today's education when he remarks "...that education today is rooted in the worldview of nineteenth-century science, where knowledge was inert and objective and the role of education was to teach students to manipulate that knowledge. The new physics, on the other hand, asserts the primacy of experience and relationship, seeing the universe as 'a great chain of being'" (Maruggi, 2013:99). This view is consistent with Capra and his expression of the "web of life" (Capra, 1996). It also implies an expression of relationship between the observed and the observer, one of equality and value, which is grounded in reality (Palmer & Zajonc, 2010; Maruggi, 2013).

Community-based participatory research is a mechanism for "seeing" these relationships for what they are (Hacker, 2013).

1.3.4 The opportunity for environmental education in South Africa

If EE is introduced, at any point, into conventional education, such an adaption can make a material difference to the lives of the current and future generations. This view is supported broadly by Northern thinkers and it is a perspective that is appearing in the recent discourse of Southern educationalists. (Greenwood, 2010; Bell, 2012; Capra, 2012; Loubser, 2014; UNESCO, 2014).

Nevertheless, it appears that support for the dominant social paradigm of neo-liberalism is taught at public high schools in South Africa, implicitly rather than explicitly. How should a student be taught to take a critical view of what s/he is being taught, so that s/he can progressively challenge the hegemony?

There are local and international examples of the "blindside" of industrial education. The academic is encouraged to be a modern day "Scheherazade",[5] and to include narrative in her/his writings to enliven the work (Pollock & Bono, 2013). In this vein, three narratives may be found in appendix 1.3 illustrating the "blindside" of industrial education and the opportunities that lie in including EE in the curriculum. These stories are:

- Local narrative: World Cup Soccer at Pinelands High School
- International story: The World Bank
- Local and international story: Oiling the already-turning wheels.

A pedagogy which, implicitly or explicitly, creates and perpetuates this blindness must be challenged. However, the examples given also illustrate that urban or rural socio-ecological disturbances, resulting in part from this very pedagogical and institutional blindness, can become the "upside" for niche EE (Greenwood, 2010; Krasny & Dillon, 2013).

Educators should present alternative realities to their students (Marshall, Coleman & Reason, 2011). They do not necessarily need to join all the dots, but rather to provide the learning atmosphere that allows the students to do this for themselves

1.3.5 Old voice, new ideas

The reductionist, industrial model of education was challenged as early as the mid-1800s by Charlotte Mason who saw the education practices in England at the time as treating the child as a "cog in a machine" and the "chattels of adults" (Schaeffer Macauley, 1984:7).

[5] Pollock and Bono (2013) use the literary character of Scheherazade to illustrate the importance of narrative in academic writing. Scheherazade was the virgin who entertained the murderous Persian king with stories for 1001 nights until he fell in love with her.

She took a deep and broad view of education that reflected her educational philosophy and, in particular, her view of the child.

> In fact, an education system that says, one bright summer's day in the dawn of my youth, "There. Now you are educated. This piece of paper says so," is doing me a gross disfavour. The truly educated person has only had many doors of interest opened. He knows that life will not be long enough to follow everything through fully.
>
> (Mason, 1904 in Schaeffer Macauley, 1984:8).

Mason could be regarded as one of the first teachers and educators of teachers to both model and teach EE, as the concept is expressed by Goleman, Bennett & Barlow (2012).

1.3.6 The place of the researcher matters

I sit in the global South[6] and it seems to matter to this research as my temporal position has, and does, inform my worldview and thus my interpretation of the research. I acknowledge Borda's challenge:

> ... do not monopolise your knowledge nor impose arrogantly your techniques, but respect and combine your skills with the knowledge of the researched and grassroots communities, taking them as full partners and co-researchers. Do not trust elitist versions of history and science which respond to dominant interests, but be receptive to counter-narratives and try to recapture them. Do not depend solely on your culture to interpret facts, but recover local values, traits, beliefs and arts for action by and with the research organisations. Do not impose your own ponderous scientific style for communicating results, but diffuse and share what you have learned together with the people, in a manner that is wholly understandable and even literary and pleasant, for science should not be necessarily a mystery nor a monopoly of experts and intellectuals. (Fals Borda in Loubser, 2014).

[6] The global South refers both to geographical places, as well as to socio-economic strata. It is considered to be the region south of the Brandt Line.

This research attempts to raise another Southern voice in the discourse of EE. The perspectives of institutions, teachers and students are included in this research to present the nuanced views referred to by Fals Borda.

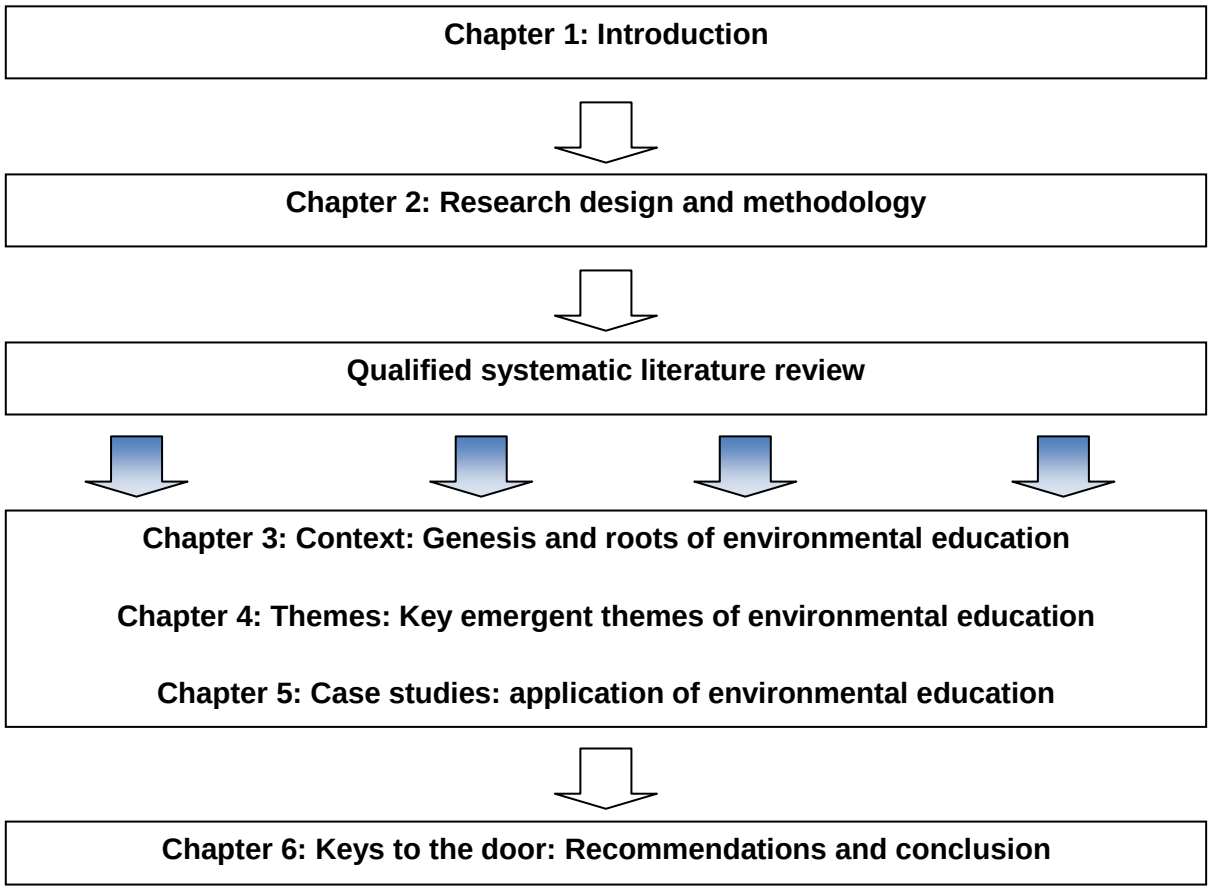
1.4 Introduction to research design and methodology

A research design is the blueprint or big picture of how the research project will be tackled (Yin, 2010). It focuses on the desired outcome and takes the research question or objectives as the starting point. The research methodology or process breaks the design down into specific tasks, procedures or tools to achieve the end result (Mouton, 2011). I use a qualified systematic literature review, based on academic (published) and grey literature (unpublished), in this study. This would be regarded as a qualitative, non-empirical research design (Mouton, 2011:57).

As sustainability comes of age, the research design and methodology around the subject is growing (Franklin & Blyton, 2011). Cognisance is taken, in this research, of these recent additions to the discourse.

1.5 Outline of thesis

Figure 1: Outline of thesis and chapter content



Reflexive box 1: Attending the World Student Environment Network Global Summit

Based on the comments of workshop participants at the World Student Environmental Network global summit, it seems that for many of the North American and European students their visit to South Africa was their first exposure to extreme poverty on a large-scale and it has left them searching for answers.

I was both fascinated and alarmed by one young German who suggested that the poor are so poor that they should not be expected to take any responsibility for their own situation, and that the wealthy should fix the problem. His understanding seemed to deny the humanness of the poor; his approach was paternalistic and instrumental! There was no appreciation for the will, ingenuity or voice of the disadvantaged. Paradoxically, the same young man is passionate about educating teenagers in his country and is deeply involved in an organisation called Generation Green.

My sense of the radical northern and southern perspectives has been concretised by attending the summit. To generalise, the northerners are primarily concerned with the green agenda (ecological issues) and have not integrated the brown agenda (socio-economic and political issues) into their thinking.

The literature indicates that a deep experience with nature during childhood seems to create a more eco-centric worldview during adulthood (Pretty et al., 2009). This perspective was challenged by conversations with young people from around the world; for example, a South African said that his mindfulness of nature came from his studies in chemical engineering when he realised just how dangerous industrial chemicals are for the environment. Another student commented that although he and his friends had all grown up on the edge of a forest, it was only he who had developed a conscience for nature.

Although this is merely anecdotal, it reinforces systems thinking that a model or research are an approximate of reality, and not reality itself ... that is always much more complex (Preiser, 2013).

1.6 Concluding chapter 1

Chapter 1 supports research objective 1, which is to explore the current and historical context of EE. It illuminates how the research problem and objectives emerged from my experiences and exposure to EE. Particular aspects of the real-life context of EE are highlighted through the discussions on the polycrisis, the dominant social paradigm, industrial education, the opportunities offered by EE, old voices and new ideas, and the place of the researcher. Chapter 1 concludes with an introduction to the research design and methodology of this thesis. The first reflexive box has been included as a device to give voice to my own observations. These boxes are situated throughout the thesis. Chapter 2 is dedicated to the research design and methodology.

Chapter 2: Research design and methodology

"Good review articles are precious commodities."

(Mulrow, 198:485)

Chapter 2 carries about a 17.5%[7] weighting in this thesis because research design and methodology lay a foundation for and determine the quality of the product and process. This foundation is designed to meet the four research objectives defined in chapter 1. The proportional space given to this chapter reflects the attempt to write a qualified systematic literature review accompanied by an internal interrogation. In addition, there is a reflexive aspect to this work that requires consideration of both the knowledge generated (what) and the generative process (how) (Alvesson & Skoldberg, 2012:8–9). This chapter presents three sections: the design, the methodology and a view on "unplugging" the "plugged-in" researcher.

2.1 Research design

2.1.1 Qualitative versus quantitative I empirical versus non-empirical research

Research design begins with the end in mind and pays attention to the sort of evidence required to address the research objectives (Mouton, 2011). The research design chosen for this study is a qualified systematic literature review. As this is a stand-alone endeavour and not the first phase of a study, it can be also be termed a literature study (Mouton, 2011). A literature review is a non-empirical study that is in keeping with the non-empirical research objectives of this thesis and it is intended to "provide an overview of scholarship in a certain discipline[8] through the analysis of trends and debates" (Mouton, 2011). Empirical studies are based on primary data and can include surveys, experiments, quasi-experiments, economic studies, case studies, programme evaluation and ethnographic studies, while non-empirical studies are based on secondary data, which can include the evaluation of text or numerical data (Mouton, 2011; Yin, 2010).

[7] Chapter 2 is about 7 000 of 40 000 words equating to roughly 17.5%.
[8] "Discipline" must be interpreted liberally as the study covers more than one academic discipline.

To generalise,[9] empirical research designs are regarded as quantitative studies and non-empirical as qualitative. A design that makes use of both qualitative and quantitative features is regarded as having a mixed research design.

Given this explanation, neither a quantitative, empirical design nor a mixed research design would meet the research objectives of this thesis. A quantitative design would be unsuitable because it is not the intention behind this work to understand EE by collecting large-scale, numeric data that is replicable and can be used to validate generalisations (Muller, 2008).

2.1.2 Types of literature included in a literature review

Although this is a non-empirical study, which is built on conceptual critique and analysis (Mouton, 2011), the inclusion of case studies, mentioned in the literature, and the use of reflexive boxes, locate the work in reality. Types of literature that may be included in a literature review include both academic works and grey literature; the latter may be organised in themes or case studies as is done in this thesis (Wallace & Poulson, 2004; Mouton, 2011). The inclusion of unpublished reports mitigates against publication bias (Campbell Collaboration, 2014).

However, the inclusion of case studies and reflexive boxes does not carry sufficient weight to be considered as quantitative data. Thus this thesis does not employ a mixed-methods design, but remains a qualitative one.

2.1.3 Sustainability research

This research takes cognisance of the recent body of work concerning research designs and methodologies for sustainability research (Alvesson, 1956-, 2009; Kelly, 2009; Filho, 2011; Franklin & Blyton, 2011). It therefore follows two tracks through the wood of innovative research techniques.

One is the reflexive aspects of the work found in the reflexive boxes and the other is the analysis of case studies drawn from literature.

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[9] The concept of “generalisation” addresses the degree of applicability of research from one context to another. This is based on the level of abstraction, i.e. the higher the level of abstraction, the more applicable research may be to a wide range of contexts. In this comment, generalisation represents a high level of abstraction (Wallace & Poulson, 2004:23).

Franklin and Blyton suggest that researchers are influenced in their choice of research design by their "disciplinary background and epistemological starting point" and that where they have been exposed to cross-disciplinary teaching, then "the potential for a widened conceptual framing can also increase" (2011:6). As a recent graduate of the Sustainability Institute, which adopts a transdisciplinary approach to teaching and learning, I suggest that this puts their students, like me, at a distinct advantage when we are deciding how to frame our future studies. This is particularly relevant as any study on sustainability engages with potentially enormous diversity, in terms of context, approach and scale and thus matching the research project with the appropriate research design can involve complex choices from among multiple available options (Franklin & Blyton, 2011).

In summary, the non-empirical, qualitative research design of a qualified systematic literature review is used to answer the research objectives. The research design of this thesis is interrogated further under four headings, namely approaches, variation, principles and limitations.

2.2 Approaches: the literature review

As the research design of this thesis consists entirely of a qualified systematic literature review, a comprehensive discussion of this device is presented. A number of current academics' approaches to the literature review are considered in this section. Noteworthy is the development in the art and science of writing literature reviews in the few intervening years between Petticrew and Robert's (2006) and Kelly's (2009) writings on one hand and Booth, Papaioannou and Sutton's work (2012) on the other.

2.2.1 The definition and history of the literature review

A literature review can be defined as "... a reviewer's critical account designed to convince a particular audience about what published (and possibly also unpublished) theory, research, practice or policy texts indicate is and is not known about one or more questions[10] framed by the reviewer. (Wallace & Poulson, 2004:39)

[10] In this instance it is objectives, rather than questions.

A classical definition can be found in the footnotes.[11] A literature review provides a "firm foundation for the advancement of knowledge" and exposes gaps and overlaps in existing research (Webster and Watson, 2002 in Booth et al., 2012:11). It is a complex and deeply personal task that involves the processes of selection, interpretation, critical engagement, ordering, synthesising and writing. It is important to acknowledge what is excluded from these definitions, i.e. it is not a simply a summary of diverse texts on the topic, but rather the reviewer is required to critically engage with the material and to build a cogent argument (Wallace & Poulson, 2004).

The literature review has been used as a research design for about 250 years. The first "systematic review" was published in 1753 by a Scottish naval surgeon, James Lind. The technique was honed over the next 240 years, mostly by scientific and medical researchers. In 1993, the Cochrane Collaboration (Cochrane Collaboration, 2013)[12] was founded and in 2000, the sibling organisation, the Campbell Collaboration or C2 (Campbell Collaboration, 2014),[13] was birthed. These organisations provide the gold standard for literature reviews (Booth et al., 2012). The history of the literature review confirms the complexity and subjectivity of the technique. Because the process and product is developed through the individual mind, there is on-going effort to bring academic rigour to the literature review, not only for the so-called "hard sciences", but also for the humanities.

2.2.2 Types of literature reviews

Authors categorise literature reviews in diverse ways, for example, Booth et al. suggests 12 different types of literature review (2012), Petticrew and Roberts propose six (2006) and Kelly (2009), who found limited literature available at the time of writing, used the typology generated by Petticrew and Roberts (2006). Different types of reviews have been categorised and may be found in appendix 2.1: Types of literature review. (Machi & McEvoy, 2012) do not differentiate between reviews, but rather propose that literature reviews may be basic or advanced.

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[11] "…a written document that presents a logically argued case founded on a comprehensive understanding of the state of knowledge about a topic of study ... [and] ... establishes a convincing thesis to answer the study's question" (Machi & McEvoy, 2012:4)

[12] The Cochrane Collaboration focuses on providing high quality medical and health research using primary data.

[13] The Campbell Collaboration proposes systematic reviews for both the science and social science fields.

The latter implies additional iterations of research activities (Machi & McEvoy, 2012). Mouton provides a refreshing perspective that does not require formally categorising the review, but rather arranging the material according to themes, i.e., date of studies, schools of thought, hypothesis, case studies construct or methods (Mouton, 2011).

To meet the research objectives of this thesis, Booth et al. 12th review type has been chosen, namely a "systematic search and review" (2012:27). This qualified systematic literature review should "combine the strengths of [a] critical review with [a] comprehensive search process"; a synthesis of the "best evidence" known to the field; and, in addition, make recommendations for practice (Booth et al., 2012). The aspects of the critical review that are absorbed by the systematic review, are the "extensive research and critical evaluation of quality", the endeavour to go beyond "mere description" and "include [a] degree of analysis and conceptual innovation ... [resulting] in a hypothesis or a model" (Booth et al., 2012:26). Due to the exploratory nature of this research, the focus is on the qualitative aspects of the "systematic search and review" (Booth et al., 2012:26-27) described above, rather than on the development of a hypothesis or model.

Another way of categorising a literature review is to describe it as one of five "intellectual projects … that produce literature"; this work would fit into the category of "knowledge-for-action" (Wallace & Poulson, 2004:35–37).

Such an intellectual project tackles the work from a positive point of view, within the prevailing ideology;[14] intends to use theory and research to build practice; and requires a critical engagement with the literature (Wallace & Poulson, 2004:3).

2.2.3 Writing a literature review

Each theorist promotes a particular approach to writing a literature review, however, they all advocate the following steps: scoping, searching, synthesising, analysing and dissemination (Mouton, 2011; Booth et al., 2012; Machi & McEvoy, 2012; Campbell Collaboration, 2014).

[14] Aspects of this work challenge the current hegemony.

This thesis follows an iterative approach of Machi and McEvoy's six steps (2012):

1. Select a topic
2. Search the literature
3. Develop the argument
4. Survey the literature
5. Critique the literature
6. Write the review.

2.2.4 The relationship between the literature review and theory

In terms of the research design, the role of theory in the literature review is both contested and offers multiple platforms for engagement. The nature of the engagement is determined by the type of literature review (Booth et al., 2012). This thesis has two relationships with theory. Firstly, particular theories have been synthesised to provide the basis of the research design and methodology used and secondly, theories around EE have been critically examined. The first use of theory is made explicit in a tabulation of the theories and how they are used in this thesis, which may be found in appendix 2.2: Use of theory in design and methodology.

The second use of theory in this thesis is made explicit in the synthesis of the work of many EE theorists and theorists from different disciplines, for example social geographers. This study makes a contribution towards the creation of a meta-model. Such a model seeks to identify published theories and adopts a reductionist approach to identify individual constructs and then reconstructs[15] these components into a sleek framework, which avoids gaps or overlaps, to offer a "consolidated framework" or "overarching typology", for the development of both theory and practice (Booth et al., 2012:12).

It is acknowledged that the area of EE lends itself to the research design persuasions of both grounded theory and transdisciplinarity. Although these approaches have not been selected for this study, either or both would provide an excellent vehicle to move the work forward.

[15] This reconstruction process does not necessarily go as far as what would be regarded as a "systems approach".

This qualified systematic literature review is inspired by the challenge posed to the social scientist when attempting a systematic literature review, which, until recently, been seen as the preserve of the physical and natural sciences (Petticrew & Roberts, 2006; Kelly, 2009; Booth et al., 2012).

2.3 Variation: the systematic literature review

If a systematic literature review can be written, the implication exists that an unsystematic review can also be written (Hammersley, 2002). The risk of bias in a literature review is prevalent "at the identification, selection, synthesis and analysis stages" (Booth et al., 2012). Booth et al. (2012:17) suggest that a recipe for a traditional, narrative or conventional review may read: "Take a simmering topic, extract the juice of an argument, add the essence of one filing cabinet, sprinkle liberally with your own publications and sift out the work of noted detractors or adversaries."

Painstaking work has been done in the field of medicine concerning the quality of the literature reviews produced. Longitudinal research conducted in 1987 (Mulrow, 1987) and 1999 (McAlister & Clark, 1999) focused on reviews that had been accepted in a cross-section of reputable medical journals. One of the motivations for this research, which has relevance to the growing sustainability discourse, is that as more information is available, professionals rely more heavily on literature reviews for their knowledge (McAlister & Clark, 1999). If the quality of a review is disputable, particularly with reference to the method(s) used, the validity of a review is in question, which is the finding of both studies (Mulrow, 1987; McAlister & Clark, 1999).

The research results of the previous studies are compiled using data recorded in Booth et al. (2012:10–11) and presented in the following table:

Table 1: Evidence of unsystematic literature reviews

1987 %	1999 %	Criterion measured
80	34	Addressed a focused review question.
2	28	Described the method of locating evidence.
2	14	Used explicit criteria for selecting studies for inclusion.
2	9	Assessed the quality of the primary studies.
6	21	Performed a quantitative analysis.

Source: Booth et al. (2012:10–11)

A systematic literature review is transparent, methodical, replicable and accountable to the reader regarding the researcher's approach to the search, appraisal, synthesis, analysis and presentation of information. It implies that the clarity, validity and auditability of the work can be verified (Booth et al., 2012). For Hammersley, the most important aspect of the term systematic is the degree to which the procedures of the review are "explicit" or "transparent" (Hammersley, 2002).

It is noted that earlier writings, such as those of Petticrew and Roberts (2006) and Kelly (2009) differ in their interpretation to other authors, such as Mulrow (1987), Hammersley (2002) and Booth et al. (2012) regarding the nature of the systematic literature review. Kelly (2009) and Petticrew and Roberts (2006) regard a systematic literature review as one that would be used to answer a specific research question or hypothesis. However, on a deeper reading of their work, it appears that this is a semantic, rather than a substantial difference, as both groups of writers advocate systematic techniques. A caveat must be made as the word "systematic differs in definition by different authors (Hammersley, 2002) because some mean a methodical, reproducible approach (Booth et al., 2012), while others infer a scientific paper based on empirical studies (Mouton, 2011).

The use of "systematic" in this thesis is allied to the understanding of Booth et al. (2012) as it creates a transparency and accountability to the reader. This methodology assures quality by increasing the validity, applicability and reliability of the work. This work does not differ in approach from Petticrew and Roberts' (2006) or Kelly's (2009), but rather takes a step further along the path towards producing a systematic social science literature review. The systematic review offers a means of producing a thesis that demonstrates both internal and external quality assurance. This concept is expanded in section 2.6 and graphically depicted in figure 3.

2.4 Principles informing this thesis

If the subject is people, "no knowledge ... can ever be beyond all doubt", and any view expressed is "intrinsically value-laden" (Wallace & Poulson, 2004:19–20). It seems important to remain open-minded and to acknowledge that there is always room for other perspectives, and possibly a shift in one's own. Stipulative definitions[16] of key concepts are provided where necessary in keeping with this attempt to write a qualified systematic literature review.

In addition, I wish to be explicit about the values or lenses or principles that inform my work. A topic cannot be viewed simultaneously through all lenses and any lens used by a writer will highlight some aspects of the subject while downplaying others (Wallace & Poulson, 2004). This may also be described as "systematised knowledge and ignorance", which is "closely related to the ways of knowing that particular cultures choose to utilize or ignore, or to legitimize or marginalize" (Peters & Wals, 2013:81).

The principles which underpin this thesis are made explicit to decrease this form of bias. A distinction is drawn between the principles that buttress the design and methodology of this thesis and those that inform the content. Each principle or value is introduced with a question.

[16] Stipulative definitions indicate to the reader the meaning of a particular concept or word in specific context of the study (Wallace & Poulson, 2004:3).

2.4.1 Principles: research design and methodology

What kind of reasoning or logic is employed in this thesis?

Logic is "...the act of advancing and clarifying arguments, reasons and evidence for reaching certain conclusions" (Mouton, 2011:113). Based on the research objectives, the nature of the findings could be descriptive (evidence of patterns or trends in data); causal (evidence of links between variables); and evaluative (evidence of impact of an intervention (Mouton, 2011). Mouton describes three kinds of reasoning that can lead to such findings (2011). These three, all present in this thesis, are (Mouton, 2011):

- Deductive: A theoretical understanding is applied to a real-life situation.
- Inductive: Inferences, generalisations or a theoretical understanding is drawn from real-life situations.
- Retroductive: An explanation for observations or data is constructed.

Has an aggregative or interpretive approach been used to synthesise the data?

An aggregative approach[17] is one where the researcher looks for the average; the research can be considered as a vote-counting exercise;[18] and with enough data considered, the researcher may reach a point of statistical saturation and render any additional data redundant. Alternatively, the objective of interpretive synthesis[19] is to broaden and deepen understanding. The study may reach a point of theoretical saturation, for example, where the same data appears from different sources, however, the researcher will continue to search for the dis-confirming case to add texture to her/his understanding.

An integrative review, used in a mixed-methods research design, makes use of both types of data synthesis (Booth et al., 2012). An interpretive approach is used to synthesise data in this thesis.

[17] An aggregate approach is generally used in quantitative research.
[18] Most researchers do not treat all evidence equally, but rather weight it according to some criteria.
[19] Interpretive synthesis is generally used in qualitative research.

2.4.2 How is the issue of the hierarchy of evidence addressed?

Does one type of evidence carry more weight than another? For quantitative research the answer is yes. The randomised control trial is considered the gold standard and the researcher will make research design choices around cross-sectional versus longitudinal, prospective versus retrospective, one group versus many groups and random versus non-random allocation of subjects. The answer for qualitative research is not as straightforward, and is one of the areas attracting current research (Fahy, 2013; Grbich, 2013). The focus of qualitative research appears to rest heavily on the appropriateness or fit of the research design to the research objectives (Booth et al., 2012). This issue is raised for two reasons: firstly, it is important for the qualitative researcher to understand something of the nature of quantitative research as s/he will come across such research during the data-collection phase and must be able to assess the quality of such data. Secondly, as a social scientist, there is a temptation to believe that such rigour does not apply to one's work because the work is hard to measure. It seems important to be aware of these principles to avoid bias and distortion in one's own work.

How have the principal considerations of validity, applicability and reliability been addressed in this research design?

Each research design comes with its own weaknesses; however, all research must address validity, applicability and reliability matters. While validity and reliability relate to the strength of the evidence in a piece of work, applicability relates to the application of the work (Booth et al., 2012).

Validity

Validity is assessed by considering the extent to which the research process has or has not distorted the results (Booth et al., 2012). The researcher is at risk of making two potential errors: bias and confounding. Bias relates to unfair treatment of evidence and this could surface in a number of ways, including publication bias, language of publication bias, discrimination among authors, selection and interpretation of text, misunderstanding the source – particularly when relying on one author's interpretation of another's work, and poorly synthesised data (Booth et al., 2012; Mouton, 2011).

Bias is difficult to detect as the reader does not usually refer to the original text and may be, unwittingly, infected with the same bias. Validity can also be distorted by confounding. This occurs where the reviewer attributes a result to a particular variable, while it is in fact caused by a different variable. Confounding happens where the relationship between the variable and the result has not been adequately established, for example, by excluding or noting the effect of the other variables (Booth et al., 2012). Validity is pursued in this thesis by making the search process transparent and explicit. The majority of the searches conducted for this work have been recorded and may be found in appendix 2.7 A-E.

Reliability

This relates to the trustworthiness or reproducibility of the results and findings. The issue of significance of data falls within this concept. Depending on the nature of the data, the researcher may need to decide if the data is statistically and/or practically significant (Booth et al., 2012). I was first attracted to the systematic review in a social science setting when considering the reliability of this work. The systemic nature of the search for data and the explicit nature of the synthesis of data advance the reliability of the data.

Applicability

The applicability of a study relates to the "strength of recommendations for practice", i.e., how useful are the results? (Booth et al., 2012:111). Applicability has to be handled particularly carefully when examining sustainability, as problems are found at different scales, they span national boundaries, there is a significant movement of economic or climate change refugees and context matters (Fahy, 2013).

Although this thesis includes international literature, chapter 6 draws out the data that is strictly relevant and applicable to South Africa. Other African countries have not been included in this claim as each African country is unique and South Africa provides sufficient scope for the purpose of this thesis.

How will quality assessment be conducted for this work?

There are two aspects to quality assessment in this thesis, one relates to assessing the quality of data included in this study, while the other relates to assessing the quality of this thesis itself. These two aspects are addressed in the methodology of building the thesis (section 2.2.2), and the methodology of evaluating the thesis (section 2.2.3), respectively.

2.4.3 Principles: content of thesis

Where is my place in this thesis?

I take the position articulated by Kelly that social science research cannot be neutral, but is rather value-laden and that it is intellectually dishonest to separate oneself from one's research (2009). In addition, the author's voice adds additional texture to the work and at no time should the author's voice be an authoritative monologue (Kelly, 2009).

This view is confirmed by leaning in to hear those that have made significant contributions in the field, at the nexus of sustainability and complexity. Meadows (in Preiser, 2013) notes that "complexity requires more than our ability to calculate ... we need intuition, compassion, vision and morality" and Paul Cilliers (in Preiser, 2013) noted that "We need to be artists and allow ourselves to become more human."

Although I have raised my voice in this thesis, I have had to keep in mind systematic review requirements, which means being transparent and explicit about information sources. I have therefore contained my views in reflexive boxes to meet this requirement. Nevertheless, I acknowledge that my work is infused with my own perspectives as "knowledge cannot be separated from the knower" (Steedman in Alvesson & Skoldberg, 2012:2). This leads directly to the next question.

What are my values that infuse and influence this review?

Although I have endeavoured to be fair and avoid bias, I wish to be explicit about my own perspectives. I hold an eco-centric, strong sustainability perspective. These paradigms are discussed in chapter 3.

Who is an expert?

I am being explicit about the voices that will be heard in this review in keeping with its systematic nature. "...no one can have a monopoly on what is to count as knowledge or what will work in practice" (Roy, 2011). Bunker Roy, who is the founder of the Barefoot College,[20] redefined the classic definition of professional to "someone who has a combination of competence, confidence and belief" (2011). It is someone who enriches her/his community. Recent contributions by academics on researching sustainability support this open-minded approach (Franklin & Blyton, 2011; Hacker, 2013). The view taken of experts in this thesis is an inclusive one.

2.5 Limitations of the literature review

There are three areas of limitation to consider: firstly, the conventional limitations of any literature review; secondly, the qualified use, in this thesis, of the qualified systemic literature review; and thirdly, the current phase of development of research design and methodology for sustainability research.

2.5.1 Conventional limitations of a literature review

Although a literature review is essential to any study, as it provides a comprehensive understanding of the discourse at hand, it cannot produce new data or test empirical work. The review may lead to fresh insights into a subject, however, these remain untested (Mouton, 2011). A literature review is seldom a stand-alone piece of research, but, rather, it is a springboard for further research. The topic of EE is a relative newcomer to the research arena, arising in the last 60 years. Preliminary searches did not reveal a comprehensive literature review of the topic, written from either a northern or southern perspective. Based on this insight, I abandoned my original ideas of including empirical data using ethnographic methods, for example, case study or participative action research, in favour of conducting an in-depth literature review of the topic. Although this thesis may provide a foundation for other research, I acknowledge that the findings will need to be empirically tested.

[20] "In Rajasthan, India, an extraordinary school teaches rural women and men — many of them illiterate — to become solar engineers, artisans, dentists and doctors in their own villages. It's called the Barefoot College..." (Roy, 2011).

As discussed in section 2.1.3, selectivity or bias is a common mistake made by reviewers. In an attempt to avoid these errors, aspects of the systematic review approach are employed in this thesis. Despite this explicit approach, I acknowledge that this work will not be entirely free of bias.

2.5.2 The limitation of the of the systematic literature review attempt

The standards for a systematic literature review provided by the Campbell Collaboration (Campbell Collaboration, 2014) and the Cochrane Collaboration (Cochrane Collaboration, 2013), and reiterated by others (Wallace & Poulson, 2004; Booth et al., 2012), are rigorous and beyond the scope of this thesis. The chief reason for this is that a literature review would only be defined as systematic by the Campbell Collaboration (2014) if the author could demonstrate that a peer review process had occurred at the thesis protocol (project plan) and study inclusion phases of the work and that the finished work had undergone both a peer and editorial review. A detailed summary of these requirements may be found in appendix 2.3. This study has incorporated some of the aspects of a systematic literature review in an attempt to improve the overall quality of the thesis and to experiment with this methodology. These aspects are discussed under the research methodology section below. In all instances in which systematic literature is mentioned in this thesis, the interpretation of this methodology is a qualified one;[21] i.e., a qualified systematic literature review.

2.5.3 Limitations due to the development phase of research design and methodology for sustainability research

The first limitation of conducting research in the sustainability field is that one is dealing with what could be described as “wicked problems”. “A wicked problem is a social or cultural problem that is difficult or impossible to solve for as many as four reasons: incomplete or contradictory knowledge, the number of people and opinions involved, the large economic burden, and the interconnected nature of these problems with other problems” (Kolko, 2012:1).

[21] In this instance the word “qualified” implies that aspects of the systematic review research design have been adopted, but not all the aspects required for the work to be defined as a systematic literature review. This “qualified” approach is an attempt to include some of the quality assurance techniques of a systematic review that are not normally included in a traditional literature review.

Such problems are characterised by complexity and radical contingency (where context is important) and the values, frameworks and cultural constructs upon which we rely are undermined by the very technology that has made them possible (Cilliers, 1998). Conceiving EE as a wicked problem means that it is a problem that cannot be resolved by technology or by simply implementing a better system. The problem is impossible to fix or even define because of the incomplete, contradictory and changing requirements of its nature. EE is a condition that needs to be understood and the best approach to "fixing it" may be "muddling along" (Preiser, 2013).

This qualified systematic literature review is limited in the sense that it does not present a solution, but rather a scripting of an on-going dance where "we cannot control systems or figure them out. But we can dance with them" (Donella Meadows in Preiser, 2013). Wicked problems are conceived through the paradigm of complexity and systems thinking.

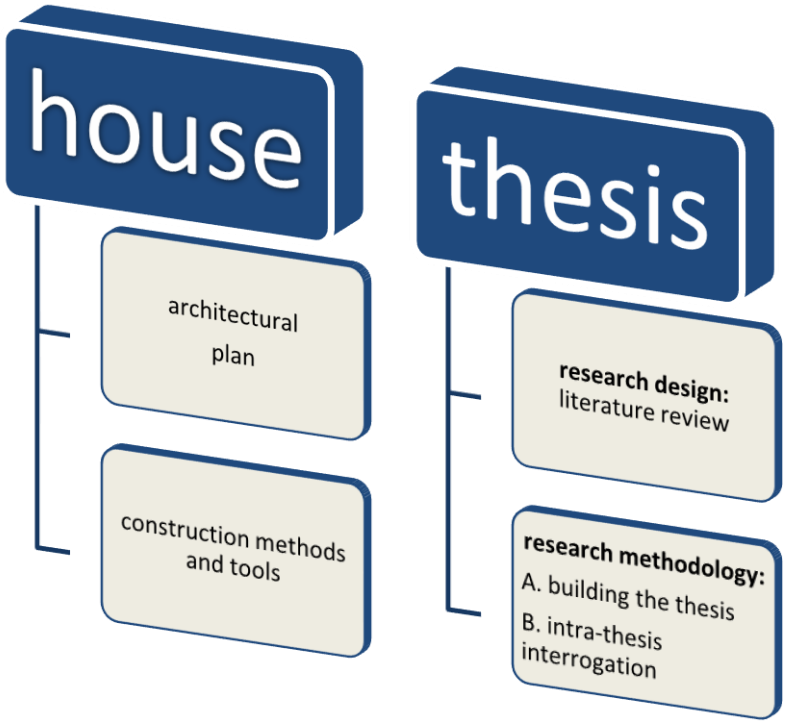
The second "limitation" arises because of the first. In an attempt to research wicked problems in sustainability, theorists have proposed innovative research designs and methodologies to try and match the research design with the research problem (Filho, 2011; Franklin & Blyton, 2011; Fahy, 2013; Grbich, 2013; Hacker, 2013; Kagan, 2013). The social sciences are traversing contested terrain between the dominant data-collection models, conventional research capacity and funding models and bold research design initiatives that incorporate new ways of knowing and knowledge co-creation, which have to date been discredited. It is worth noting the publication dates of the theorists cited to appreciate the newness of this theory generation, which is upsetting the more rigid research orthodoxy. However, the limitation that it presents, and which is reflected in this thesis, is that there are many research modalities to choose from, but no consensus on what constitutes the gold standard. So what does one aim for and which voices does one pay heed to? This study addresses the plethora of new, emerging ideas by firstly using more than one theory (resilience lies in diversity) to meet the research objectives and secondly, by employing a qualified attempt of the systematic approach.

Despite the limitations of this literature review, effort has been made to not "force a result". This may occur in social science research, as indicated by the work of

Alvesson and Skoldberg, who propose that “our humanism leaves [its] mark on the relation between empirical reality and/or attempts to force segments of reality into research texts, so that the relation between ‘reality’ and ‘text’ (the research results) is at best uncertain and at worst arbitrary or even non-existent.” (Alvesson & Skoldberg, 2012:2).

The link between the research design and the research methodology are represented in the following figure. Section 2.2 provides a step-by-step review of the research design.

Figure 2: A metaphor for research design and methodology



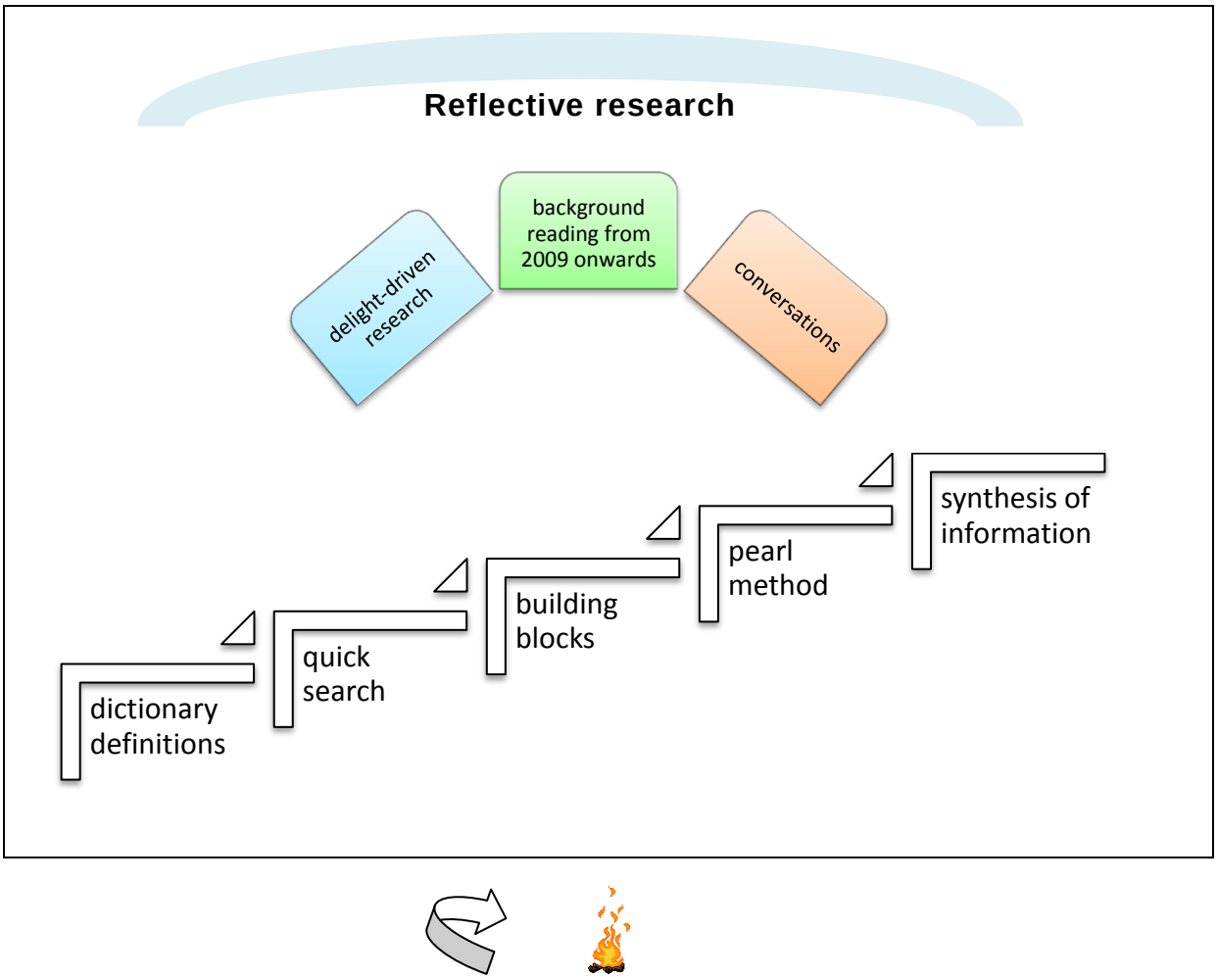
Source: Adapted from Mouton (2011:56)

2.6 Research methodology

If the research design can be compared to a set of architectural drawings, the research methodology is the construction process and tools used in this process.

The tools used to build the qualified systematic literature review are described followed by an explanation of the tools used to ensure intra-thesis rigour. The methodology attempts to meet the research objectives in the most impartial way possible (Mouton, 2011; Preiser, 2013). The following figure represents an overview of the methodology.

Figure 3: Representation of research methodology



2.6.1 Method used to build this systematic literature review

There are three methods or tools used to build this qualified systematic literature review. These are outlined below.

Step-by-step search

The first tool is a detailed step-by-step search and synthesis of information. This process makes use of the ideas from three sources (Booth et al., 2012; Machi & McEvoy, 2012; SUL&IS, 2014), which are tabulated in appendix 2.2.

Although the search and synthesis process is designed to ensure reproducibility, it is not like a scientific experiment because it is not a linear process, but rather an iterative one (Kelly, 2009).

Observation

To add “thickness” (Muller, 2008) to the work, I have included my delight-driven research, conversations and insights gained from reading about EE over the years.

Reflective approach

The third tool is a reflective research approach. The words reflexive and reflection are interchangeable (Alvesson & Skoldberg, 2012). A growing number of theorists advocate a reflexive approach to research. Booth et al. (2012) assert that “…where the literature review is intended to inform a dissertation or a thesis, there may be a strong imperative to engage in conceptual innovation, to be reflexive about one’s methods and to demonstrate a journey of personal growth through the methodology.” (Booth et al., 2012) A reflexive approach uses oneself in the research endeavour (Etherington, 2004). A reflexive approach was explicitly crafted into the course design of a MSc. in Responsibility and Business Practice at Bath University in 1997 (Marshall, Coleman & Reason, 2011). Use of this reflexive approach has had an enduring effect in the lives of graduates, for example, the practice of silence and “walking meetings” was initiated by James Barlow, a sustainability manager in the European Division of PepsiCo. (Marshall, Coleman & Reason, 2011). Barlow found the need to manage his emotional life carefully so that the magnitude of his sustainability work did not overwhelm him (Marshall, Coleman & Reason, 2011). The emotional life of sustainability researchers, practitioners and educators is a subject that is increasingly attracting attention (Marshall, Coleman & Reason, 2011; Bell, 2012).

Although neither the observations nor the reflections are reproducible, and thus appear in the reflexive boxes, they are included because education is an intimate and human process that cannot be adequately viewed through the single lens of available literature.

This reflexive approach recommended itself as a neat compromise. Because no empirical work is included, these reflections add texture without distraction to the work. It requires the researcher to engage in the practice of “deep” thinking and ”other ways of knowing”, which is one of the characteristics of an eco-literate person (Goleman et al., 2012).

It seems that a critical thinker should also be a critical reader and writer, which may include radical listening and looking (Wallace & Poulson, 2004; Clough & Nutbrown in Kelly, 2009). Given the critical approach advocated, the following section focuses on the interrogation of the review.

2.6.2 Method used to evaluate intra-thesis rigour

To conduct a qualified systematic literature review, a quality-assurance mechanism is built into the methodology. This mechanism also measures the work's reliability, validity and applicability. In addition, Booth et al. refers to "clarity" and "audibility" (Booth et al., 2012:22–24). Clarity denotes a clean, easy-to-navigate methodology – usually achieved by including an over-arching structure, such as the one depicted in figure 3; while auditability is a synonym for reliability or reproducibility (Booth et al., 2012). To achieve the quality assessment mechanism, ideas from a number of sources have been synthesised and tabularised in appendix 2.2. Section 2.1.2 introduced the concept of the systematic literature review, while this section describes the three tools that will be used to evaluate the extent to which this thesis may or may not be systematic.

Thesis protocol

The first tool is the thesis protocol. This is a formal document that "specifies the plan which the reviewer will follow to identify, appraise and collate evidence" (Booth et al., 2012). A research protocol is a mandatory requirement for a systematic review (Cochrane Collaboration, 2013; Campbell Collaboration, 2014). The protocol is formulated before the research begins, which ensures adequate consideration of data collection and synthesis. It assures reliability and validity, makes the research process transparent to the readership, and holds the researcher/s to account (Booth et al., 2012). The key components of a research protocol and an evaluation of the performance of this thesis against these components may be found in appendix 2.5.

Comparative tables

The second tool is two comparative tables, which may be found in appendices 2.6 and 2.7 respectively. The first table is a comparison designed to indicate the extent to which the internal logic of the thesis is systematic. The second table is an external comparison structured to adjudicate this work against standards set in the industry.

These mechanisms obligate me to examine the degree to which I have written a systematic thesis. The value of these tables is not that the answers are definitive, or even objective, but simply that they indicate that I have applied my mind to the issues. These tables are filled in retrospectively. They invite the readership to assess the internal and external degree of systemisation, ensure accountability to the audience, and assure validity and reliability of the thesis.

Search record

In keeping with the requirements of a research protocol, the third tool used to ensure a degree of systemisation is the creation of a search record. This is a record of the searches conducted, which serves to improve the reproducibility of the work and demonstrates how the search is linked to the selection and synthesises the data. A systematic review records every search. As this is a qualified attempt, the majority of searches were recorded, which will improve the validity and applicability of this research. A sample of this record may be found in appendix 2.4 A-E, which covers five areas: EE, design and methodology, research context, adaptive leadership and previous research.

In summary

An articulated two-part methodology is used in this work. The first method builds the thesis using three tools: a step-by-step search process, observations and reflections. The second method evaluates the thesis using three tools: a research protocol, comparative tables and a search record. This is a reflexive methodology that advances towards a systematic approach to improve the reliability, validity and applicability of the research.

2.7 On unplugging the “plugged in” researcher

This section examines the contradiction of doing a thesis that is closely associated with nature, while being indoors and “plugged in” to multiple electronic platforms, devices and systems. Can a researcher be so plugged in that s/he misses the point? There is mounting evidence that technology uptake is not uniform and that in some quarters there is a conscious abstention decision by an individual, for example, from Facebook use (Portwood-Stacer, 2013). Art is a potential mechanism that offers an antidote to intellectual “deafness” and “blindness”.

It has the ability to cut through our intellectual defences and speak to us in a language we did not know we understood. There are many recorded examples of this phenomenon.[22] Art as a means of accessing "other ways of knowing" is a mechanism that has found resonance with sustainability researchers. Schwarte and O'Gorman (2011) describe a fascinating use of art that enabled sustainability students, on a short-term trip to Costa Rica, to access the deep, cultural beliefs that led to the ratification of radical, eco-centric legislation. Kagan (2013) suggests the challenging idea that if current art represents our un-sustainability, what does sustainable art look like? This research demonstrates that the sustainability researcher can "unplug" by turning towards the creative arts to extend her/his research and perhaps even uncover answers lost to conventional research methods.

> In effect, I will be asking the question, 'Given the speed of technological advancement, are we as humans preparing our children and ourselves sufficiently to remain relevant?'... However, as I get more exposed to where technology is going, and how quickly our current role in work is being made redundant, I am left with the challenge of using my efforts [promoting hi-tech solutions] to advance the purpose of humanity, not obliterate it.
>
> (Falkenberg, 2014)

Reflexive box 2: On discovering the importance of research design and method

Due to ignorance I was bored at the thought of research design and methodology at the outset of this project. However, based on my readings, I was taken with the idea that research should be transparent and repeatable, and that the principles of a systematic review could be applied to the social sciences.

I also become aware of elitism or bias and an unholy imbalance between hard and soft science. So, despite myself, I have grown in understanding and appreciation of the science and art of research design and methodology.

[22] A particularly powerful example is Henry Nouwen's description of the effect of Rembrandt's painting of the Prodigal Son (Nouwen, 1994). Through a haze of utter exhaustion, Henry describes how the painting gave him unexpected insight into a deep and hitherto unarticulated need for homecoming, which altered the course of his life.

2.8 Concluding chapter 2

In summary, a golden thread runs through chapters 1 and 2, which is that EE is an adaptive problem, which is being tackled using an adaptive approach to figure out what the data means, which will hopefully evoke an adaptive response (Yin, 2010). To appreciate the extent that EE is a wicked problem, chapter 3 provides a theoretical and contextual backdrop for the remaining chapters.

Chapter 3: Context of the study

The motivation for and objectives of this study were outlined in chapters 1 and 2. This chapter builds on the foundation these create to provide a framework for the theoretical and practical application of EE, which is expanded on in chapters 4 and 5.

3.1 Six significant influences

EE is a complex, multi-faceted topic that cannot be reduced to simple building blocks or viewed in isolation. The chapter pays attention to six significant influences, both of the past and the present, which affect EE theory and practice. These are a transdisciplinary lens; development in South Africa; sustainable development in South Africa; exploring the terminology; the role of educational philosophy, environmental ethics and religion; and the roots of EE.

The content substantiates research objective 1, which is to explore the context of EE and it provides the particular contextual background for South Africa through local examples – research objective 4.

3.1.1 A transdisciplinary lens

Although it is not the intention of this thesis to give a detailed description of transdisciplinarity, the work of theorists and practitioners from this discipline substantially deepen the understanding of EE (Remington-Doucette, Hiller Connell, Armstrong & Musgrove, 2013; Augsburg, 2014). Transdisciplinarity has provided a systems and complexity thinking lens to be used regarding EE, as well as introducing the notion of collaborative research or “trading zones” into the field (Krasny & Dillon, 2013).

I have included a section on discourse analysis within this sub-heading as, although not strictly transdisciplinary in nature, language is our pervasive “operating system”.

Systems thinking and complexity

There are several defined periods of human life broadly grouped into pre-modern, modern and post-modern ages that have shaped our thinking. The pre-modern era encompasses Antiquity (700BC–476AD) and the Middle Ages (470AD–1450AD). This was followed by the Age of Enlightenment or Renaissance (1450–1650AD).

The modern era stretches from about 1650 to 1945 when post-modernism, both as a concept and lived reality begins to appear (Preiser, 2013). There is a lag between the introduction of an era and its saturation point. So although the post-modern era was entered about six decades ago, modernist thought still prevails. It can be observed in the paradigms that promote standardisation, conformity, industrialisation, institutionalism, formulism, mechanism and reductionism (Preiser, 2013). Systems thinking and complexity is a post-modern construct and a critique on modernist or Newtonian thinking. A systems/complexity view suggests that Newtonian methods do not hold when studying complex phenomenon, however, neither should modernist thinking be completely disregarded as the paradigms underpin and, as such, add value to post-modern society (Preiser, 2013).

South African high school education is modernist in nature. It was shaped by the forces at play during the industrial revolution and the modernist constructs mentioned above as a result of European influences during the colonisation era. There is a disconnect between the education received, which is based on modernist principles, and the local, national and international challenges teenagers face on leaving school. The world, and South Africa, needs young people that are educated to solve complex or wicked problems. An “athletic understanding” of systems thinking and complexity enables an appreciation of EE and the wicked problem it represents (Cilliers, 1998:3-5). There are no universally accepted definitions of systems thinking and complexity, however, characteristics can be identified (Preiser, 2013) that have implications for EE. The following characteristics have been identified and adapted from the work of Krasny and Dillon (2013) and Cilliers (in Preiser, 2013):

- There are many related elements in an educational system.
- The interaction and organisation within the educational system is dynamic and in constant flux.
- There are complex causal feedback loops – changes to one part of the system may affect other parts in an intended or unintended manner.
- The education system is constituted contextually or embedded in other social, economic and ecological systems.

- Hierarchies are important and may indicate that the system is far from equilibrium.
- Memory is decentralised and dispersed in various parts of system.
- Local knowledge and actions are important.
- The educational system will have emergent phenomena, where emergence is regarded as those properties that are linked to relationships between components and not vested in a single component.
- An adaptive leadership approach is most helpful. This approach is discussed in more detail in chapter 5.

In any discussion on complexity, the contribution of Paul Cilliers to the discourse on a national and international level should be noted, as well as his contribution to sustainable development and education (Cilliers, 2005, 2007, 2010; Osberg, 2011).

Language and discourse analysis

The use of language and the particular meaning of words are important in social science research. Gee (2014) suggests that language helps people to say, do and be things; and that it matters who says it, when it said, and what is said. Discourse analysis is defined as "the study of linguistic relations and structures in discourse" (Merriam-Webster, 2014). As this area of study has developed, it has been argued that discourse (conversation, dialogue, talk, communication) may have a transformational-generative element to it (Harris in Britannica, 2014).

Language is interpreted within a specific context, which may create winners and losers and that may be appropriate or inappropriate. In a discourse, "social goods" may be at stake, which makes language key.

> Politics is not just about contending social parties. At a much deeper level it is how to distribute social goods in a society: who gets what in terms of money, status, power, and acceptance on a variety of different terms, all social goods. Because social goods and their distribution are always at stake, language is always 'political' in a deep sense. (Gee, 2014:10)

Gee's work (2014) sets a foundation for this study to asset that language is not neutral, but carries a "political pay-load". In this context the word "political" is not confined to political parties, but includes the power relationships between individuals and groups in the educational arena. The issue of language speaks particularly to research objective 4 as the South African high school context is multicultural and multilingual. To provide an example of the extent that multiple cultures and languages co-exist, consider Pinelands High School where students speak English, Afrikaans, Xhosa, South Korean, German and "ggum".[23] The end-of-year carol service in 2013 was conducted in five different languages to actively celebrate the diversity of the student body. When evaluating EE, if the initiatives and discourse are viewed through the lens of language or discourse analysis, clues emerge about social goods distribution. Words matter.

Trading zones in environmental education

Trading zones are defined as "any kind of interdisciplinary partnership in which two or more perspectives are combined and a new, shared language develops" (Collins et al. in Krasny & Dillon, 2013). This study has consciously drawn on a number of research papers that could be regarded as trading zones (Brooks, Fuller & Waters, 2012; Krasny & Dillon, 2013). This concept will be expanded in terms of the future research suggested in chapter 6. To "re-solve" EE defies the knowledge and wisdom of a single academic discipline (Krasny & Dillon, 2013:xv). Collaboration is necessary, not only between academic disciplines, but between all stakeholders and experts.

By placing systems thinking and complexity, the creative power of traditional zones and the use of language at the foreground, I attempt to make explicit the lenses used. This is to align with the degree of transparency required by any systematic review. It is against this background that the remaining five influential factors on EE will be discussed.

[23] This is a dialect that originated in the kitchens of Dutch settlers in the 1700s and 1800's in South Africa. It pre-dates Afrikaans and is considered a language in its own right. "Ggum" is also associated with the street, the poor and revolution, in a similar way to the Tango dance in South America.

3.1.2 Development in South Africa

People interpret development in South Africa and the broader Southern African Development Community (SADC) in different ways (Gallopin, 2003; Nederveen Pieterse, 2012; Swilling & Annecke, 2012). This section clarifies the perspective used in this thesis. An education system is a state mechanism to ensure that a country produces graduates with the requisite skills to fit into and grow the economy. This skills agenda is driven by the type of economy, which is determined by the chosen development pathway. This has implications for EE and it is imperative to be explicit about the nature of development to unearth the drivers of education policy and practice. An overview of development in South Africa is drawn from a number of authors and woven together to present the development perspective that underpins this study. The chosen work illustrates the complexity of development in Africa and offers perspectives that help make sense of the development trajectory. Educators working in EE need to embrace these complexities if the field is to make a contribution to South Africa's olive-green agenda, which merges environmental matters with social issues (de Gruchy, 2007). This is expanded on in section 3.1.3.

Long-wave theory in development

There are four expressions of development, namely (Gallopin, 2003):

- Development: improvements in well-being plus material economic growth.
- Mal-development: material development with no improvements in well-being.
- Under-development: no material growth and no improvements in well-being.
- Sustainable development: improvements in well-being plus non-material economic growth.

Murray (2012) describes the mounting literature on transitions, waves and cycles as a framework through which one can understand global change and past and potential future development. Swilling synthesises three prevailing transition theories and substantiates this synthesis using empirical data[24] (Swilling, 2012, 2014a).

[24] The findings of the South African–German Centre for Research, UNWESS, Integrated Resource Plan (2011) and McKinsey Reports are incorporated.

The short-wave of industrial era's provided by Perez (2010) is superimposed over the long-wave socio-ecological epochs described by Fischer-Kowalski (in Swilling, 2014a) and knitted together by Gore (2010) who, by means of the Kondratiev Cycle, links the socio-technical and economic cycles within these waves (Swilling & Annecke, 2012). Gore realised that a Kondratiev Cycle could simultaneously be powered by the deployment phase of one transition and the installation phase of another (Swilling, 2012). Further, material flows analysis permits the calibration of development in tons of resources or carbon dioxide (CO^2) per capita (Swilling & Annecke, 2012). These numbers currently stand at 4.5tons per capita of CO^2 and 8 tons per capita of resources and need to decrease to 2.2 tons per capita of CO^2 and 4.5 tons per capita of resources by 2050 (Swilling, 2014a) to avoid catastrophic environmental consequences. A mechanism to effect this decrease is the relative or absolute de-coupling between economic growth and material resource use (Swilling & Annecke, 2012).

This provides an accurate overview of the global development trajectory. This means that the spring/summer of the next (post–2009) long-term Kondratiev Cycle will be powered by the deployment phase of the Information Age (5^{th} Wave) and the irruption and frenzy phase of the Sustainability Age (6^{th} Wave)[25] (Swilling, 2012). However, there is no guarantee that this transition will occur,[26] nor that it would be evenly distributed if it did. The global position could be described as an "interregnum between the old, which has not yet died and the new waiting to be born" (Swilling, 2012:18). Swilling (2014c) suggests that we are living in a "thick present" and that this interregnum came about between 2007 and 2009 because the:

- Intergovernmental Panel on Climate Change won the 2007 Nobel Peace Prize
- Majority of the world's population was urbanised by 2007
- Global economy shrank for the first time since the end of World War II in 2009.

[25] Note: Swilling (2012:22) refers to the next long-term development cycle as the 6^{th} Transition (based on Perez), whereas Gore (2010:725) refers to it as the "5^{th} Kondratiev long wave".
[26] Climate change-related technology, rising resource prices and eco-system breakdown will be determinants (Swilling 2012:20).

Swilling strongly warns against a simplistic implementation of long-wave theory because it is used to predict a future based on past predictions, and therefore will delineate perceptions of the issues and current choices (2014c). In addition, the state has in all past epoch shifts re-conceptualised itself to play a dominant role and there is no evidence of such a reconfiguration to date (Swilling, 2014c). Long-wave theory indicates that the 6th Wave (the Era of Sustainability) will gain momentum through the mobilisation of capital around green technologies and that the mid-cycle crisis is likely to be ecologically driven (Swilling, 2014b).

Closer to home Swilling suggests that development in Africa could have global repercussions for the 6th Wave. If Africa's energy requirements are derived from the "Clean Energy Corridor" of renewable energy envisaged on the continent, and if the fabrication of rapidly growing cities leapfrogs the out-dated technologies predominant in the global North, and if this infrastructure is financed using resource rents derived from the current resource boom then the Era of Sustainability has a brighter trajectory (Swilling, 2014c) because global targets of CO^2 and resource reduction are possible.

Long-wave theory can be useful to educators because it provides a mechanism by which a current perspective can be gained and an intentional plan for future action drafted. It allows insight into three important questions (Swilling, 2014c):

- What needs to change?
- What may already be changing?
- Who may be giving meaning now to emerging futures?

The answers, or partial answers, to these questions could provide the basis for a productive *agora*[27] for educators, students, curriculum developers and policymakers.

Multi-level perspective theory provides a broad analysis of socio-technical systems or transitions using three levels of analysis – landscape, regime and niche (Smith, Voss & Grin, 2010).

[27] An *agora* was a public meeting place or market in Ancient Greece (Soanes & Stevenson, 2009:26). This is an idea explored further in chapter 4, as a mechanism for finding answers to wicked problems.

EE in South African high schools could be regarded as a niche change that could evoke a regime change over time as more and more eco-literate teenagers leave high school and lead sustainable lives.

The developmental state

Considering the developmental state from a global perspective, Murray (2012) suggests the following perspective: A developmental state is one that is "capability-enhancing", and where "active democratic structures are the necessary foundation for effective economic action" (in Evans, 2010).

Swilling and Annecke (2012) synthesise the strands of development economics (endogenous growth, institutional, capabilities) and ecological economics (measurement, rights-based). The notion of a sustainability-orientated, innovative, developmental state[28] emerges from this synthesis where innovation is a core enabler at different levels – technical, relational and institutional (Swilling & Annecke, 2012).

Development in the 21st century, a qualitatively enhanced form of 20th century development (Evans, 2010), challenges civil society, the development industry and its research agenda, and where it once supported "the hegemony of business", this "Washington utopia" is now giving way to the "nitty-gritty"[29] development issues (Nederveen Pieterse, 2012).

Pluralistic development seems to be a "learning by doing" and continually reflexive (Evans, 2010). This study acknowledges, but does not address, the question of how development will be measured – gross domestic product (GDP), the happiness rating or other alternatives?

A local educational view of development

EE cannot be properly conceived outside the framework of the developmental state.

[28] An innovative developmental state is one which "invests in sustainability-orientated innovations as an explicit way to drive job-creating growth" (Swilling & Annecke, 2012:87).
[29] These issues would include matters of rural and urban poverty, as well as environmental and democratic issues (Nederveen Pieterse, 2012:7).

The view taken in this study is that as the 6th Wave rises, a sustainability-orientated, innovation developmental state in South Africa would be able take advantage of the narrow time frame (2015–2050) to appropriate both the resource rents and the available green technological capital to fabricate South African cities (Swilling & Annecke 2012). For education, and EE in particular, this implies that students need to be equipped with skills to take advantage of this opportunity. Here lies the implication of building a pedagogy that is attuned to the birthing Era of Sustainability and not the dying Era of Information.

A real-life example is included in the reflexive box below to illustrate the different interpretations of "development": Coca-Cola probably perceives development as the profitable operation of another manufacturing plant, while the women of Kerala in India probably perceive it as the right to clean water. The story below illustrates the agency of ordinary people, hope and the importance of institutions, all are relevant to EE.

Reflexive box 3: Real-life example: Coca-Cola in Kerala

Coca-cola was licensed to operate and extracted 1.5 million litres of clean water for a day's production in their plant in Kerala, India. The result was a water shortage, which was made worse by the dumping of effluent into uncontaminated water sources. A small number of women began to protest in 2000. Their resistance gathered momentum and by 2004 Coke's licence was revoked and similar activism has sprung up in protest of 87 other Coke plants that diminish and contaminate local water sources.

The Kerala women were supported by the Indian province's legal structures and incorruptible senior officials (Shiva, 2005). The story demonstrates the power of one and that honest institutions count. It also demonstrates that transition is underway and the status quo is being effectively challenged.

3.1.3 Sustainable development in South Africa

The Decade of Education for Sustainable Development (UNESCO, 2014) is built on the premise that EE should promote sustainable development.

This connection is made in the Tbilisi Declaration in 1971 and echoed in the many subsequent international conventions, declarations and commitments over the years to date (Irwin & Lotz-Sisitka, 2014). To clarify what is meant by "sustainable development" in this study, a classical perspective of sustainable development is presented, followed by a contemporary revision of the term.

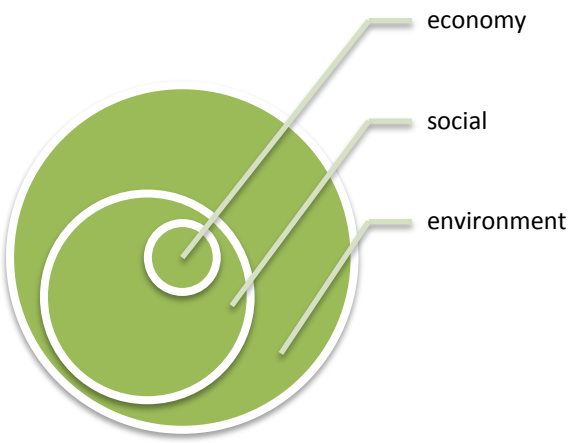
A classical perspective of sustainable development

The mainstream origin of the definition of sustainable development is accredited to a document entitled *Our Common Future* in the Brundtland Report, published in 1987, which states that sustainable development is "that [which] meets the needs of the present without compromising the ability of future generations to meet their own needs" (UN:WCED, 1987).

Models of sustainable development

Based on the definition above, a number of models representing EE have been developed, for example, the triple bottom line, the three pillars of sustainability and the nested model (Farley & Smith, 2014). Systems thinkers strongly contest the approximation of models to real life and caution against making real-life decisions based on abstracted models (Preiser, 2013). The figure below represents the model of sustainable development used in this thesis. This is an eco-centric model encapsulating Gaia first, humankind coming second to the environment, and thirdly the economy (Lovelock, 2007). The circles have been drawn in a nested, off-centre form to depict both the systems/complexity view and messiness of the inter-relationships between the environment, the social world and the economy.

Figure 4: Sustainability model



Source: Murray (2011)

Critique of the definition and models of sustainable development

Over the last 30 years, the most-used definition outline above and models have attracted a great deal of critique. Sustainable development, as conceived by Brundtland, and broadly interpreted by business, governments and civil society, has become an elastic term, stretched to encompass whatever the user wishes it to cover. It has come to mean everything and nothing (Farley & Smith, 2014). The definition has not significantly affected a "business as usual" mentality and it seems counterintuitive to pass on the current state of the earth to the next generation, considering the polycrisis facing the planet (Farley & Smith, 2014). Swilling criticises the Brundtland definition for acknowledging that while there may be institutional or technical limits, these are remediable through techno-fixes, but denying the possibility of resource limits or planetary boundaries and for promoting the idea of substitutability – that one form of capital may be swopped for another (2010).

What exactly is being sustained? Three interpretations of sustainable development seem to have been particularly harmful. Echoing Swilling (2010), a "weak sustainability" implies that economic, social and ecological capital are substitutable; while, the "triple bottom line" and the "three pillars of sustainability", imply that the three silos are of equal value.

These interpretations of sustainable development do not recognise that the environment forms the foundation, upon which the social and economic pillars operate and are primarily dependant (Farley & Smith, 2014). The term has become ineffective, has lost its meaning as a guiding principle and is most recently referred to as faux-sustainability or a false sustainability (Farley & Smith, 2014).

A contemporary revision of the term "sustainable development"

Sustainable living

In an attempt to mitigate the weaknesses of the Brundtland definition, the idea of sustainable living is proposed. It consists of eight core values placed in two categories a) people and nature: ecological sustainability principles; and b) people and people: social justice principles (Le Grange, Loubser & Le Roux, 2014). This concept is useful for EE as it is a starting place for an eco-centric, values-based pedagogy. It is particularly pertinent to this study as it is currently been explored by South African academics (Le Grange et al., 2014).

Neo-sustainability

In response to the above discourse, Farley and Smith (2014) propose the concept of neo-sustainability. Neo-sustainability can be defined as "the ability of an activity to sustain a system by improving its quality and operating within its limits" (Farley & Smith, 2014:151). This thesis deliberately distances itself from the Brundtland definition, for the reasons cited above, and aligns itself with the definition of neo-sustainability as the stipulative definition of this work. Neo-sustainability lines up with the idea that true sustainability requires inter- and intra-generational justice and a "net positive ecological outcome"; without this, regardless of the accounting, industrial growth will not meet human needs in the long run (Birkeland, 2008:xv).

Sustainability talk

Sustainability talk could be regarded as the confluence of the sustainable development, sustainable living and neo-sustainability concepts. Sustainability talk highlights the importance of discourse (language), once again, as the means, vehicle, or carrier of ideas into the contested and messy business of working out sustainability issues on the local and larger scales.

> Sustainability talk potentially brings together different groups in society searching for a common language to discuss environmental issues. Where different ways of looking at the world meet, dissonance is created and learning is likely to take place – so called “learning on the edge”. This dialogue also allows the socio-scientific dispute character of emerging knowledge and values to surface. Participation in such a dispute is an excellent opportunity to learn about a highly relevant, controversial, emotionally charged and debatable topic at the crossroads of science, technology and society.
>
> (Wals & Jickling, 2002:23)

Sustainability talk is also reflective of work done in “leadership for sustainability”, which recognises that sustainability educators locate themselves in less comfortable margins, on the edge of orthodoxy (Marshall, Coleman & Reason, 2011).

The olive-green agenda

The green agenda is concerned with environmental matters, such as biodiversity or ecosystem goods and services, while the brown agenda covers social issues, such as population or poverty. Steve De Gruchy proposes in his writings on the “metaphorical theology of development” that the green and brown agendas should be merged into an olive-green agenda (de Gruchy, 2007).

To transition to a fair and low-carbon society both agendas must be addressed otherwise “...while both are fundamentally right, taken in isolation from the other, each is tragically wrong ...” (de Gruchy, 2007:4). The characteristics and measurement of an olive-green agenda may be found in appendix 3.1 (a) and (b).

In summary, this thesis assumes the definition of neo-sustainability by Farley and Smith (2014) and it adheres to a nested model of sustainable development, which supports an olive-green agenda. It seems that the concept of sustainable development should be regarded as a "polysemous term (having different meanings) ... reflective social process ... rather than a fixed idea" (Le Grange et al., 2014:135).

Reflexive box 4: Talking sustainability with BP human resources practitioners

On behalf of Wits Enterprises, the commercial arm of the Wits Business School, I was recently invited to develop and deliver a two-day module to the Human Resource Managers of British Petroleum (BP) Southern Africa. I invited a colleague to join me for this project. The topic was environmental and leadership sustainability.

The delegates were middle-tier managers who shouldered the day-to-day operation of human resources in their region or area of expertise. As a result of the Deep Water Horizon accident in 2010, which is viewed as one of the worst environmental disasters ever, the culture of the organisation has changed significantly and safety has become a driving ethos of the business.

The interesting aspect of this workshop was the delegates' repeated confusion around the term sustainability; they equated safety with sustainability or business longevity. The implication is that resources can be used in an unsustainable manner as long as this occurs safely. The delegates also battled to relate the trends of the polycrisis to their reality of their jobs.

The take-home message for me was two-fold. Firstly it confirmed Farley and Smith's (2014) view that the term "sustainability" has become an elastic, one-size-fits-all concept. Secondly, as sustainability educators, we need to hone our skills in explaining a complex concept with invisible links in concrete terms to our audience.

3.1.4 Exploring the terminology

In keeping with the intention to deliver a "thick" understanding of the topic (Muller, 2008) the rich and convoluted texture of the various definitions that appear in the national and international EE discourse are discussed (McBride, Brewer, Berkowtiz & Borrie, 2013).

The history of EE tabulated further below provides a clue as to the moulding and nuances found in these definitions. Similar sentiments are expressed about the EE terms as about the term sustainable development. "... these terms have become so all-encompassing that they have very little useful meaning" (McBride et al., 2013:1).

Although it is tempting to use the terms environmental education, education for sustainability, ecological literacy, environmental literacy, eco-literacy and eco-pedagogy interchangeably, they are not equal terms. Each one has a specific etymology and history, meaning and intended application, which would be diluted by not appreciating these differences (McBride et al., 2013). The commonalities are education – environment – social impact – ecology. Authors offer theoretical frameworks to substantiate their favoured term, which is useful in the development of a pedagogy and practical curriculum (McBride et al., 2013). This section is limited to a discussion on definitions of the above terms, and will not extend to the frameworks offered. Aspects of these frameworks are referenced in chapter 4 where the measurement of EE is raised. This discussion will conclude with a substantiation of the choice to rest this thesis on the International Union for Conservation of Nature and Natural Resources definition (The World Conservation Union, 1971).

Environmental education (1971)

This term was derived through the collaboration of the International Union for Conservation of Nature with the United Nations Educational, Scientific, and Cultural Organisation (UNESCO) in the 1960s and 1970s and it is defined as:

> ... the process of recognising values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among people, their culture and their biophysical surroundings. Environmental education also entails practice in decision making and self-formulation of a code of behaviour about issues concerning environmental quality.
>
> (The World Conservation Union, 1971).

This definition was reworked in the *Belgrade Charter*[30] in 1976 and it has been debated widely over the decades as it reflects a rational, linear and developmental view of education. Further, it is based on the premise that increased knowledge results in attitudinal and behavioural changes and the definition lacks radical social critique. Nevertheless, it "remains the almost universally accepted international term" and is used by South African academics and practitioners alike (Irwin & Lotz-Sisitka, 2014; Loubser, 2014; Swilling, 2014a)

Environmental literacy and illiteracy (1960s)

Just as illiteracy preceded literacy, environmental illiteracy preceded environmental literacy. This idea was brought to the public's attention by Rachel Carson's *Silent Spring* (Carson, 1963); and an increasing emphasis on nature conservation (McBride et al., 2013). Its counterpart "environmental literacy" is defined by the North American Association for Environmental Education as "an awareness of, and concern about, the environment and its associated problems, as well as the knowledge, skills, and motivations to work toward solutions of current problems and the prevention of new ones" (NAAEE, 2004).

Ecological literacy (1986)

McBride et al. (2013:3) suggest that for an individual to gain ecological literacy, s/he must gain "key ecological knowledge necessary for informed decision making, acquired through scientific inquiry and systems thinking." The feature differentiating this definition is the focus on a scientific view of nature and that it does not take cognisance of the people–nature relationship; humans are viewed as instrumental. Ecological literacy germinated from a concern at the time over a lack of general scientific literacy.

[30] The *Belgrade Charter* describes the goal of EE "as to develop a world population that is aware of and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones" (UNESCO, 1977).

Eco-literacy (1992)

Capra (1996) defines eco-literacy as “an understanding of the principles of the organisation of ecosystems and the application of those principles for creating sustainable human communities and societies.” Eco-literacy arose from a systems and complexity paradigm applied to the development of sustainable communities. The process of becoming eco-literate is achieved through a “socially and emotionally engaged eco-literacy” (Goleman et al., 2012:2). Eco-literacy encompasses more than cognitive growth.

Education for sustainability (1998)

This term reflects the working out of the relationship between the green and brown agendas and is the educational approach that encompasses both (Loubser, 2014).

Critical eco-pedagogy (early 1900s roots – gaining popularity in 2000s)

Khan calls for a critical eco-pedagogy that is concerned with understanding how political economy and ideology result in the domination of nature. A critical eco-pedagogy promotes a dynamic and complex definition of EE that seeks to promote the idea that “while we are hemmed in by the limits of and interpolated by destructive institutional forms, we can recognise and transcend these thresholds through measures of individual transformation and collective action, which aim for sustainable place-based relationships” (Kellner, 2010:152). There is a radical political edge to eco-pedagogy as the pedagogy challenges the dominant social paradigm.

Justifying the choice of using environmental education

This thesis retains the 1971 definition of EE. The 1976 *Belgrade Charter* definition is rejected because it takes a step backwards from its 1971 counterpart, a step away from the social or brown agenda. The other terms have not been adopted because they are not widely accepted and their interpretation differs widely. As sustainable development, a parent concept of EE, EE is a polysemous term with many meanings. A continuum is represented in the above definitions from conservative (nature conservation) to a radical position (eco-pedagogy) with a middle ground of eco-literacy, which represents both the social and the ecological aspects of EE.

This is a similar continuum to what can be seen in the range of environmental ethics positions discussed below. It is important to know the stance of the speaker to understand the meaning of the term, as the same words in different mouths mean completely different things. For example, Greenwood (2010) uses the term EE to address a radical green and brown agenda; however, the term is commonly restricted to mean nature education. It is acknowledged that EE "continues to be advanced via widely differing theoretical, pedagogical, and research objectives" (McBride et al., 2013:5).

In the context of this thesis, the term EE is used in the broadest possible sense to incorporate the olive-green agenda. An explanation of the alternative terms is provided so that the term can be understood in all its richness. As for the definition of sustainable development, in a sense the use of EE in this thesis could be regarded as neo-EE, as the intention is that the term holds and reflects the meaning encapsulated in the other terms mentioned. The choice of EE is not intended to subordinate the other terms, nevertheless, for simplicity's sake, just EE will be used.

In summary, Farley and Smith argue that that it matters the way in which a term is defined because this understanding has on-going effect on the implementation of the ideas, which may be positive or negative (2014). This thesis supports this argument, evident by the devotion of this section to the substantiation of the use of EE, rather than other available terms.

Reflexive box 5: A dangerous confusion of ideas and over-thinking...

A dangerous confusion...

I find myself in the same boat as Loubser et al. (2014) struggling to differentiate between two issues. In the spirit of the systematic literature review, I wish to make my dilemma explicit. There is a very close link between education and EE, and although this thesis is about EE, education in general is the starting point. For this reason, EE and education are almost used interchangeably, yet are very different.

Loubser et al. (2014), like myself, cites typical sustainable development success stories. The temptation to cite these stories, I believe, is because they provide excellent EE learning material. However, sustainable development success stories are quantifiably different to EE success stories; for example, Rethinkers (the youth leadership NGO discussed in chapter 5), even though the latter, will, by definition improve the sustainability of the given situation.

I believe it is important to make a distinction between education and EE and between EE and sustainable development stories to know where exactly to attribute success. If there is a messy, confused diagnosis, the wrong prescription may be issued. So saying, I am struggling to draw these strands apart as they are birthed from the same womb and joined at the hip.

Is this over-thinking?

I have spent a great deal of time exploring the different terms and re-reading McBride (2013). The work is very useful, especially if one used it to set up a measurable EE curriculum. Nevertheless, I found the focus on the definitions disturbing.

Firstly, I noticed that most articles came from the global North and secondly, it struck me that perhaps the reason for this is that in the global South the needs are so evident that definitions are simply not as important. I think it is possible to spend too much time quibbling about definitions while the ice caps melt and another generation of children leave school eco-illiterate.

3.1.5 The role of educational philosophy, environmental ethics and religion

This section is included for two reasons, firstly that EE is a complex force field that both substantially attracts and alters other fields of interest. Secondly, it includes the latest South African EE literature (Dreyer, 2014; Hattingh, 2014; Schultze, 2014). To ignore either of these reasons would be to present a superficial exploration of EE.

Philosophies of environmental education

There are a number of paradigms or philosophical positions that dominate EE, namely behaviourist, interpretivist and social critical (Schultze, 2014). If the teacher and student understand her/his own and the others' philosophical stance, s/he can make a conscious choice to remain within a particular framework or worldview or change to a different one or take a pluralistic approach. This is in keeping with the evidence that indicates the importance of preparing EE teachers (Barret, 2011). The paradigm chosen will influence the following (Schultze, 2014:68):

- Ideals
- Main interests
- Aims
- Objectives
- Focus
- Strategies and methods used to reach objectives
- Theories involved
- Definitions of EE used in practice
- How the role of students and teachers is interpreted and how the curriculum should be developed
- How knowledge is constructed.

Behaviourism

This paradigm, also known as positivism, is based on observable behaviour and the potential conditioning of that behaviour. EE aims to change behaviour towards nature by teaching facts. Knowledge is seen as neutral. The teacher is the expert and the students are "empty vessels" waiting to be filled (Schultze, 2014).

Interpretivism

This paradigm is based on the idea of self-actualisation through experiential and self-driven learning. A student's mind is not seen as a blank canvas, but one that is already filled with schemas, intuitive knowledge, and which will expand as the student learns. The implication for EE is that the student needs to be placed in an interesting, rich environment so that s/he can develop in a holistic manner. This implies becoming eco-literate through child/community-based environmental experiences. In this paradigm, eco-literate knowledge increases proportionally to the student's environmental experiences. The teacher is a facilitator and the student takes a dominant, active role (Schultze, 2014).

Socio-critical

The aim of this perspective is two-fold: mass empowerment and social justice. Education is seen as the mechanism that will bring forth this liberation. The implication for EE is that the green agenda takes a backseat to the brown one. The student is seen as a "fire to be kindled"; and the teacher is a powerful agent of change. The curriculum is negotiated by all stakeholders and reflects community interests (Schultze, 2014).

This thesis supports a pluralist approach where the "environmental educator need not be condemned to either be imprisoned within a single perspective or bounce from one position to another" (Higg in Schultze, 2014:68). The wealth of each perspective should be mined and respected. In addition to the paradigm from which EE is taught, the content must be viewed through the transdisciplinary lens. This position is supported by Bell, an environmental sociologist, who describes himself as a student of the "community in the largest possible sense" (Bell, 2012:2). He believes that although humans are responsible for the environmental crisis, they also have the ability to solve the problems, providing a transdisciplinary philosophy is adopted, as no single discipline has all the answers (Bell, 2012).

Environmental ethics

Ethics are regarded as the "the moral principles governing or influencing conduct" (Soanes & Stevenson, 2009:490). Ethical behaviour is that which conforms "to a high standard of morality or virtue" (Merriam-Webster, 2010:379).

The focus in this thesis is on environmental ethics. Environmental ethics and environmental philosophy are “two sides of the same coin” and function to make explicit, systematically review and critique environmental values (Loubser, 2014). In this instance, ethics will be understood in the sense of “ethos”, which refers to a broader expression of “belief, attitudes, values and standards”, rather than a narrow, prescriptive set of rules (Benton, 2004:229). There are a number of schools of thought that can be found on a continuum of environmental ethics, from conservative (ruthless developer, conservation, preservation and extensionism) to radical (bioregionalism, social ecology, eco-feminist and deep ecology) with a mid-point (bio-centric, eco-centric and ecosphere). These paradigms are expanded on in appendix 3.2. It is important that environmental ethics are consciously discussed as Benton and Benton propose that this set informs one’s thoughts and actions and is therefore important to surface these attitudes and beliefs for critical examination (2004). In other words, students and teachers alike engage in EE from an ethical standpoint, whether or not the particular ethical philosophy remains implicit or explicit.

This thesis is written from an eco-centric perspective, as reflected in the nested sustainable development model in figure 8. The olive-green agenda is also adopted - anything less would smother “...the scream from the future that a truly radical shift in philosophy and leadership is required...” (Clark, 2011:33). Capra lays down the challenge of moving from an out-dated, reductionist, anthropomorphic worldview to a systems-based, eco-centric ethical paradigm, which recognises interdependence and interconnection (Capra, 1996). He suggests that the link between ethics and the polycrisis is a “crisis of perception” (Capra, 1996:4).

The Prince of Wales echoes this call commenting that although mechanistic thinking, which is the basis of neo-liberal education, is a “powerful instrument in humanity’s toolbox ... what happened to make it the only tool we now feel it is right to use [?]” (Skelly, 2011:26). Skelly observes that the Age of Disconnection has resulted from the dream of the Age of Convenience (Skelly, 2011). The prince’s remark is particularly relevant to the “plugged-in” teenage generation and perhaps EE is an antidote? A value shift, and a “transformed way of being” (Gosling & Jeanrenaud, 2011) is required. This could stem from a migration away from an anthropomorphic ethos towards an eco-centric one.

Although this review is written from an eco-centric perspective, the significant contribution of eco-feminist literature (Capra, 1996; Warren, 1998; Hattingh, 1999, 2014), which challenges the logic of domination that subjugates both women and nature is acknowledged. Shiva proposes 10 principles of eco-democracy – these are reflected in appendix 1.2 (2005). These principles are representative of an ecocentric paradigm and articulate the values that underpin the International Union for Conservation of Nature and Natural Resources' 1971 (The World Conservation Union, 1971) definition of EE. For EE to be transformational, this thesis supports Hattingh's view that a diversity or plurality of views should be embraced as the field of environmental ethics matures (Hattingh, 1999).

The influence of religion on environmental education

A discussion around EE is not complete without mention of religion as it influences an individual or group's view of nature and their relationship with the environment (Swimme, 1987; Tucker & Grim, 2007; Dreyer, 2014).

One religion may promote a utilitarian, anthropomorphic domination of nature, while another may espouse an eco-centric paradigm, an equality of beings and respect for all life. In a study of environmental destruction and the major religions, Islam, Christianity, Judaism, Hinduism and Buddhism, Dreyer concludes that "…in the heartlands of all religious groups, there is environmental destruction as never before" (Dreyer, 2014:117). He does, however, express some hope, based on previous research, that there are pockets of religious groups that are taking their role as stewards of the earth or "earth keepers" to heart and "even one congregation can make a big difference in the effort to live more sustainably" (Dreyer, 2012 in Dreyer, 2014:117).

Tucker and Grim, founders of the Forum on Religion and Ecology at Yale University, openly court the involvement of the religions in addressing the polycrisis and question why the religious have been so slow joining the global efforts (Tucker & Grim, 2007). Swimme speaks of a "cosmic adventure", encouraging a broader and more interconnected view of religion than traditionally accepted (Swimme, 1987). His view seems like an earlier reflection of Capra's web of life (Capra, 1996).

The Southern African Faith Communities' Environment Institute is a fine example of collaboration among religious leaders to cherish the earth and her children. The mission statement incorporates both environmental and socio-economic aims. It is an active and growing organisation (SAFCEI, 2008, 2014). One of the latest initiatives is an EE one, aimed at empowering emerging Karoo farmers to deal with the threat to their livelihoods that fracking presents (SAFCEI, 2014).

The following faith communities are part of the institute (SAFCEI, 2014):

- Baha'i
- Buddhist
- Council of Traditional Healers
- Hindu Maha Sabha
- Muslim Judicial Council
- Jewish Board of Deputies
- Religious Society of Friends
- SA Council of Churches
- World Conference of Religions for Peace.

This thesis supports an approach of plurality, of tolerance and the search for commonalities among religious groups. There appears to be a great deal of common ground among peoples of different religions, in terms of both the brown and green agendas discussed in this thesis. Dave Bookless, of A Rocha International, advances that the reason for this commonality may be that there is a shared moral compass (Bookless, 2014). A Rocha (South Africa) recently convened a poets' workshop in the Western Cape. Encapsulating the close ties between religion and EE, the resultant anthology drew the remark, "So often environmental discourse is full of foreboding, but here even the lamentation finds lyrical forms that promise redemption" (Barbour, Gaum, Goddard, Roff & Argent, 2014).

3.1.6 The roots of environmental education

EE, as it is understood and practised today, has been developing for over half a century. To appreciate the roots of EE, the theme of "looking both ways", will be employed.

This will be done in two ways: firstly, by looking at a comparative history of the EE and sustainable development movements and secondly, by discussing the contemporary relationship between sustainable development and EE.

Comparative history: roots of environmental education

When exploring the potential of EE, it is important to understand the history of both sustainable development and EE, as they mirror one another. The presentation of this information highlights the journey of both away from narrowly defined conservation movements to world-wide socio-ecological movements (Irwin & Lotz-Sisitka, 2014). Viewing EE through an historical lens brings an appreciation of both the current position and future opportunities. This is an exercise that is also being attempted in other countries, for example, Shobeiri, Meiboudi and Kamali (2014) have traced the history of EE in Iran post-1972. Further, this perspective provides an insight into why sustainable development and EE are emerging in mainstream thinking and practice at this juncture in history.

Although important, an in-depth historical discussion on the international developments of either and covering the early debates concerning preservation or conservation or limits and growth and tragedy of the commons (Farley & Smith, 2014) are beyond the scope of this thesis. It is further noted that, as the intention is to provide a historical synopsis, the history of EE in South Africa and the southern African region is deserving of greater attention because it is fascinating, complex, deeply intertwined with the political history of the region, and has elements that demonstrate a provocative progressiveness (Deenanath, 2005; Irwin & Lotz-Sisitka, 2014).

To capitalise on an emerging perspective, which appears when these two histories are laid side by side, a comparative table has been constructed. This table is an attempt to map the interrelated development of sustainable development and EE over the last 60 years making particular reference to South Africa.

Table 2: Comparative histories of sustainable development and environmental education

Timeline of sustainable development (bolded entries refer to South Africa)	**DATE**	**Timeline of environmental education** (bolded entries refer to South Africa)
	Ancient times	Archaeological evidence shows that Ancient Egypt, China, India and Greece actively taught EE.
	4 BC	Theophrastus, a student of Aristotle, argued for the inclusion of EE in public education.
	Pre-colonial times	African societies utilised eco-systems goods and services sustainably. The knowledge and practices were taught through cultural mechanisms like rituals, taboos, folklore (Mduli, 1977 & Lupele, 2002 in Irwin & Lotz-Sisitka, 2014).
	C18 & C19	Cultural critiques that promoted EE: Poet: Wordsworth Philosophers: Thoreau; Kropotkin Sociologists: Le Play; Engels Naturalists: Darwin Visual artist: Audubon Educationalists: Rousseau; Pestalozzi; Emerson; Charlotte Mason; Maria Montessori.

	1874	Ernst Haekel coined the phrase “ecology”.
	1854-1933	Patrick Geddes, Scottish Professor of Botany and schooled in sociology (under Le Play), is regarded as the father of EE. He was the first person to acknowledge the importance of EE and the urban environment.
	Post-WW2	Appalled at war-time devastation, people searched for a better way, resulting in a number of initiatives. Recognition of the need for public awareness of environmental issues.
	1946	UNESCO was formed. Work migrated from conservation awareness to full-blown EE.
International Union for Conservation of Nature and Natural Resources formed.	1948	
World Wildlife Foundation formed.	1961	
Rachel Carson publishes *Silent Spring.*	1962	
	1960s	Both International Union for Conservation of Nature and Natural Resources and the World Wildlife Foundation acknowledge the centrality of EE, and engage non-governmental organisations (NGOs) around the world, **including in SA**.

Environmental portents increased awareness of nature-people link: • London smog • Cuyahoga River • Oil spills.	Early 1960s	
UNESCO Intergovernmental Conference of Rational Use and Conservation of the Biosphere.	1968	
Launch of the USA Environmental Protection Agency.	1969	
USA President Nixon signs National Environmental Policy Act.	1970	Throughout the 1970s there was robust debate concerning the place of EE in education and for some years, influenced by the USA, EE was equated with outdoor education.
Rene Dubos and Barbara Ward use the words “Only One Earth” and coin the phrase “common future”.	1971	
Stockholm: First United Nation’s international conference with a focus on the environment-development relationship; shift towards developing nations.	1972	Stockholm had a significant impact on EE.
United Nations Environmental Programme established in Kenya. This was the first United Nation’s organisation to be seated outside of Europe or the USA.	1972	The United Nations Environmental Programme tasked to establish EE as a universally accepted term and framework
Enactment of USA Endangered Species Act.	1973	

	1975	Belgrade, Yugoslavia: First International Workshop on Environmental Education.
	1977	Tbilisi, USSR: First inter-governmental Conference on Environmental Education.
	1977	Tbilisi Principles of Environmental Education: provided framework on a local, regional and global scale. See appendix 3.3 for Tbilisi Declaration. **The South African government did not accept the Tbilisi Declaration due to its communist origins**.
World Conservation Strategy released by the International Union for the Conservation of Nature and Natural Resources identified causes of destruction and recognised the positive relationship between development and conservation.	1980	EE was central to the World Conservation Strategy.
The Global 2000 Report to the USA President encouraged developed nations to assist under-developed nations as an act of enlightened self-interest. Commissioned by Jimmy Carter and disregarded by Ronald Reagan.	1980	**Outdoor education conference held in Pretoria.**
United Nation's Convention of the Law of the Sea.	1982	**EE was firmly established as encompassing social, political, economic, cultural, urban and ecological aspects of South African life.**

		First international EE conference hosted at Treverton College, KwaZulu-Natal. Included delegates from four continents and led to the establishment of the Environmental Education Association of Southern Africa.
Brandt Commission Report entitled Common crises: North-South: co-operation for world recovery. Focus on fairer redistribution between, what was conceived as, the rich North and poor South.	1983	
International Conference on Environment and Economics held by the Organisation for Economic Co-operation and Development consolidated the idea that economic growth and environmental issues should be mutually reinforcing.	1984	**First publication of Southern African Journal of Environmental Education.**
	1985	**University of Bop (now North-West University) offered under- and postgraduate courses in EE, plus all five education colleges offered a three-year EE course as part of teacher-training.**
Brundtland Commission brought sustainable development into the mainstream and expressed a Promethean view, i.e. that technical fixes will overcome limits and that environmental protection and economic growth are simultaneously possible.	1987	
		Global 2000 Report, Brandt 1983 and Brundtland 1987 had the most impact on EE.

Montreal Protocol: successful international co-operation to manage the hole in the ozone.	1987	
International Panel on Climate Change established to investigate the science behind climate change	1988	**First publication of Environmental Education Bulletin**
The phrase “environmental crisis” enters the lexicon.	1980s	**Between the 1980s and 1990s the growth of EE was almost synonymous with the Environmental Education Association of Southern Africa and the collaboration with pioneering NGOs, such as the Wilderness Leadership School, Wildlife Society of South Africa, the Umgeni Valley Project. The Environmental Education Association of Southern Africa hosted SADC’s Regional Environmental Education Programme.** **The Wildlife Society of South Africa and the Environmental Education Association of Southern Africa developed “critical evaluation” within EE.** **Up until 1994, only four of the 17 education departments in South Africa co-operated with the initiatives described, mostly due to political and ideological differences. Well established EE programmes existed in three former “homelands” – Bophuthatswana, KwaZulu, KaNgwane.**

		Two particularly successful EE programmes ran in Soweto (National Environmental Awareness Council) and Bophuthatswana (Lengau Wildlife Clubs, among others).
	1989	**White Paper on Environmental Education (including the Tbilisi principles).**
Report of the South Commission, also known as the Nyerere Report supported the Brandt Commission findings, but had little international or African impact.	1990	**During the 1990s tertiary qualifications in EE were pioneered.** **Unisa; Stellenbosch and Rhodes universities were forerunners and to date deliver 75% of EE research in Africa (Irwin & Lotz-Sisitka, 2014)**
World Conservation Strategy revised and renamed: Caring for the Earth: a strategy for sustainable living.	1991	Caring for the Earth: a strategy for sustainable living – EE central in this document; and used for national policymaking.
South Africa ignored both the World Conservation Strategy and Caring for the Earth: a strategy for sustainable living; the World Wildlife Foundation and the Wildlife and Environment Society of South Africa mounted significant campaigns around these publications which had an impact on public opinion.	1991	

Rio de Janeiro: UN Earth Summit i.e. UN Conference of Environment and Development: 172 governments, 2 400 NGOs; 100 head of states attended. Results include: • UN Commission on Sustainable Development • Agenda 21 (UNCED) • Rio Declaration on Environment and Development (UNCED) • Forest Principles (UNCED) • UN Convention on Climate Change (UNFCCC) – foundation for Kyoto Protocol • UN Convention on Biodiversity. The language of the conference encouraged talk rather than action.	1992	Rio confirmed the integrated nature of EE, i.e. social, economic, political and ecological aspects. **Businesses (for example, Gold Fields and Mazda) and international donors (Swedish International Development Agency, the Danish International Development Agency and the MacArthur Foundation) supported South African EE.**
	1992	**Environmental Education Policy Initiative (EEPI) – this was a participatory state/civil society initiative.**
	1993	**Due to deliberations of EEPI, a statement emanating from the National Education Co-ordination Committee included "This conference...therefore resolves that...the curriculum will develop the understanding, values and skills necessary for sustainable development and an environment that ensures healthy living" (Clacherty in Irwin & Lotz-Sisitka, 2014:58).**
	1994	**End of apartheid regime.**

		African National Congress' Policy Framework for Education and Training (included the National Education Co-ordination Committee's statement).
	1995	**White Paper on Education and Training (included principles of the above statement)** **EEPI changed to Environmental Education Curriculum Initiative and participated in the development of the Curriculum 2005.**
SA National Environmental Management Act.	1998	
	2000	**Council of Education ministers noted that EE should receive special attention in the curriculum development processes.** **Minister of Education established a national EE project for the General Education and Training phase funded by the Danes. Initiative piloted approaches for including EE in forth-coming curricula. Similar initiatives have been included in the Further education and training (FET) phase, as well as qualifications within the National Qualifications Framework adjudicated by South African Qualifications Association.**

Johannesburg: World Summit on Sustainable Development: review of the progress on Agenda 21.	2002	Johannesburg summit focused on education as a response to poverty and sustainable development challenges. **National Curriculum Statement (outcome-based).**
Kyoto Protocol.	2005	
Stern Review.	2006	
Sir David King as United Kingdom's Chief Scientific Advisor increased British awareness.	2007	
National Framework for Sustainable Development was adopted by the South African Cabinet. South Africa addresses the olive-green agenda through: • **R1.1 billion Rand Green Fund** • **National Development Plan, Vision 2030** • **New Economic Growth Path** • **National Strategy for Sustainable Development** • **Climate Change Response Strategy** • **DST's Global Change Grand Challenge** • **National Skills Development Strategy**	2008	**South Africa legislated and institutional intention to transition to a sustainable future requires a new set of skills, which is at yet undeveloped, which points to the centrality of EE at all levels.**
Global Financial Crises	2008	
Copenhagen COP 15.	2009	

Durban COP 17.	2013	
Sir David King promoted by United Kingdom's Foreign Secretary to Special Representative for Climate Change to work with foreign powers on climate change. Gaborone Declaration for Sustainability in Africa are a group of 10 African nations which are committed to "A set of concrete principles and development goals that soundly move the value of natural capital from the periphery to the center of development planning..." (GDSA, 2014).	2013	
September 2014: UN Climate Change Summit 2014 convened by UN Secretary-General, Ban Ki-moon in New York. World leaders, finance, business and civil society met in an attempt to agree on initiatives to reduce emissions; strengthen climate resilience and mobilise political will (UN, 2014). **President Zuma to address the UN General Assembly on South Africa's commitments to climate change (SAnews, 2014)**.	2014	**Southern African Regional Universities Association Report.** **September: Establishment of Knowledge Co-Production Framework for Climate Compatible Development in Southern Africa (SARUA, 2014).** **Roll-out** of Curriculum Assessment Policy Statements **continues with EE inclusions. EE is South Africa firmly serving the olive-green agenda; initiatives at GET, FET and higher education phases to include EE. Government gearing EE activities towards the World Summit on Sustainable Development outcomes and sentiments of the Gaborone Declaration.**
	2014	**EE has become an entrenched input and outcome of the South African Constitution.**

Source: Compiled from Farley and Smith (2014) and Irwin & Lotz-Sisitka (2014), unless stated otherwise in the text.

Observations about environmental education made through the lens of a comparative history

The history of EE is deeply embedded in the socio-economic and political framework of the day. An implication is that to appreciate current and future trends in EE, a thorough understanding of the dominant social paradigm must be grasped and integrated with the geo-political framework of a particular place or region. To read the times we live in, it appears that we should pay equal attention to our social scientists and artists, as we do to our scientists. It is about “Remembering thick place in deep time” (Gill, 2002:177)

In the last 60 years, sustainable development and EE have both moved from a simple understanding of the relationship between nature and humans towards a highly complex understanding of this relationship at a local, global and biophysical level (Irwin & Lotz-Sisitka, 2014). It is noteworthy that these complex relationships were well understood by the ancients (Norberg-Hodge, 1991) and there is evidence that sustainable socio-ecological relationships were practiced by traditional African societies. It could be argued that humankind practiced EE in the past, lost this knowledge in the tumble of colonisation and civilisation, and is now in the process of regaining the same ground – just on a larger scale. This point demonstrates one of the values of the historical lens. The comparative table also illustrates the growth of EE in South Africa and the surprising places and times where this growth took place before 1994, for example in Soweto and Bophuthatswana.

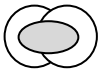
Reflexive box 6: What was I thinking in the 1980s?

I have found constructing this comparative history of sustainable development and EE fascinating. I was at university from 1984 to 1987 reading for a degree in humanities. Not once did the topic of sustainable development or EE come up, yet it was clearly playing out at a national and international level. It raises two questions that relate to the topic of EE: firstly, whose responsibility was it to bring this information to my attention – the higher learning institution, my teachers or myself? And secondly, what is happening now that I unaware of? Thinking about the answers to these questions has reinforced for me the importance of EE and the value of a radical perspective, “learning on the edge” (Wals & Jickling, 2002:123).

Contemporary view: the relationship between environmental education and sustainability

The is debate around the exact relationship between EE and sustainable development (Loubser, 2014); and four options seem to emerge:

i) There is no relationship they are separate fields of study 

ii) There is an overlap between them 

iii) EE is a subset of sustainable development 

iv) Sustainable development is a subset of EE. 

"To stay free in a period when slavery is sold through spin and propaganda implies that *satyagraha*, the struggle for truth, must extend to the instruments that colonize our minds and thoughts." (Shiva, 2005:184). The view taken in this thesis is that EE is a subset of sustainable development. Education[31] lies at the heart of sustainability and may be considered one of its foundations.

Krasny makes the interesting observation that the appearance of the wicked problem in the literature coincided roughly with the formal recognition of EE in the UNESCO Belgrade Commission Report in 1975 and the UNESCO Tbilisi Declaration in 1977 (Krasny & Dillon, 2013). EE is regarded as a wicked problem. There is no consensus on the starting point of defining the problem, nor at the end point, of what constitutes successful EE, nor any of the ground in between (Krasny & Dillon, 2013). For example, has EE been effective if a teenager has been deeply affected by a lesson on the life of Wangari Maathai, who started the Greenbelt Movement in Nairobi, Kenya if s/he responds by joining Greenpop, a tree planting social enterprise, but s/he continues to wear brand clothing and fall prey to the latest cellphone adverts? As early as 1973, Rittel and Webber respectfully suggested that "re-solutions" should be sought rather than an infinite end point. "Re-solutions" are those answers that are in constant flux as new information appears and are also influenced by the initial framing of the problem (Rittel & Webber in Krasny & Dillon, 2013:x).

[31] Here a broad view of the word "education" is taken and includes, *inter alia*, formal and informal, indigenous knowledge, workplace learning, practical trials and experiments.

“After all is said and done, the challenge of sustainable development in the current global conjuncture is about eradicating poverty, and doing this in a way that rebuilds the ecosystems and natural resources on which we depend for our collective survival” (Swilling, 2012:68). Sustainability education is inculcating in our children the competences required to do this kind of development with their hands, hearts and minds.

3.2 Concluding chapter 3

The dovetailing of disciplines in EE is acknowledged as early as 1977 in the Tbilisi Declaration (UNESCO, 1977) and reflected in current thinking and practice (Brooks et al., 2012; Goleman et al., 2012, DBE:CAPS, 2014; GDSA, 2014; Krasny & Dillon, 2013; Loubser, 2014; SARUA, 2014). In an effort to meet the first research objective of this thesis – to explore the current and historical context of EE – chapter 3 has described a number of key influences on the current status. These include the meta-cognition that transdisciplinarity offers to the study of EE, the stance taken in this thesis of “development” and “sustainable development”, the definitions associated with EE – including a justification for employing EE, the effect of educational philosophies, environmental ethics and religion, and finally a historical and contemporary view of EE. Chapter 3 explores research objective 4, as it provides a rich context for discussions on EE in South Africa undertaken in subsequent chapters. Reviewing the key influences on EE helps one “in a wild moment of reversal” to transcend the heavily walled boundaries of one’s own systems of knowledge (Turnbull, 2011:13). Researching this chapter, and especially creating the comparative history table, has challenged and refreshed the way I look at EE in this country. Chapter 4 journeys to the heartland of EE and reviews the key themes that are emerging in academia locally and internationally.

Chapter 4: Theoretical themes of environmental education

If chapter 3 sets the stage, then chapter 4 introduces the principal actor, EE. By outlining key influences on it, the previous chapter sets the backdrop for a discussion on the current trends observable in this field. Chapter 4 addresses research objective 2, which is to distil key emergent themes emerging in EE. This is done by reviewing contributions, generated both locally and internationally, from across many disciplines. Material has been drawn from published and grey literature in an attempt to avoid publication bias (Campbell, 2014). The six emergent themes presented are those which emerged through the research process. They should not be considered an exhaustive account. Chapter 4 also explores research objective 4, which is to sift the research material in search of key learnings relevant to South Africa and South African teenagers. This evidence may be found in the references made in the chapter to South Africa, teenagers and high schools. Although some of this research is directed at education in general, it has been included if pertinent to EE. This relevance is reinforced if the etymology of the word "education" is considered, deriving as it does from the Latin word "educo", meaning to "lead or draw out (and) to raise up" (Wordsense, 2014). In the context of sustainable development and this thesis, it means taking a holistic approach to people and a broad view of education – being inclusive, rather than exclusive. The chapter begins with an insight gained during the research process concerning the categorisation of the information presented in this chapter. This explanation is followed by a discussion of the six themes discerned in the broad range of literature referenced and read.

An insensible division

The original intention behind chapters 4 and 5 was to divide the material along geographic lines; one would address the theory and practice of EE in the global North and the other focused on the global South using the Brandt Line as the divide. The rationale was because this is commonly used to denote a socio-economic and political divide, with the global North categorised as developed and encompassing the first and second world countries, including the USA, Canada, Europe, the United Kingdom and East Asia. The global North is home to four of the five United Nations Security Council members and includes all of the G8 nations.

The global South is categorised as the developing, third-world countries in Africa, Latin America, Asia and the Middle East. The Brandt Line, at latitude 30°N, is an imaginary line that divides all the countries in the world between north and south (BBC, 2014). This divide can also be viewed as differentiated access to information technology and communication technology creating a form of techno-apartheid. As this divide is a largely an economic measure, pockets of global North can be found in the global South, for example, the wealthy residential suburbs of Sandton or Constantia in South Africa. The 2008 financial crisis had a seismic effect on the north/south divide, relationships and the balance of power. Relationships between the two were weakened while south-south and south-east relationships were strengthened. This has influenced both trade and credit acquisition with the rise of the East Asia Credit Complex, with the implication that developing nations could raise credit in the East and were no longer dependant on the developed nations of the global North for this purpose (Gowan, 2009). This divide is a fluid one and will be affected by the sustainability crises. However, it became clear that the approach had its limitations.

Firstly, the divide between the North and the South obscures a clear view of the divide between the western and eastern hemispheres. If a “western education” or industrial education is practiced by the majority of countries in the West, whether they are situated above or below the Brandt Line, what kind of education is practiced in the East? Could one argue for radical Western or Eastern perspective? From a sustainability researcher’s perspective, western hemisphere academic literature and practice of EE is easier to find than the equivalent information from the eastern hemisphere. This seems to be a translation or accessibility issue (Shima, 2014). Secondly, the work of an individual or organisation cannot be pinned down to a geographical region, as theorists and academics alike have drawn their inspiration from a multitude of strands across the globe, for example, Khan (2010), a radical Northerner, based his work on the writings of a prominent Southerner, Freire (Gadotti & Torres, 2009). A reason for this is the globalisation/commodification of information, encapsulated in the first theme below: space and place.

Considering this insight, it made more sense to present the information in two chapters, one dealing with the emerging theoretical trends, and the other focusing on the practical implementation of EE.

4.1 Emerging theoretical themes in the environmental education discourse

The six dominant themes that emerged from a review of the literature are outlined below. The term EE is used in its broadest possible sense to incorporate the full ambit of the olive-green agenda, as justified in chapter 3.

4.1.1 Space and place

> "Spatial analysis can illuminate the interaction of social processes at different scales."
>
> (Brooks et al., 2012:1).

Recent collaborative research between geographers and educationalists has yielded fresh insights into a "spatial turn" in the social sciences. Place and/or space matter. Space is a social construct as well as an objective, physical place (Singh, Rizvi & Sherestha, 2007 in Brooks et al., 2012). Globalisation, which is a "time-space compression", has fuelled much of this latest thinking. (Brooks et al., 2012:1). In this research, consideration is given to the plurality of spaces as education takes place in many spaces – homes, workplaces, international space and cyberspace.

This raises the question of "power geometrics" as has education been democratised or has techno-apartheid increased, as students are "placed in very different ways in relation to these new flows and inter-connections" (Edwards & Usher, 2008 in Brooks et al., 2012:13). This in turn could cement the fault-lines of the neo-liberal dominant social paradigm (Holloway, Brown & Pimlott-Wilson, 2011 in Brooks et al., 2012).

Using the word in a broad sense, consider the political use or misuse of space in high schools. Note the locus of control in the following statements, the first one refers to the school grounds and buildings, while the second one talks to education in a home:

> Schools traditionally manage the behaviour … of students by manipulating both space and time. Students are sent out of learning time-spaces to punitive/therapeutic ones. (Thomson, 2007 in Brooks et al., 2012:6).

> By moving education into the private home and participating in novel forms of educational delivery (for example, online schools), home-schoolers facilitate the decoupling, both material and discursive, of state-sanctioned education from the public space of common schools ... geography [thus] becomes a stake and a strategy in political mobilisations. (Thiem in Brooks et al., 2012:6)

Space is influenced by broader socio-economic and political processes. Even so, research indicates that the dominant space constructs in a high school can be resisted by, for example, creating a time and space for a group of girls to initiate and run a voluntary organisation (Thiem in Brooks et al., 2012:6).

This literature discussed above is transdisciplinary in nature and seeks very firmly to transcend sectoral, as well as geographic, boundaries, rather than reinforce them. Looking at education through the spatial lens challenges common assumptions and raises at least three issues, namely (Brooks et al., 2012):

<u>International and trans-national spaces of education</u>

Trans-national is defined as:

> … the process whereby immigrants forge and sustain multi-stranded social relations that link together their societies of origin and settlement. We call these processes trans-nationalism to emphasize that many immigrants today build social fields that cross geographic, cultural and political borders. Immigrants who develop and maintain multiple relationships – familial, economic, social, organizational, religious and political – that span borders we call ‘trans-migrants’. An element of trans-nationalism is the multiplicity of involvements that trans-migrants sustain in both home and host countries. (Basch, Glick Schiller & Szanton Blanc, 1994 in Brooks et al., 2012)

This issue is discussed under the theme of trans-nationals and third-culture kids in section 4.1.2.

<u>New policy spaces of education</u>

New policy spaces of education is demonstrated by the central role that policy generation played in the inclusion of EE in the current Curriculum Assessment Policy Statements curriculum in South Africa.

Education is one of the social processes commodified in the Age of Globalisation. This phenomenon has shifted the locus of national education policy generation. Viewed through a spatial lens, the generation of national education policy is contested ground, and is not simply enacted at a provincial or local level, but rather "reworked creatively, in many different ways, depending on particular actors within specific school spaces" (Brooks et al., 2012). Policy generation has been affected in three ways: firstly, on the level of scale, as policymakers must take into account the demands of an international learning community and secondly, in the manner in which policy is generated and the players who participate, with the advent of information and communication technology (ICT) facilitating the arrival of private enterprise into the educational space. Thirdly, educational policy may be generated transnationally, crossing national boundaries, for example, the Bologna Process and the Lisbon Strategy, which have opened up a European learning space (Brooks et al., 2012).

The Regional Environmental Educational Programme could be regarded as the SADC equivalent of EE, which has positively affected education. Centrally based educational policies may be dislocated or inappropriate at a local level (Warrington, 2012 in Brooks et al. 2012) . These changes leave an uncomfortable tension in policy generation and implementation at the local, regional, national and international levels. Ball coined the phrase, "unstable hybridity", which describes the "often contradictory forms of co-ordination and control played out in different policy spaces." (Ball, Rowe & Gewirtz, 1995 in Brooks et al. 2012) This oscillation in governance weakens the sovereignty of the nation-state and amplifies the non-sense of the north-south divide in the field of education. The shifting terrain of "space and place" in education, and the impact on policy generation has far-reaching implications for South African compulsory education and the SADC region.

The shift in policy generation may explain the differential of experiences and results by schools that are governed by the same set of rules, but have chosen to interpret and enact these rules very differently.

Lifelong learning and work spaces

The notion of linear progress at defined stages in a person's life is replaced with the idea of simultaneity and diversity (Brooks et al., 2012).

Another aspect of the space/place theme is the trend that learning continues throughout life and occurs in different places, which permeates the traditional work-leisure boundary and heralds a move away from “fixed spaces of work … towards more fluid locations” (Brooks et al., 2012:12). Nevertheless, corporate vigilance has not lessened, it is merely exerted through other means, such ICT monitoring. The “home” is becoming a significant place of learning, either as a study or work venue. Charlotte Mason (1842–1923), a leading educationalist in Britain at the turn of the century and forerunner of the post-modern EE project (Schaeffer Macauley, 1984; Cooper, 2012; SCM, 2014), may say that learning is rather returning to the home. From a compulsory education perspective, this means that school-leavers should be equipped with additional or different capabilities (Sen, 1999) in order to make use of the learning opportunities available throughout life. These capabilities are likely to be the same skills that EE fosters, which are described in this thesis in section 6.4.2 on measurements.

Every-where and no-where education

An additional “space and place” issue, which relates to this field, is raised by South African academics. On one hand, there is the need to appreciate that EE may occur *every-where* in SA, at a number of levels in society and on different scales. EE is not restricted to schools and higher places of learning, but may also occur in the non-formal sector, private training and development organisations and corporate research houses (Loubser et al., 2014). As this thesis is concerned with the application at high schools only, these contributions are acknowledged but not investigated further. Loubser et al. suggest that EE principles and contributions are applicable everywhere, if done so sensitively, with the context in mind (2014) .

On the other hand, at the time of writing, there are a number of districts in the country disrupted due to service delivery riots, which has resulted in the closure of schools; for example, 12 schools in the Grabouw district in the Western Cape were closed and 5 000 students sent home due to service delivery protests (IOL, 2014). Although academic “boot” camps have been established to ameliorate this situation, many grade 12 students have been de-registered from writing the year-end exams in 2014, and will be given the opportunity to write supplementary examinations. For these students, education in general, and most certainly EE, is *no-where*.

The irony is that if the broader community was more equitable (brown agenda) and ecologically sensitive (green agenda), the rioting may have been tempered.

Place-based education and “space and place”

Place-based education is a distinctive pedagogy (Orr 1992; Morgan, 2000; Smith 2002; Gruenewald, 2003; Greunewald, 2008), with modern and post-modernist roots. As this thesis progresses, it finds a natural “holding space” in place-based education. The above discussion on space and place could be considered as an aspect of this. Chapter 6 houses the key learnings of this work, and a broader discussion of place-based education may be found there.

In summary, as schools are becoming more ICT-literate, the same challenges and opportunities that have arisen in tertiary institutions due to “space and place” may arise in high schools. Advantage could be taken from the insights gained through the research described above. In South Africa particularly, consideration should be given to the question: How can differential access to “connectivity” be addressed and how can this technological advancement be used to further EE in high schools?

Reflexive box 7: The community contestation that arose from being a kilometre down the main road from the village school…

I was elected as the chair of the local village school parents' committee in 2008 and 2009. Over the two years, the position required a considerable amount of time, thought and input, as do most volunteer, small-town community jobs. During the children's tenure at the school, I had communicated to the staff my life-long dream to home-school the girls. At the end of 2009, I withdrew my children from the school to do just that. Our place of learning became a sunny room in the middle of the village. In terms of "space and place", our experience was twofold. Firstly, *because* the girls were no longer receiving their education on the *physical* school grounds, our *social* place in the school community changed dramatically. We fell from grace. Secondly, because we *did education* in the middle of town, many villagers were attracted to the *place* and taught us on topics that delighted them, for example, making corn dollies, dissecting a sheep, Indian cooking, playing ancient musical instruments, Russia by rail and poetry. We had one dear friend, who unbeknown to us was dying, and he simply came to *be in the space* and join us in our reading of "living books". We were all deeply enriched by our experiences.

The insight gained pertaining to this study is that people are tenacious and territorial about the physical and social place of education and one must be prepared for both the backlash and the unexpected blessing if one decides to swim against that current.

4.1.2 Trans-nationals or third-culture kids

Phenomena of third-culture kids

Between 1970 and 2005, the number of international migrants[32] doubled from 81 million to 191 million, which has ushered in a new "age of migration," and bears witness to the declining control of nation states over population movement.

[32] International migrants are defined by the United Nations as "those who have lived outside their country of birth for more than 12 months". (Hayden, 2012:59)

These migrants are not a homogenous group, but may be found somewhere along a continuum between unskilled, impoverished migrants and the highly mobile global elites or trans-national ruling class. This continuum includes a mobile and educated middle class.

The implication for education studies is the dramatic growth of trans-national students, pursuing either compulsory (school) or non-compulsory education (higher education) and the growth of international schools. The view is that these schools are the "natural stepchild of international business and provide a vital piece of international business infrastructure" (MacDonald, 2006). This has given rise to third-culture kids who are the children of elite, nomadic parents who may be pursuing mobile, international careers and who have high aspirations for their children. Although generalisations must be made cautiously, as each third-culture kid has a unique family background, they seem to share a number of characteristics. They are cultural chameleons who form intense, short-term relationships, say goodbye easily, struggle to form lasting, emotional bonds and often suffer from grief, anger and depression (Hayden, 2012). Many of them absorb an Anglo-American, neo-liberal ethos. Although they become functionally multilingual, they may never master a language, which has other conceptual development knock-on effects. They experience multiple acculturations, often becoming hidden immigrants[33] in their home country.

On the positive side, they develop an intercultural literacy, tolerance, an advantage in the knowledge economy and a worldliness and resilience, while on the negative side, they are rootless and do not experience enculturation (Brooks et al., 2012). When considering third-culture kids, the impact of peer-to-peer education may also be considered (De Vreede, Warner & Pitter, 2014).

[33] A hidden immigrant may be defined as "being of similar appearance to those around them, but viewing life "through a lens that is as different from the dominant culture as any obvious foreigner. People around them, however, presume they are the same as themselves inside, since they appear to be [the] same outside" (Pollock & Van Reken in Brooks et al., 2012:59–77).

Implications of the third-culture kid phenomena

Educational policy

There are a growing number of highly educated trans-nationals with little or no national affiliation. This is one of the influences reshaping the tradition generation of national education policies as discussed above, as they exert a demand-side push on the generation of private education.

Nationals and indigenous knowledge

An inferred prejudice arising from educated trans-nationals, and the international schools they attend, is that indigenous knowledge and the national education system are regarded as inferior and less desirable. To illustrate this point, the number of students in international schools increased dramatically when the Thai government legalised the attendance of Thai nationals at such schools. Some international schools now exist to service Thai nationals exclusively (MacDonald, 2006 in Brooks et. al., 2012).

Environmental education

The implication for EE is contained in the question: How can the capacity to develop a sense of interconnected relationships, an eco-centric viewpoint and sense of place be instilled in someone who struggles to make connection to people or place? It is important that this question is answered, firstly as the analysis infers that there are a growing number of third-culture kids and, secondly, many of them are wealthy and, therefore, from a sustainability point of view, have the power to do more good or bad than most.

The phenomenon of third-culture kids has particular relevance to EE in South Africa as it is a multicultural society with many young South Africans becoming third-culture kids. The reasons for this are multifarious, including that their parents, previously disadvantaged, are becoming more mobile, or the child is assisted by a parent's employer, or s/he benefits from an international or local upliftment programme. Many of the same issues arise for the South African intranationals as do for the trans-nationals.

A distinct advantage that exists at some high schools in South Africa is the advanced and celebrated racial diversity that capacitates young people with the flexibility, tolerance and cultural literacy mentioned in respect to third-culture kids. For example, Pinelands High School took the first week of the 2014 school year to acclimatise the teenagers from very diverse backgrounds to the ethos of the school. This included a number of days of diversity training for Grade 8 students. Diversity is celebrated repeatedly throughout the school year to reinforce these values. (PHS, 2014). Teenagers who do not have this worldliness or cultural accomplishment are referred to by other students as being "bubble" girls or boys, and are viewed as being at a distinct disadvantage.

In summary, the growing trans-national and third-culture kid phenomena cannot be ignored. This is particularly true for South Africa given the wide diversity and differing life stories of its citizens, which creates many national third-culture kids or "hidden immigrants". These groups find it more difficult to absorb EE and become eco-literate for the reasons cited above. As "no-one lives in the world in general" (Geertz in Gruenewald, 2003:621) but physically resides somewhere, regardless of a transnational status, place-based education offers a "vibrant counterpoint" to the third-culture kid phenomenon (Gruenewald, 2003:261).

4.1.3 Claims of transformation

A theme running through EE literature is the claim that it can be transformational on a grand scale. Europe, the USA, Australasia and South-east Asia have had flagship national education policies that have sought to transform, renew, turn-around, future-proof, regenerate, re-build and redesign both the schooling experience and the buildings themselves. Examples of these projects include Australia's Building Education Revolution, the Portuguese School Modernisation Programme, similar projects in the USA, and the British Building Schools for the Future initiative (Horton & Kraftl, 2012). However, research indicates that it is a lot tougher on the ground to implement, and then measure, the envisaged transformation and that more moderate aspirations are often more effective (Horton & Kraftl, 2012). Horton and Kraftl suggest thinking of transformation with a lower-case "t" rather than an upper-case "T" (Horton & Kraftl, 2012:114–115).

Horton and Kraftl (2012) researched the Building Schools for the Future project and compared the *pre-project promise* and the *post-project practice* of transformation of 10 school-renewal projects, which occurred between 2003 and 2010. There are salient and humbling lessons to be learnt by this research for the education, political and financial communities in South Africa that promote both grand and more modest (T)(t)ransformational projects in South African public or private schools.

Although this research project is extensive, only the aspects that have bearing on South Africa are presented. The similarities in policy documents is described, the actual participation of students outlined and the impact of this participation is tabularised; finally the three conclusions of Horton and Kraftl (2012) are considered.

Common characteristics of national school reform policies

Horton and Kraftl (2012) found that policies generated at a national level with the purpose of overhauling schools or education share a number of common characteristics, namely:

- The policies over-promise transformation. Although the focus is on the physical buildings, the brick and mortar is vested with the promise of job creation, nation building, increasing community involvement, improving the economy and creating environmentally friendly norms – to name just a few.
- The education policy supports the neo-liberal economic policies of the country, even if the rhetoric is “transformative”.
- There is a plurality of actors, which include private-public partnerships.
- The policies commit themselves to involving the school children. This has been particularly prevalent since the promulgation of the United Nations Convention of the Rights of a Child (UN, 2014).
- Exemplars are required from architectural firms for demonstration to the children so that they can participate in the design process in some way, for example, the interior decoration of school buildings.

Student participation: tabularised results

This table represents a summary of the actual student participation across the 10 projects researched and the effects of this participation. Even though the students' participation was far less than envisaged in the national policy documents, it was still positive.

Table 3: Nature of actual participation of students and the effects on the school transformation policy

Participation by students	Effects of participation
• Token participation.	• Staff-student relationships improved.
• Participation *ad hoc* and not core to the design.	• Involvement did cause a "buzz".
• Restricted by tightly run public-private partnership agreements, schedules and budgets.	• Participation created a sense of familiarity that was important for younger children.
• Public delivery of projects also constrained student involvement due to ambitious time and financial targets.	• Teachers made use of the trans-disciplinary teaching opportunities provided by involvement in the project.
• Viewed by teachers/project managers as an educational opportunity.	• Even small and superficial involvement meant a lot to the students, for example, including their designs in the curtain fabric of the classrooms.
• Students viewed by some as not being able to make a valuable contribution.	• The modest involvement of the students caused some teachers and architects to review their own professional practice, especially around making grand promises.
• Expectations for transformation not managed leading to disappointment.	• Expectations for transformation not managed leading to disappointment.

Source: Compiled from Horton & Kraftl (2012:119–130)

Horton and Kraftl (2012:130–131) draw three conclusions:

- It is better to promise less and deliver more. Policy proposals of (t)ransformation ought to be modest and designed to make incremental changes in "everyday spaces". Although participation by stakeholders may not be the "best practice", it may engender emotional engagement and commitment.
- Despite the growth of virtual education, the local school building still remains central in transformation.
- There is a temporal aspect to school reformation, although there have been shifts of historical proportion, some factors in education have remained the same, namely: a) school building remains a national project; b) teachers have been practising participation for years; and c) adults and students alike are attached to the "old", and thus, small incremental changes seem to be more effective.

In summary, both temporal and scalar aspects of school/education transformation must be borne in mind. From a temporal perspective, renewal must be planned by taking into account the history, present and future of the school or district. From a scalar point of view, tri-nocular vision is required: (a) there is a move towards fluidity and mobility at an international level; (b) educational policy discourses remain at a national level; and (c) the "locally-scaled material practices at individual schools" matters (Horton & Kraftl, 2012:131–132). In conclusion on this trend, research indicates that practitioners and policymakers ought to be very careful to not over-inflate the transformational aspects of a project; the participation of children, even though it is costly and time-consuming, is valuable; and the material arena for working out this transformation remains the local school.

4.1.4 Principles of environmental education

Significant work has been done, over a long period of time around what constitutes the capabilities of an "environmentally educated" person; how these capabilities are achieved; and what appropriate measurement tools exist to detect such skills (Jordan, 2013; McBride et al., 2013; CFE, 2014a). This sub-section focuses on the "how"; the "what" questions are addressed in chapter 6. The first part of this discussion highlights the work of four theorists – Capra (1996; 2014), Barlow and Goleman (2010), Bennet (2012) and Goleman (2012).

The reason for this selection are that the work of Capra (1996; 2014) triggered my interest in EE in 2012 and the Centre for Ecoliteracy and the other authors, all activist academics, have inspired me throughout the research process. The second part of this section focuses on South African academic activists.

Centre for Ecoliteracy, California

The physical locus of the work of Capra, Barlow, Bennet and Goleman seems to be the Centre for Ecoliteracy and there appears to be a close working collaboration between them (Goleman et al., 2012; Capra, 2014; CFE, 2014). Barlow is the executive director and co-founder, along with Capra, of the Centre for Ecoliteracy (CFE 2014)[34] and Bennet is the communications director.

The theoretical approach employed at the centre on "how to" develop EE in students seems to be a collaborative one from the four theorists mentioned. The principle of integrated, multiple intelligences within an eco-centric, systems/complexity paradigm is the core pedagogy of the centre and its programmes. Additionally, the contribution of those who have been working in the same, or related fields, for a long time, is acknowledged, for example, Howard Gardener's multiple intelligences[35] (1985) and David Orr's place-based education (Orr, 1992; 2004). These contributors refer to their work as eco-literacy, rather than EE, however, to remain consistent and prevent confusion, the term EE will be used as it encompasses the intention and meaning of eco-literacy.

> While social and emotional intelligence extend students' abilities to see from one another's perspective, empathize, and show concern, ecological intelligence [or EE] applies these capacities to an understanding of natural systems and melds cognitive skills with empathy for all life.
>
> (Goleman et al., 2010:92).

[34] http://www.ecoliteracy.org/about-us/board-members [accessed 12 June 2014].
[35] Multiple intelligences include: bodily-kinesthetic, interpersonal, verbal-linguistic, logical-mathematical, intrapersonal, visual-spatial, musical and naturalistic (Gardener, 1985).

Goleman et al. propose five practices of emotionally and socially engaged EE (2012:10–11); these are used at the centre (CFE, 2014):

- Developing empathy for all life: Encourages students to move from an anthropomorphic worldview to an eco-centric one, to recognise and show compassion to all forms of life as “members of the web of life” and to practice “a more inclusive network of relationships”.
- Embracing sustainability as a community practice: Encourages students to recognise that community resilience is a function of interconnectedness and to actively work towards building community through co-operation.
- Making the invisible visible: Encourages students to actively seek connections between action and impact, which the exponential expansion “in time, space and magnitude” of post-modern life have rendered indiscernible.
- Anticipating unintended consequences: Encourages students to take two actions: a) to make decisions using the “precautionary principle”, i.e. if the impact on the “web of life” is uncertain, refrain from the action and b) to rebuild natural and social capital destroyed inadvertently. It is reported that even the best intentions can end in a “transition disaster” (Hart, 2014).
- Understanding how nature sustains life: Encourage students to follow the processes of biomimicry to ensure the restoration of natural capital for future generations.

It is suggested that these practices have the potential to move a situation from break-down to break-through because, collectively, they engender the capacity to put the pieces together, bringing connection, and to develop an eco-intelligence, which allows individuals and communities to move beyond a collective blindness (Goleman et al., 2012). Aspects of the practical impact of the centre’s theoretical contribution may be found under the key learnings described in chapter 6.

South African academic contribution

- Prof Callie Loubser (University of South Africa)
- Prof Johan Hattingh (University of Stellenbosch)
- Prof Lesley Le Grange (University of Stellenbosch)
- Prof Cheryl le Roux (University of South Africa)
- Prof Josef de Beer (University of Johannesburg)
- Prof Johann Dreyer (University of South Africa)
- Prof Pat Irwin (Rhodes University)
- Prof Heila Lotz-Sisitka (Rhodes University)
- Prof Solom´e Shculze (University of South Africa).

Three points are made in respect of the academic activists listed above. These remarks are restricted to the observations made from the reference list included in this thesis, and are not representative of all EE literature in South Africa.

Firstly, and most importantly, they have made a significant contribution to EE as is evident by the work cited in this thesis. The edited collection of works titled *Environmental Education and Education for Sustainability: some South African perspectives* is the most comprehensive and current work on EE in South Africa that I have located in this research process (Loubser et al., 2014).

Secondly, the universities represented are dominated by University of Stellenbosch, the University of South Africa and Rhodes University. This reflects the history of EE (see table 2) where the same three universities have made significant historical contributions to EE in the past. In fact, a number of those mentioned have contributed to this history through their local involvement in the Regional Environmental Education Project and the National Qualifications Framework (by participating in the Standards Generating Body); and internationally in UNESCO.

Thirdly, it is interesting to note that these academics are all from similar backgrounds – education, EE and environmental ethics. Their contribution is most valuable at this time in this country. However, the work is not as radical as their northern counterparts, who have embarked on “trading zones” which seek to bring completely different disciplines together, including social geography and EE or psychology and EE (Krasny & Dillon, 2013).

The purpose of this radical collaboration is to forcefully generate a new, shared language and fresh insights. Imagine if the 'trading zones" concept was tried in Southern Africa, with the already diverse and textured educational landscape?

In summary, there is a rich theoretical heritage from which to draw principles and practices of EE. The work of the Centre for Ecoliteracy is fore-grounded in this regard. In addition, the current contribution of South African academics is acknowledged and represented in this thesis.

4.1.5 Institutional innovation

Greenwood[36] writes as a tenured associate professor and the Chair in Environmental Education at Lakewood University, Canada. His expressed view is that his ideas would probably not be tolerated unless he held the academic position and pedigree that he does, as he expresses anti-establishment views on education. Efforts to deviate from the "script" remain minimal as education professionals are afraid of the consequences of censure on their earnings and careers (Greenwood, 2010). Greenwood's (2010) chief contention is that education, focused on the environment and sustainability, can be brought into the mainstream if it is done so little by little. Greenwood (2010) contends that school education and teacher education at higher education institutions is tightly controlled, evaluated and monitored by the state to ensure the continuance of the political-economic *status quo*. This form of education is strictly guided by curriculum and standards and it is measured by standardised testing. Even though educationalists refer to this pedagogy as "anti-intellectual" or "anti-educational", it is nevertheless consciously or unconsciously reproduced (Greenwood, 2010:3). Greenwood suggests that, even though EE is marginalised in the education discourse, changes can be effected on three levels: firstly, by experimenting with EE ideas in the classroom; secondly, by impacting local cultural practices; and thirdly by proposing policy changes at a state level, based on the success of the first two levels (Greenwood, 2010). He substantiates his argument by citing his own experience over the last 15 years.

[36] http://scholar.google.co.za/citations?hl=en&user=VDlkV4wAAAAJ&view_op=list_works&cstart=20 [accessed 16 June 2014]. http://www.chairs-chaires.gc.ca/chairholders-titulaires/profile-eng.aspx?profileId=2846# [accessed 16 June 2014]

On the first level, Greenwood started by "greening" the content of the courses that he taught and developing a "critical pedagogy" that was "culturally and ecologically responsive" (2010:5). His success in his endeavours, measured by the conventional faculty standards, won over his colleagues. Greenwood's response to critics, who levelled the accusation of "greenwashing" at his attempts, was to assert that "making any intervention to frame teacher education in the context of our current local/global dilemmas is vital, and that these interventions, no matter how small, can build over time towards deeper changes in course and programme content" (Greenwood, 2010:4).

On the second level, Greenwood took the opportunity of an official and bureaucratic National Council for Accreditation of Teacher Education[37] evaluation to pitch for a revision of the conceptual framework, which is the document that shapes the pedagogy of the particular college. For the first time a "place-based, environmental and sustainability ... transformational pedagogy" was to be foundational in all courses offered by the college (Greenwood, 2010:5). Greenwood managed to integrate a radical, marginalised education discourse into the mainstream, by serving on the right committee, and using the credibility he had built over the years with his colleagues (2010).

On the third level, the sustainability education envisaged by the revised conceptual framework was grafted into the institution by a fortuitous and concurrent revision of state standards for teacher education. In addition, the State of Washington passed a specialty teaching endorsement in environmental and sustainability education. In Greenwood's opinion, the state's actions reflect the many small actions of committed educationalists. Education systems, curriculums and philosophies are often in constant flux, which Greenwood (2010) suggests is an opening or a key for inserting EE initiatives.

In summary, although Greenwood (2010) writes from a northern perspective, the lessons that the local education community can learn are, that small efforts made in the classroom can coalesce into a school-wide initiative, then to a district-wide initiative and finally may invigorate the broader national policy debate.

[37] National Council for Accreditation of Teacher Education later became the Council for the Accreditation of Educator Preparation and the only and official teacher education body in Canada.

This is borne out in the South African history of EE (table 2), where many small, persistent efforts eventuated in the recognition, and inclusion, of sustainable development and EE in curriculum development. Secondly, collegiate relationships and networks count and thirdly, it is vital to be vigilant for any opportunity to originate an EE initiative whether this is at a practical (classroom), cultural (district) or policy (provincial or national) level. South Africa has experienced continuous change in education policy, and although this creates a change-fatigue in the teaching staff, it may also be viewed as a chink in the armour, a place to begin...

4.1.6 The role of a sustainability researcher

As sustainable development has matured and emerged into mainstream thinking, so has the research design and methodology of sustainability projects, which has increasingly become honed and fit for purpose (Filho, 2011; Franklin & Blyton, 2011). These developments have cast light upon the capabilities required by a sustainability researcher (Phol et al., 2010). This research has been included in this sub-section for three reasons, namely that:

- The theory discussed above is not produced in a vacuum, but by researchers located in a physical place and time; and this inclusion is an attempt to “see” the researcher, not just the product as they are intertwined (Steedman in Alvesson & Skoldberg, 2012).
- The research cited is drawn from a project conducted in Kenya, Switzerland, Bolivia and Nepal, which makes the link between theory and practice; and this research reinforces the notion that the North-South divide is nonsensical.
- The findings of this research are relevant to both theory and practice, and thus build a bridge between chapter 4 (theory) and chapter 5 (practice) in this thesis.

The sustainability researchers’ capabilities were the subject of Phol et al. (2010) research. The skills of the researchers, who were conducting four different case studies in the countries mentioned, were observed.

Two key points are drawn from this research, which are relevant to the EE project:

Roles of the sustainability researcher

Phol et al. (2010) argue that knowledge co-production[38] requires the sustainability researcher to play potentially three different roles, namely that of reflective researcher, intermediary (or facilitator), and facilitator (or activist). In the discussion of this work, the word "intermediary" has been substituted with "facilitator" and the word "facilitator" with "activist" to fit in with the South African lexicon and use of these words (Van Breda, 2014).

Sustainability researchers require training in order to play these roles effectively. It is advantageous if they develop the ability to work out when to wear which hat and, consequently, which language to employ for the role being played, for example, academic or community parlance. Words matter (Gee, 2013). In line with the requirements of the systematic review, I make the role that I am playing in this project explicit, although I showcase the work of researchers, facilitators and activists. I play only one role and that is of the reflective researcher.
Future research suggested in chapter 6 will require the researcher to be a reflective researcher, facilitator and activist.

The co-production of knowledge

The co-production of knowledge requires the creation of an *agora*.[39] This differs from the classic approach of a "boundary organisation". The latter is a body that mediates between the stakeholders and stabilises the boundaries of the individual organisations. An *agora* blurs the boundaries of the individual organisations into a messy meeting place, which often results in the creative dissonance required to "re-solve" problems (Pohl, Rist, Zimmerman, Fry, Gurun, Schneider, Speranza, Kiteme, Boillat, Serrano, Hadorn & Wiesman, 2010). In some ways an *agora* can be equated to a "trading zone" (Krasny & Dillon, 2013); it is the contestation, debate and melding of ideas that forms something new.

[38] Knowledge co-production relates to both knowledge and changes in social order (Phol et al., 2010:270)
[39] An *agora* was a public meeting place or market in Ancient Greece (Soanes & Stevenson, 2009).

In summary, in both the role that the sustainability researcher plays, and the space s/he creates to play this role, three major challenges must be faced (Phol et al., 2010):

- Managing power relations between parties
- Integrating knowledge among parties
- Orienting action towards sustainability goals.

Pohl et al. (2010) research has particular relevance to South Africa, as a developing nation, where sustainability researchers need to be particularly skilful and self-reflective, as they seek to serve multiple agendas simultaneously, such as the green (environmental), brown (social), academic, state and funding agenda.

4.2 Concluding chapter 4

The strong voice from the left of those who propose and practice a radical EE and/or a critical pedagogy must not be overlooked. This group cannot be regarded as homogenous because they propose significantly varied “means” to a radical “end”. The discussion on radical EE is mindfully placed between a critique of EE, and a discussion on place-based education, under key learnings (section 6.1), as the radical approach is a response to the former; and, I suggest, finds a “radical pragmatism” (Swilling & Annecke, 2012) in the latter.

Chapter 4 explored research objective 2, which is to distil published and unpublished EE material into key themes. Six themes have been presented, namely space and place, trans-nationals or third-culture kids, claims of transformation, principles of EE, institutional innovation and the role of the sustainability researcher. The themes selected are neither intended to be a definitive list, nor exhaustively investigated, as EE’s rich complexity exceeds the bounds of this thesis. Suggestions for extending this research are made in chapter 6.

Encapsulated, explicitly or implicitly, in the literature reviewed in this chapter is the reference to the practical application of these theoretical themes. It seems that three major tributaries contribute to the strong flow of EE, which is evident in both local and global expressions. A discussion of these mechanisms, supported by real-life examples is the subject of chapter 5. As chapter 4 gives particularly attention to South Africa, chapter 5 singles out local examples, in addition to international ones.

This deliberate focus is an attempt to substantiate research question 4, which is to consolidate the material, with particular reference to South Africa and South African teenagers.

Gill remarked 12 years ago that there were “two worlds, one dead and the other powerless to be born” (2002:180). This referred to the birthing of the Age of Sustainability, or in terms of the long-wave theory discussed in chapter 3 (Swilling, 2014b), the 6th Wave. Given the vibrancy that both the theory (chapter 4), and the practice (chapter 5) of EE injects into this interregnum, I suggest that there are hopeful signs that this birthing is underway. Both these chapters provide evidence that EE is one of the drivers of the installation phase of the 6th Wave and, in terms of multi-level perspective theory (Smith, Voss, & Grin, 2010), it could be one of the niche innovations that results in regime change.

Chapter 5: Practical applications of environmental education

"The power of place will be remarkable."

Aristotle

EE happens somewhere. In exploration of research objectives 2 and 4, I endeavoured in chapter 4 to construct key theoretical and emergent themes from the current writings, across disciplines, of those who concern themselves with this field. Chapter 5 is a reflection of chapter 4 because there is an attempt at sense-making by clustering practices of EE into assemblages of similar initiatives. There is a multiplicity of factors to be considered and such categorisation is not intended to create "tight" boxes, but rather to foreground connections within the education and broader system. The EE schools and initiatives showcased in this chapter cannot be reduced to the "silver bullet", but their use is rather intended to inspire context-appropriate initiatives that could benefit the lives of South African teenagers. Given that this chapter is centred on real-life EE practices, which are temporally and spatially located, there are links to context (chapter 3); theory (chapter 4); and key learnings, particularly radical critique (chapter 6). The practices described "ground" EE; and, as such, exert a gravitational pull on the other chapters. Chapter 5 explores research objective 3, which is to gain insight into the practical application of EE. It also addresses research objective 4 by highlighting a number of South African initiatives.

The blurring of the division between the global North and South, also expressed in the introduction to chapter 4, was reflected during the research process of chapter 5. Many organisations have transnational operations, and significant institutions are arising in East. However, there appear to be three natural divisions within EE practice. These are named and described as follows:

- New institutions or "green fields" EE: initiatives that have been started from nothing on the basis of an environmental or sustainable development vision.
- Adapted institutions or "moving train" EE: initiatives that have begun within existing educational organisations.
- Extra-curricular activities or "plug in" EE: practices that occur as an add-on to the educational experience.

There is no single generator of initiatives; there are examples of practices being driven by the state, by NGOs and by private enterprise. This chapter is structured to mirror the three categories. Each section highlights local and international examples. There has been attempt to cover the traditional global North and rising East Asia. A link is drawn to the theoretical underpinnings of this experience in each practical example. The limitations of this thesis do not allow an account of many commendable initiatives, so those deserving of future research attention, but which are not discussed, are listed in section 6.6.

> Let us try, however imperfectly, to make education a science of relationships – in other words, try in one subject or another to let the children work upon living ideas. In this field small efforts are honoured with great rewards, and we perceive that the education we are giving exceeds all that we intended or imagined.
>
> (Charlotte Mason, 1904)

5.1 New institution: green fields environmental education

5.1.1 Example of Green School, Bali, Indonesia

The Green School is included in this discussion as it is often referred to as the poster child for EE. In 2012, the school was awarded the accolade of the “Greenest School on Earth” by the United State’s Green Building Council and when Ban Ki-Moon, the United Nations Secretary General, visited the school in August 2014, he remarked that it was "the most unique and impressive school I have ever visited" (GreenSchool, 2014). This Indonesian school was founded by John and Cynthia Hardy in 2008 with 90 students, as their response to polycrisis and to fulfill a desire to “give back” to Bali (Hardy, 2010). Green School literally emerged from the jungle – the structure was architecturally designed to reflect the ethos of the school, it was built using locally sourced materials and technologies – and it is breathtakingly beautiful. The “buildings” are inspiring and it has become known as the Green Cathedral (Hardy, 2010). In the Hardy’s words “We are building Green School to create a new paradigm for learning. We want children to cultivate physical sensibilities that will enable them to adapt and be capable in the world. We want children to develop spiritual awareness and emotional intuition, and to encourage them to be in awe of life’s possibilities” (GreenSchool, 2014).

The high-school curriculum aims to produce young adults who can comfortably compete on the international higher education and job market. The subjects taught are conventional and the pedagogy and practice reflect familiar elements from Waldorf, Montessori and Ambleside educational philosophies. It could be regarded as an interpretivist rather than a socio-critical educational paradigm (Schultze, 2014). Each lesson follows an integral framework that includes reference to physical, intellectual, emotional and spiritual aspects. Students are encouraged to be creative and critical thinkers, who can become leaders and have an effect on the world. Food is a central aspect at the school, 400 meals are produced daily and fresh produce is grown on campus in permaculture gardens. A fifth of the students are local Indonesians and 80% are foreign, representing 25 different countries (Hardy, 2010). To attend grades 9–12 at the Green School in 2015 would cost about R222 000.00 (ZAR), excluding specialist equipment, field trips and elective courses (GreenSchool, 2014). This is about double the fees of South Africa's top private schools and seven times that of a high-quality state school (Hiltoncollege, 2014; PHS, 2014; Somersetcollege, 2014). Although the Green School has initiated outreach programmes, they do not yet appear to be comparable with those at some South African private schools (De Boer, 2010; Hiltoncollege, 2014; Somersetcollege, 2014). Green School, like South African schools, is inclusive in its approach, for example, the school has had particular success with dyslexic students where they are known as "prolexic" (Hardy, 2010)

Theoretical link: trans-national education and third-culture kids

There is an obvious link to the Hayden's (2012) work on the appetite for trans-national education and the upsides and downsides of being a third-culture kid, as expounded in section 4.1 and 4.2.

Theoretical link: (T) or (t)ransformation

Not wishing to take anything away from this initiative, I respectively suggest that it is the poster child of the green (ecology) EE agenda, rather than the olive-green (ecology and social) one. Although the physical structure of the Green School reflects the ambitions of EE, are the pedagogy and students produced that different from well-recognised "non-green" private and state schools in South Africa? Green School is upheld as a replicable model (Hardy, 2010).

The danger of proposing a particular school as a model is myopic as context is integral to the success or failure of EE ventures (Franklin & Blyton, 2011; Fahy, 2013; Krasny & Dillon, 2013). The issue raised by Horton and Kraftl (2012) of (T) or (t)ransformation is relevant here. Based on a limited study of the school, I argue, that the promise and potential of sustainable development transformation have only partially materialised, at least for the poor of Indonesia.

5.1.2 Example: Rethinkers: New Orleans, USA

Rethinkers arose in response to the educational disaster that resulted from Hurricane Katrina in 2006, which destroyed 110 of the 126 public schools. Fifty percent of the population fled the city and students were sent to schools in other areas for an extended time. They were amazed, and horrified, as they experienced far better schooling than they had had in New Orleans, and some of them began to complain and to dream... Jane Wholey, the founder and director of the NGO, Rethinkers (Rethink: Kids Rethink New Orleans Schools) harnessed and directed the energy of a group of New Orleans teenagers by suggesting that if they wished to get anything done, they had "better quit whining" (Goleman et al., 2012). Rethinkers was born and it actively engaged in the reconstruction of many of the public schools in New Orleans. Their participation had a direct effect on diverse areas including the quality of school lunches, procurement policies, and security interventions. For example, the Rethinkers asked that metal detectors be removed from the school entrances and replaced with "mood detectors" – these were students who would watch out for unhappy students and be able to intervene immediately to prevent problems arising (Goleman et al., 2011).

In the eight intervening years, Rethinkers has grown and matured as an organisation and today their mission statement reads: "Kids Rethink New Orleans Schools is a youth organizing and leadership development organization that uses participatory education and action research to build organizing and leadership skills of New Orleans youth." (Rethink, 2014).

Rethinkers have remained true to the foundational beliefs that sparked the initiation of organisation; these are (Rethink, 2014):

- The lives and experiences of young people are important.
- Young people's ability to deconstruct their experience and create a new narrative is important.
- Young people are experts in their own reality which means that they have the capacity to both learn and teach in ways that are transformative.
- What young people have to say is important.
- Intergenerational solidarity and collaboration is important.

There are a number of noteworthy observations to be made related to EE.

Theoretical link: school culture

To bring about effective change in schools, one must acknowledge and address the school's culture. Rethinkers moved towards an ethos of trust and respect, fostering a culture of civic engagement among students (Rethink, 2014). The forces that influence these "communities of practice" (Capra, 2002) must be understood as "school culture… [which] plays a vital role in the transmission of new values and behaviours that are essential to any school change" (Barlow, Bennett & Goleman, 2010:88–90).

Theoretical link: connecting the dots...

Using the example of the devastation caused by Hurricane Katrina, Barlow et al. ask if there a link between ecological degradation and educational degradation (2010)? This question is worth further consideration in the South African context.

Rethinkers support aspects of place-based education, for example, public school participation in *Place-Based Storytelling in New Orleans at Tulane*. This Tulane University-based programme, reported on in the *News from Tulane* under the title of "Tell me something, mister", was designed to develop a rich, nuanced appreciation of New Orleans (Sparacello, 2012).

Theoretical link: the opportunity of disruption

Rethinkers is a fine example of Capra's point that when a system is ruptured, it opens the way for innovation (Capra, 2002). Rethinkers affected all three of the levels described by Greenwood – the school, the region and policy (Greenwood, 2010). In the new builds, Rethinkers not only increased social capital (health, education, community), but also rejuvenated ecological capital by insisting that school's supported local farmers to provision the cafeterias.

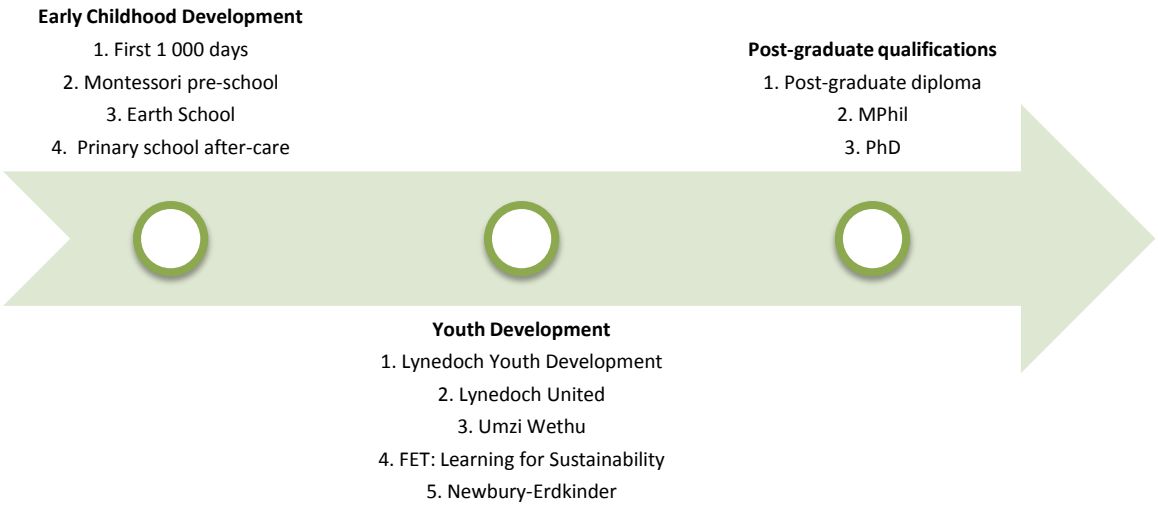
5.1.3 Example: The Sustainability Institute in the Lynedoch Eco-village

The Sustainability Institute is a "place" (Swilling & Annecke, 2012; Annecke, 2014; SI, 2014). It was founded in 1999 and is located in the heart of the Cape Winelands, outside the historic town of Stellenbosch. The Sustainability Institute founded the Lynedoch Eco-village and this now consists of a child-centred community, a Montessori pre-school and a 300-strong primary school of mainly farmworker children, a sports club, a post-graduate university campus, a business incubator and hub, a safe haven for teenagers after school, and FET college, an agroecology academy, and an organic farm. It is a lively meeting place, a test site for new technologies, a project hub serving disadvantaged communities and national and global projects and it is a guest house. It participates in a transdisciplinary PhD programme with Stellenbosch University; and it is a sanctuary for many students and visitors alike. Lynedoch Eco-village is the first mixed income, eco-sensitive village in South Africa. The village models sustainable living and learning, but would never be referred to as *the model* by the founders or residents. As much has been learnt from mistakes as has been from the successes. The eco-village reappears under Future Research (section 6.6) as the institution makes a diverse contribution that cannot be explored in the depth deserved, as this thesis restricts its inspection only to what it contributes to teenagers.

EE[40] at Lynedoch Eco-village can be envisaged as a continuum, as indicated in the following figure.

[40] At Lynedoch Eco-village, environmental education is referred to as education for sustainability. In this thesis the term is intended to encompass education for sustainability.

Figure 5: Environmental education at Lynedoch Eco-village as a continuum



Source: Compiled from (SI, 2014)

Youth development at Lynedoch

- Lynedoch Youth Development: A daily programme supports teenagers after school providing academic assistance, cultural and craft activities and sport. Young people are mentored by committed adults who assist them to learn valuable life skills.
- Lynedoch United: This is the soccer club that supports five teams. The teams have been disproportionately successful and have won honours at regional level.
- Accredited qualifications: Training and National Qualification Framework-accredited qualifications are offered to young people through a number NGOs started and run by Lyndoch Eco-village, including an FET college called Learning for Sustainability. Qualifications are offered in early childhood development, agroecology, and hospitality.
- Newbury School-erdkinder: This is a green fields EE project currently in progress. Newbury House is a private Montessori school based on EE, in the broadest sense of the term. The Sustainability Institute participates in the formulation of institutional arrangements that make possible teacher development in Montessori education in the Cape Winelands region that addresses financial inequality and the unequal access to education present.

- Food: Food plays an important role for the youth. All the above-described initiatives are supported in one way or another through the urban farm and restaurant business called Farm to Fork.
- Agroecology Academy: this practice-based academy for youth is based on an organic farm where young participants are involved in a four-year accredited learning programme to build capacity in both farming and successful land reform.

Source: Swilling & Annecke (2012), Annecke (2014) and SI (2014).

Theoretical link: radical agenda and place-based education

The Sustainability Institute could be regarded as an institution that practices radical pragmatism (Swilling & Annecke, 2012) and it follows a place-based pedagogy. These concepts are discussed in section 6.3. Like Healdtown and St Mark's (discussed below), the Sustainability Institute is an outlier that challenges the dominant social paradigm, in the political, socio-economic and educational spheres. Place matters, and how that space is configured also seems to matter (Morgan, 2000; Greunewald 2003; Khan, 2010; Kellner, 2010; Kelly & Kelly, 2013a, 2013b). The Sustainability Institute is one of two institutions in South Africa, discovered in this research, where the physical structures mirror the pedagogy taught.[41] The Sustainability Institute animated Lyndedoch Eco-village with an EE and child focus. The educational buildings are right in the centre of the village. In addition to this, the site and buildings were restored using ecological design and sustainable technologies. This means that a pre-schooler and high-school student or PhD scholar can walk out of the classroom and experience what is being taught, there is no dissonance between classroom and context.

Theoretical link: environmental education principles

The learning processes at all levels at the Sustainability Institute are based on the principles described in section 4.4 (Capra, 1996, 2002; Goleman et al., 2012). These principles have been sensitively applied to the local context. Being a satellite campus to the University of Stellenbosch has required careful and on-going negotiation because its progressive teaching is located in an orthodox institution.

[41] The other institution is Southern Cross Schools (Southerncross, 2014).

Marshall, Coleman and Reason (2011) acknowledge the personal cost of "working on the edges of orthodoxy and radical change, there is a high cost to be paid for 'locating oneself in the margins'".

Theoretical link: taking ground

The Sustainability Institute also represents an institution that has taken ground on every level described by Greenwood (2010) – in the curriculum, in the region and in policy. The latter could be extended to an international sphere as a number of faculty members serve in international forums. Its projects indicate that ground has been taken where a gap in the system has been apparent.

5.2 Adaption of existing institution: moving train environmental education

5.2.1 Example: Centre for Ecoliteracy: California, USA

The Centre for Ecoliteracy makes a diverse contribution that could benefit development of EE in South Africa, despite its minimal representation in the SADC region. It is therefore included as a recommendation for future research in section 6.6. A limited overview is provided in this section.

The centre is based in Berkeley, California and was founded by Fritjof Capra, Zenobia Barlow and Peter Buckley in 1995. It is a non-profit organisation that provides books, resources and consults on strategies for school communities, foundations, filmmakers and other change agents around enhancing EE.[42] It aims to "advance academic achievement; address today's important ecological challenges; and help develop strength, hope and resiliency in young people" (CFE, 2014).

Complexity and systems thinking is grafted into the DNA of the organisation and their ethos advances that the notion that nature is the teacher and that sustainability is a community practice. Their experience indicates that EE works best if it involves the entire school system, including the school gardens, canteen, building design and maintenance, and curriculum.

[42] In this study, EE encompasses the terms ecological education; sustainable living and eco-literacy (refer to chapter 3).

The centre practices and promotes a teaching strategy that includes (CFE, 2014a):

- An interdisciplinary approach using age-appropriate materials.
- Active engagement with students in and out of the classroom buildings.
- Involvement in long-term projects, for example. STRAW (Students and Teachers Restoring a Watershed) and the procurement and preparation of food for schools.
- Creating an atmosphere of purposeful conversation and reflection about complex issues.

A real-life intervention is recounted below to illustrate the centre's work. This particular story is one of the sources that ignited the inspiration for this study. Through integrated learning, an out-of-the-classroom experience and community involvement, a high-school project was designed to include the elderly.

> The students grew vegetables outside the classroom from which they harvested and made soup. They then turned their classroom into a restaurant and invited the elderly of the town to a meal. The older folk were then required to tell their stories and connect the students to the past giving them a sense of living history. Students wrote these stories down in a creative manner. Everyone won: the young people were taught biology, domestic science, history and English as well as communication skills and a 'servant leadership'. The elderly knew they had a role and were still important.
>
> (Murray, 2012b; CFE, 2014a)

<u>Theoretical link: principles of environmental education</u>

Given the illustrious founders, there is a self-explanatory link to the work cited above on the principles of EE, as the centre embodies the theory espoused (Capra, 1996, 2002; Goleman et al., 2012).

<u>Theoretical link: institutional innovation</u>

The centre's philosophy also falls in line with Greenwood's (2010) thinking about making an EE contribution in any institutional space and opportunity provided, as they work at all three levels – school, district and policy.

The centre works with organisations that are represented by all three categories suggested in this thesis – green fields, moving train and plug-in EE.

Theoretical link: role of sustainability researcher and (t)ransformation

Although not explicit in online or printed material, collectively viewed, the centre's staff seem to play the roles of reflective researcher (academic), facilitator and activist (Pohl et al., 2010). The material produced is user-friendly and practical and the method suggested is the five EE practices explained in section 4.4. The impression is that they are offering (t)ransformation using *a* method, rather than punting *the* method or model (Horton & Kraftl, 2012).

5.2.2 Example: The Zoo School, Minnesota, USA

The School of Environmental Studies or The Zoo School, as it is more commonly known, has many links to the EE theory discussed in this thesis. However, just one link will be highlighted that demonstrates how the school's structure matches the pedagogy, by conscious design.

"The mission of the School of Environmental Studies is to be a community of leaders learning to enhance the relationship between humans and their environment" (SES, 2014). This school offers a two-year high-school programme in EE, while also covering the subjects required by the state. It serves three local state high schools and draws students by application and lotto. The school is a "thematic" high school, focuses on a particular aspect such as EE or arts and culture, and one of a number planned for the region. The Zoo School has received a number of awards for the thorough preparation of students for college, the high graduation rate, the successful partnerships developed with other organisations, and their strong community presence (SES, 2014). One of the places visited on The Zoo School field trips is South Africa.

The Zoo School is built around the Minnesota Zoo. Two years were taken to finalise the design of the school buildings as the visionaries were insistent that the buildings reflected the pedagogy of the school. The school was built in movable modules around a central square or *agora*.

Although the school caters for 400 students, the modular structure ensures that the buildings remain “human sized” and organic and students are grouped into home-units of 10. A student describes her experience in this built environment as:

> I feel like I'm not learning in a box of fluorescent lights like I was in my first years in high school. I’m learning in a classroom, and I'm learning outside by a pond. I'm learning in a local park. I'm learning at the zoo, working with people who are doing stuff in the field. We do a lot of stuff that has a significant impact on the community.
>
> (Curtis, 2014).

A more detailed description of the design is provided by Design Share and can be found in appendix 4.1. It is worth noting that the institutional arrangements that support The Zoo School are complex and were carefully negotiated between educational authorities, private enterprise and various civic organisations. Similar institutional complexity underpins the Lynedoch Eco-village.

Source: Curtis(2014), Designshare (2014) and SES (2014).

Theoretical link: Radical view and pedagogy of place

A link is drawn between The Zoo School and the radical EE perspective and place-based education, discussed in section 6.3. *Place* matters; and how that *space* is configured also seems to matter (Morgan, 2000; Greunewald 2003; Khan, 2010; Kellner, 2010; Kelly & Kelly, 2013a, 2013b). In most instances, modern and post-modern schools have been designed and built using the similar structures to prisons, factories, hospitals and municipal buildings. If this pattern is repeated, the same industrial education of “eco-illiteracy” is likely to result. The Zoo School challenged the conventional school build (and institutional arrangements) setting off a “virtuous cycle” and it now actively restores social and ecological capital (Birkeland, 2008) through the education process.

5.2.3 Example: Healdtown and St Mark's College, South Africa

Healdtown: Under the eagle's wings

Webster (2013), with the support of colleagues at Rhodes University (2014), traces the history of Healdtown from 1835 to 2012 from its origins as the largest Methodist Mission Station School situated near Fort Beaufort in the Eastern Cape. This school was the educational birthplace of a number of South Africa's elite. The impact of the school is regarded as "an important piece of history that miraculously shaped many lives since 1855" (Luhabe in Webster, 2013). Among the many professional alumni who graduated from Healdtown are Nelson Mandela, Govan Mbeki, and Robert Sobukwe. It was in this place that Enoch Santonga composed South Africa's national anthem, *Nkosi Sikelel' iAfrika* in 1897, which was sung by the students each Sunday (Webster, 2013) The significance of Healdtown is that it provides inspiration for the practical implementation of EE. The underpinning pedagogy of Healdtown was one of racial and gender equality (Webster, 2013). It was considered radical and, in some quarters, "wrong", given the political hegemony of the day. Nevertheless, the alumni are powerful testimony to impact of a pedagogy that advances the brown sustainability agenda.

St Mark's College

A second example of a school that advances the brown agenda is found in St Mark's College. In 1985, Peter and Elizabeth Anderson birthed one of the first multi-racial high schools in apartheid South Africa, situated in a disused stone building on the property of the Anglican Church in Limpopo. Graduates achieved academic results that enabled young people of different races to pursue a tertiary education. St Mark's weathered storms and dust, had tents for classrooms, was beset by an inadequate water supply and often harassed by the military – yet another world was created and opportunity was born.

Theoretical link: complexity thinkers look at both sides of the coin

Healdtown and St Mark's College are the other side of the coin to the Green School. During the Anderson's tenure at St. Mark's College, they focused on the brown agenda.

However, in a recent interview with them, the challenges that the Andersons are assisting St Mark's current management team to resolve are more ecologically related, for example, disposing of waste and making compost (Anderson 2012; Murray, 2012b).

It is argued that it would be limiting to review only those initiatives that serve the olive-green agenda. As many of the puzzle pieces should be gathered as possible when attempting to "re-solve" a wicked problem (Kolko, 2012; Preiser, 2013).

Theoretical link: institutional gaps

St Mark's College was viewed with suspicion by the educational authorities and, as a result, closely monitored. There was very little room in the curriculum to introduce innovative ideas. However, the Andersons realised that the chink in this armour of control lay in the ubiquitous school assembly. They used these occasions to bring forth new ideas and to invite students to do the same. St Mark's enacted Greenwood's (2010) theoretical insights by acting where there was room to act, in assembly. Greenwood also noted the capacity of the school assembly for innovation (2010).

Theoretical link: community builds resilience

Both schools also utilised the political headwinds and disruption of the time to build strong, resilient communities (Dichmont, 2007; Webster, 2013a). This is a foundational principle of EE and practiced by the Centre for Ecoliteracy (Capra, 1996, 2002; Goleman et al., 2012). Students left both these schools with a strong sense of "other", which has been demonstrated in the public lives of past students.

Theoretical link: critical eco-pedagogy

A link between Healdtown and St Mark's College is the radical EE perspective, discussed in chapter 6 (Greenwood, 2010; Kellner, 2010; Khan, 2010; Swilling & Annecke, 2012; Kelly & Kelly, 2013b). Both schools were outliers in their day. Considering the radical EE agenda, an important skill is critiquing: the ability to read and deconstruct the economic, social, political and environmental norms of our own society (Khan 2010). The management teams of Healdtown and St Mark's confidently ruptured the *status quo* and provided life-sustaining solutions.

They modelled a social critique and skilfully untangled the syllabus from the dominant eco-political agenda. Do we have the political will and ability to shine this energy onto other ecological and social injustices dominating the 21st century? Perhaps this is more possible in South Africa as it citizens have summoned the capacity in the recent past to challenge and replace a pervasive, unjust system.

5.3 Extracurricular programmes: plug-in environmental education

5.3.1 Example: A Rocha, international

A Rocha was founded in Portugal in 1983 by Peter and Mirinda Harris. It is an interdenominational, Christian environmental organisation and a member of the International Union for Conservation of Nature and Natural Resources (Arocha, 2014a, 2014b). The ethos of A Rocha is a holistic one, caring for both the planet and all forms of life. These values are reflected in the activities undertaken to further environmental conservation, undertake scientific research, relieve poverty (particularly food insecurity), and conduct EE. An example of an A Rocha USA project is the Five Loaves Farm in Santa Barbara, which grew and distributed 20 tons of organic fresh produce last summer to those in need – 21% of children in Santa Barbara live under the federally defined poverty level (SBCC, 2014). It is apparent that A Rocha International has an olive-green agenda. Short and long-term projects are achieved through uplifting local rural and urban communities and encouraging their participation in the projects.

By 2013, A Rocha International had projects in 19 countries, namely Brazil, Bulgaria, Canada, Czech Republic, Finland, France, Ghana, India, Kenya, Lebanon, Netherlands, New Zealand/Aotearoa, Peru, Portugal, South Africa, Switzerland, Uganda, United Kingdom and the USA. The organisation develops strong local and national networks. Although A Rocha is explicitly a Christian organisation, it collaborates with other faiths based on a shared value system around caring for the Earth.

A Rocha Finland

A Rocha Finland have developed an effective way of reaching most teenagers by assisting with Lutheran confirmation classes (Arocha, 2014a). Approximately 90% of Finnish 15 year-olds attend week-long confirmation camps.

"The natural setting of the camps has always influenced them, but we have made this explicit. The environment participates in Christian education!" (Arocha, 2014a). Academic, facilitator and activist, Rev Panu Pihkala, Chair of A Rocha Finland, has developed EE material that is taught at these camps. The implication is that by the time 90% of teenagers leave high school they have had some form of EE. In addition to the eco-theological work described, Panu has increased the reach of A Rocha Finland by engaging in collaborative partnerships (Arocha, 2014a).

A Rocha: East Asia

It is difficult to find any material, academic or grey literature, on what EE efforts are occurring among Chinese adolescents (Shima, 2014). Available material is written in Cantonese or Mandarin, the translation of which is beyond the scope of this thesis. However, as China is such a significant world power, an initiative is included that aims to increase EE among Chinese teenagers, both those in China and those living abroad. A Rocha has appointed an East Asian project co-ordinator, Samual Chiu, who works with the Chinese diaspora in Vancouver and Toronto, Canada. He also co-ordinates and supports a diverse group of environmental professionals and practitioners in Hong Kong, in their individual and group efforts, to bring about social and environmentally sustainable lifestyles in the local context. Chiu's focus in Canada is to offer EE to the 900 000 congregants of Christian churches in both cities. He is also currently translating *Planetwise* by Dave Bookless into Mandarin so that it may be read in North America, Taiwan and Hong Kong (Chiu, 2014).

Theoretical link: taking the opportunities offered and "being the change"

Using the principles promoted by the Centre for Ecoliteracy (Goleman et al., 2014a; CFE, 2014a), A Rocha seems to recognise the gaps in the system (Greenwood, 2010), and utilises these to provide EE to teenagers. Considering the Chinese diaspora to Canada, A Rocha may be working with third-culture kids, who present particular challenges for environmental educators (Hayden, 2012). The organisation is not reinventing the wheel, but rather working collaboratively with existing structures and organisations to increase the environmental knowledge of school leavers. Pockets of A Rocha also seem to model a more sustainable way of life, for example, through the examples set by the camp staff; although, their published material states that this is not always the case (Arocha, 2014a).

5.3.2 Example: Eco-schools and Landcare, South Africa

Although neither a full discussion will be had, nor links made to the above theoretical themes, Eco-schools and the Landcare Programme are mentioned in this section as a conversation about EE in South Africa would not be complete without them. Eco-schools is an international NGO and has had a presence in the country since 2003. It is supported by both the Wildlife and Environment Society of South Africa and the World Wildlife Federation-SA.

“The programme is aimed at creating awareness and action around environmental sustainability in schools and their surrounding communities as well as supporting ESD [Education for Sustainable Development] in the national curriculum.” (WESSA, 2014). Landcare focuses on land resource management and “promotes local people taking local action in their local area to achieve sustainable land use and management” (NDA, 2014). Landcare activities involve holding wilderness camps for disadvantaged teenagers.

Both Landcare and Eco-schools have complex operations, which have supporters and detractors. These initiatives are deserving of an in-depth discussion and research, especially around the questions raised by Krasny and Dillon (2013) of whether or not such EE (increase of knowledge) has/is/will lead to more eco-centric behaviour and whether such efforts are greenwashing or useful as they are at least doing something (Greenwood, 2010).

5.4 Concluding chapter 5

Chapter 5 set out explore to research objective 3, which was to gain insight into the practical application of EE. The chapter also addressed research objective 4 as it highlighted South African initiatives. The practical examples described in chapter 5 were linked to the context and key theoretical themes explored in chapters 3 and 4.

The key learnings emanating from these chapters are consolidated in chapter 6, which aims to derive lessons from this material that may be useful in the South African context.

This chapter closes by drawing attention to the quality of leadership evident in the initiatives discussed above.

If adaptive leadership is “inclusive and emergent” and if it goes “beyond conventional notions, because it needs to be able to step outside and challenge current formulations of society and business, and because sufficiently robust change means questioning the ground we stand on” (Marshall, Coleman & Reason, 2011:6–7), then the genitors of the above-mentioned projects are adaptive leaders in EE. And further, like the students they teach, academics and practitioners need to work out their own place in the messiness (Marshall, Coleman and Reason, 2011).

> A child should be brought up to have relations of force with earth and water, should run and ride, swim and skate, lift and carry; should know texture, and work in material; should know by name, and where and how they live at any rate, the things of the earth about him, its birds and beasts and creeping things, its herbs and trees...
>
> (Charlotte Mason, 1904)

Chapter 6: Recommendations and conclusion

6.1 Introduction

"Our aim in Education is to give a Full Life. We begin to see what we want. Children make large demands upon us. We owe it to them to initiate an immense number of interests. Thou hast set my feet in a large room; should be the glad cry of every intelligent soul."

(Charlotte Mason, 1904)

This chapter is designed to indicate how this thesis has answered the research objectives. The key learnings, derived from the exploration of EE theory and practice traversed in previous chapters, is synthesised to address each objective in turn, with particular reference to South Africa and South African teenagers. The key learnings are preceded by a table of evidence, which substantiates the claim that this thesis addresses the four research objectives established in chapter 1, which were to:

1. Understand the current and historical context of EE (see chapters 1 and 3).
2. Synthesise published and unpublished material to distil key themes emerging within the field of EE (see chapter 4).
3. Gain insight into the practical application of EE (see chapter 5).
4. Consolidate the context, theory and practice of EE into key learnings relevant to South Africa, and South African teenagers (see chapter 6).

“We do not try to be comprehensive. Firmly categorizing the narratives or drawing conclusions would deaden the stories and interfere with the reader’s, your, own sense making. Our intent is more to notice interesting strands and raise questions.” (Marshall, Coleman & Reason, 2011:3).

6.2 Table of evidence

This section employs a technique often utilised by the South African Qualifications Association in accreditation processes to assure the quality of the qualifications developed (SAQA, 2014).

Evidence for this thesis will be presented in a similar tabular form that will substantiate that the four research objectives have been met and where this evidence may be located in the thesis.

Table 4: Table of evidence

Research objective	**Evidence to substantiate the claim that the objectives have been met**	**Location**
Objective 1: Understand the current and historical context of environmental for sustainability.	☐ Background and motivation ☐ Real-life context of study ☐ Transdisciplinary lens ☐ Development in South Africa ☐ Sustainable development in South Africa ☐ EE and related definitions ☐ Educational philosophies ☐ Roots of sustainable development and EE	☐ 1.1 ☐ 1.3 ☐ 3.1 ☐ 3.2 ☐ 3.3 ☐ 3.4 ☐ 3.5 ☐ 3.6
Objective 2: Synthesise published and unpublished material to distil key themes emerging within the field of EE.	☐ Space and place ☐ Trans-nationals and third-culture kids ☐ Claims of transformation ☐ Principles of EE ☐ Institutional innovation ☐ Role of the researcher	☐ 4.1 ☐ 4.2 ☐ 4.3 ☐ 4.4 ☐ 4.5 ☐ 4.6
Objective 3: Gain insight into the practical application of EE.	☐ New institution: green fields EE ☐ Adaption of existing: moving train EE ☐ Extracurricular: plug-in EE	☐ 5.1 ☐ 5.2 ☐ 5.3
Objective 4: Consolidate the context, theory and practice of EE into key learnings relevant to South Africa and its teenagers.	☐ Key learnings: research objective ☐ Key learnings: research objective ☐ Key learnings: research objective ☐ Key learnings: research objective ☐ Future research	☐ 6.2 ☐ 6.3. ☐ 6.4 ☐ 6.5 ☐ 6.6

6.3 Key learnings

6.3.1 Research objective 1: key learnings

To explore the current and historical context of education for sustainability.

Qualified systematic literature review methodology

The discovery and qualified use of the systematic literature review (Booth et al., 2012; Cochrane Collaboration, 2013; Campbell Collaboration, 2014) was foundational to the validity, reliability and applicability of this thesis. This methodology played a significant role in the data collection and synthesis of information, as it brought to bear an objectivity a less-disciplined approach may not have rendered. It also provided a mechanism for my voice to be heard (Kelly, 2009), without becoming too entangled in my own opinion (Steedman in Alvesson & Skoldberg, 2012). When conducting social science research in a "thick place in deep time" (Gill 2002), such as South Africa, it is valuable to use a methodology that requires the researcher to be reflective about the nuts and bolts rigour of the research process.

6.3.2 The value of lenses

The value of viewing EE through different lenses, or put another way – making use of the "trading zone" (Krasny & Dillon, 2013) – has been an exciting discovery. This approach provided insights into EE that may have otherwise been missed. This discovery can be likened to walking around a small cottage and looking at the interior through different windows – one sees different things through each window. This approach has provided a more nuanced and fuller "kaleidoscope" perspective of EE. The different lenses which have been employed in this thesis are the:

- Lens of geography
- Lens of history
- Lens of language and discourse
- Lens of art
- Lens of self
- Lens of science
- Lens of psychology.

EE is a wicked problem, many EE efforts to date have not hit the mark and EE is not the domain of a single discipline (Krasny, 2013). These conditions would indicate that EE research, theory and practice are all eligible for an approach using a multiplicity of lenses, which is perhaps one way that the efficacy of EE efforts could be improved. This multifocal approach is particularly relevant for South Africa, which is a complex and shifting society. For example, it is argued that this type of approach to EE in South Africa may achieve the following:

- Encourage the EE educator to take a broader view and challenge what s/he is most certain of.
- Allow a new shared language and perspectives to emerge.
- A ferment of new educational techniques and methods.

It is further argued that the spatial lens offers South Africa a particular gift. Firstly because I did not come across this approach in my research on South African EE literature, so perhaps it is something uncommon for South Africa and secondly, given the apartheid history of our country, where place and space has been and remains a contested issue, I believe that looking at EE in this manner will yield insights into how to move forward, particularly where educators are stuck in the mire of policy and the need to maintain school facilities.

Many other lenses could have been employed in this work, for example, assessing EE through the lens of social anthropology, sociology, technology or health. This kind of collaborative work or trading zones are an untapped resource in terms of EE research. They offer fresh ways of understanding and of “doing” education. One lens blurs into another like a kaleidoscope creating an entirely new picture.

6.3.2 Research objective 2: key learnings

To synthesis published and unpublished material to distil key themes emerging within the field of environmental education.

> "They were making a journey to a place, but in truth they were making a journey to an idea."
>
> Found in *The Age of Magic* by Ben Okri (2014)

This section presents two of the most significant key learnings – a radical perspective of EE and place-based education. These topics will be discussed sequentially and are linked to section 6.4 below, where I express my own position on the radical perspective and some of the implications for South Africans and South African teenagers of this perspective.

Presentation of a critique of environmental education and a radical perspective

The presentation of the radical position is placed in chapter 6, rather than clustered in chapter 4 with the other theoretical themes because this perspective is more fully understood in the light of the preceding chapters. The critique of EE is given only from a liberal perspective. The conservative critique is not entertained because the conservative paradigm is apparent in the history of EE presented in chapter 3, as this was the dominant view in the 1970s and 1980s and the discourse has moved on in the last 40 years. The conservative voice is almost inaudible in the literature reviewed. The liberal critique represents the radical paradigm of EE, and henceforth will be referred to as the radical perspective.

When I began the research process, I assumed that there would be a global North and global South divide on the radical perspective; however, the literature disproved this assumption. The radical view is not clear cut, and practitioners and academics cannot be painted with the same brush simply because of their geo-political location; a distinction between North and South thus becomes jumbled and unhelpful. This is primarily because the space of the discourse is in cyberspace, although the practice of EE remains solidly place-based.

There has been a stimulation and cross-fertilisation of ideas, for example, Khan (2010) built a critical pedagogy on the eco-centric and emancipatory pedagogies offered by Freire, Marcuse and Illich (2009 in Gadotti & Torres, 2009; Khan, 2010; Gadotti, 2011). Nothing in the literature indicates that conversations took place between the academics. What is clear from the literature is that some voices appear more edgy and overtly political and that a strong brown agenda, as a cross-cutting theme, is vehemently articulated and that there is a concentration of these views in developing nations.

In addition to the above, if the material and ideological realities of religion, gender, technical advances and what Bell refers to as the “invironment” (the connection between our physical bodies and the environment) are also taken into account when attempting to deconstruct the radical view of EE, the picture becomes a great deal messier (Bell, 2012). This thesis attempts to present a realistic view of the radical perspective, and as such, it cannot be neatly boxed.

The radical view is currently evolving; and seems to be made up of many strands, some of which are presented under the following headings – The Orwellian Turn; Critical Eco-pedagogy; Bright Greens; Developed, Developing; Building a Conceptual Bridge; Blindsided; and To all Radicals Everywhere.

The Orwellian turn (Khan, 2010)

Academics and practitioners alike have questioned the efficacy of the current anthropomorphic pedagogies that dominate current mainstream education, as well as the neoliberal agenda that this education seems to serve. Expression of these reservations have been heard for over 100 years (Mason, 1904; Orr 1944; Holt, 1964; Schaeffer Macauley, 1984; Montessori, 1994; Costley, 2011; Robinson, 2012); Deeply disturbed by ecological degradation, Senator Gaylord Nelsson of Wisconsin announced Earth Day on 22 April 1970 (Libraryofcongress, 2000). This day is marked by some as the beginning of the pedagogical and political start to a more sustainable society (Khan, 2010). EE has increased awareness since Earth Day in 1970. The research of one of the world’s premier EE organisations, the North American Association for Environmental Education, working in 55 countries, demonstrates that millions of Americans understand more about the environment, but that what is understood is often flawed (Khan, 2010).

This knowledge has not immunised the population against increasing degradation of the environment or been effective in the face of the rapacious resource consumption at either the scale of an individual or trans-national corporation (Khan, 2010). Writers and activists are provoked to present a compelling argument against an a-political form of EE in favour of a radical argument for a politicised EE (Gadotti & Torres, 2009; Kellner, 2010; Khan, 2010; Shiva, 2012; Kelly & Kelly, 2013a, 2013b; Le Grange, Loubser, & Le Roux, 2014).

> ... here environmental literacy has not only been co-opted by corporate state forces and morphed into a progressively-styled, touchy-feely method for achieving higher scores on standardised tests like the ACT and SAT, but in an Orwellian turn it has come to stand in actuality for a real illiteracy about the nature of ecological catastrophe, its causes, and possible solutions.
>
> (Khan 2010:9).

One of the responses is the rise of critical eco-pedagogy.

Critical eco-pedagogy

The work of Richard Khan (2010) is seminal to promoting a critical eco-pedagogy. He is both an activist and an academic, and proposes a "philosophy of eco-pedagogy for the Global North", calling for a radical overhaul of education – one which challenges the current hegemony and dominant elite (Khan, 2010:186). As explained earlier (Loubser, 2014), Khan's work appears to emanate from a social-critical, eco-centric philosophy. He concurs with Shiva and demands that we "remove our blinders, imagine and create other possibilities [as] liberation in our genocidal times, is, first and foremost, the freedom to stay alive" (Shiva, 2012:267). Khan, here, is referring to life in the broadest sense, encompassing all forms of life.

He regards the dominant social paradigm arising from four factors (Khan, 2010):

- An anthropomorphic world view
- A matrix of domination
- A market-based techno-capitalist infrastructure
- Reductionist science.

Khan refers to EE as green-washing and offers The Zoo School as an example of this practice. Khan's central argument is twofold: that EE does not teach students to be critical thinkers about the dominant social paradigm and that EE promotes the idea of taking a "balanced view", which allows the destruction of social and ecological capital, by "business as usual", to hide in plain view. Thus, EE may be one of the *causes* of the very wicked problem that this education seeks to solve (Khan, 2010). Khan is not a lone voice, other authors and activists whose work supports a radical EE perspective are tabulated below.

Table 5: Proponents of the radical perspective

Moniker of discourse	**Author/s**
Ecological education	Orr, Capra, Stone, Barlow
Place-based education	Gruenewald, Smith, Haluza-DeLay
Humane education	Selby, Weil
Holistic education	Miller; Mason (Mason, 1904; Schaeffer Macauley, 1984); Montessori (Montessori, 2004)
Eco-justice education	Martusewicz, Edmundson, Wayne, Gruenewald, Bowers
Commons-based education	Prakash, Esteva, Bowers, Martusewicz
Transformative education	O'Sullivan, Morrell, O'Connor, Taylor, Hill, Clover
Peace education	Andrzejewski, Baltodano, Symcox, Wenden, Eisler, Miller; Kelly & Kelly (2013a; 2013b)
Barefoot Colleges	Bunker Roy (2014)

Source: Table compiled from Khan (2012:11) and additional stated references

From a reading of the literature studied, it is difficult to determine the exact birthplace of critical eco-pedagogy as the concept has many threads and has built progressively. The pedagogy has matured over the last 20 years and can roughly be described as a four-stranded education ideology: the first strand is an emancipated education ideology; the second strand is an eco-centric education ideology; the third strand is a critical-education ideology; and the fourth strand, related to the first, is a pro-poor ideology.

It is significant that eco-pedagogy has progressed well in South America, which is also a region that has made significant strides towards sustainable living, for example, Costa Rica's Constitution and Cuba's organic food production. Education cannot be removed from its socio-political and economic context. Swilling (2014a), based on his recent participation in the International Resource Panel suggested a significant parallel between Latin America and Africa concerning resource governance and the value of integrating the Latin American ideas into the African discourse.

The same kind of integration, of ideas and conversations around eco-pedagogy, would likely be beneficial to Africa.

The bright greens

Some academics and practitioners seem to look more in one direction than the other – there is a firm and explicit reference to the green agenda and a looser, implied reference to the brown agenda (Orr, 1944, 1992; Hardy, 2010; Brooks et al., 2012; Goleman et al., 2012; McBride et al., 2013; SES, 2014).

To illustrate an example of the dissension within the radical camp: the bright green position is regarded by the critical eco-pedagogists as a sanitised version of EE, as the social element of sustainable development is disregarded (Khan, 2010; Kellner, 2010; Kelly & Kelly, 2013b; Irwin & Lotz-Sisitka, 2014). South Africa, influenced by the USA, held the bright green position in the 1970s when the focus was on outdoor education. Irwin and Lotz-Sisitka (2014) propose that South Africa rejected this approach during the 1980s and has progressed towards a more radical view first expressed through the Treverton Conference and incubated in the Environmental Education Association of Southern Africa and beyond. Nevertheless, this bright green perspective remains the preserve of some, particularly those living in developed nations. The inequality strand of the polycrisis is so grotesque that it cannot be ignored in any discussion on EE. Benefits would arise if academics and practitioners look both ways when considering EE, as both the green and the brown agendas are important. This is a call to develop an olive-green eco-pedagogy; and perhaps this is what Khan (2010) has developed?

> In this uncertain situation, it is up to critical educators and concerned citizens to re-envision the importance of education as a means through which we can engage our current set of crises, as we develop pedagogies adequate to the challenges of the contemporary moment that can promote social transformation guided by concerns of sustainability and justice.
>
> (Kellner, 2010:153).

Developed, developing?

As evidenced by the academics and practitioners mentioned in chapters 4 and 5, there is a deep, long-standing tradition of EE theory and praxis in the developed nations. This is both influential and inspiring; however, it cannot claim to hold the high ground or majority seat. If EE is about teaching and learning ways of "sustainable living" (Loubser, 2014), perhaps developing nations could be regarded as "equally advanced"? How should sustainable living be measured? This could be done in a conventional manner, using an economic measure, such as GDP, or alternative measurement systems that rate well-being and sustainable development, such as the World Happiness Rating (UNSDSN, 2013). The result generated depends on the yardstick employed. It seems that developing nations use less resources and produce less waste than developed nations (Swilling & Annecke, 2012).

In order to live in this manner, one requires particular cognitive, relational and practical skills – one needs to be eco-literate (Goleman et al., 2012). In practice many of these skills are gained in one of two ways: a) need drives innovation and modest resource consumption or b) there is a wealth of indigenous knowledge that is modelled and taught orally in communities. Neither of these methods of becoming eco-literate are written down or even regarded as unusual as these skills are deeply grafted into the DNA of individuals and communities.

It is these *publishing* and *calibration biases* that create the uneven view of the body of work surrounding EE. The orthodox lens of developed versus developing nations is unhelpful in any discourse on EE. As a result, a great deal of knowledge is overlooked and undervalued; and a deeply ingrained prejudice, between developed and developing nations, is cemented.

These prejudices could be mitigated by firstly, actively acknowledging, searching for, and capturing knowledge generated by "experts" (Roy, 2011) *in situ* - space and place matter (Brooks et al., 2012); and secondly, by measuring the EE indices of developed and developing nations by using an eco-centric measurement tool, as opposed to an anthropomorphic one.

This concept could be further extended to include "developing" groups within a "developed" nation, i.e. poor, indigenous or remote communities within wealthy nations. The implication of this is that accumulating and appreciating the *developing brand* of EE may be more accessible than generally considered. Raising a louder developing nations' voice will benefit the development of EE everywhere.

An example of illuminating work done in this vein is Norberg-Hodge's work in Lahdak (Norberg-Hodge, 1991). In dealing with the polycrisis, the luxury of reinventing the wheel does not exist. This is a call to really *see* what is already there.

Building a conceptual bridge

Khan, a northern writer, articulates a *radical critical eco-pedagogy*. The genesis of eco-pedagogy is in the south. However, Khan claims that he promotes a synthesis of the southern concept of social justice with the northern concept of respect to all life, or a "future-orientated" ecological politics. Khan asserts that he takes a step beyond Paulo Freire by opposing globalisation and imperialism and by supporting sustainability, planetarity and biophilia.

This radical eco-pedagogy is manifest in the extra- and intra-institutional foundations being laid in both academic and international institutions, such as the United Nations Environment Programme, as well as grassroots social movements, such as Brazil's Landless Rural Workers' Movement (Khan, 2010).

To contend with Khan's claim that biophilia is a northern precept – such an assertion denies the value of southern indigenous knowledge where respect for all life is not only a cognitive idea, but also a lived principle and practice. Nevertheless, Khan calls for a critical reading of education for sustainability that is timely and provocative. He calls for a *critical* view of EE.

He urges all scholars and practitioners to deeply question whether the EE which they are teaching is "little more than the latest educational fad or, worse still, turns out to be a pedagogical seduction developed by and for big business-as-usual in the name of combating social and ecological catastrophes"; or is it a radical eco-pedagogy that will boost social movements and challenge hegemonic institutional structures? (Khan 2010:17). In determining the point on the continuum articulated by Khan, the definition of sustainable development becomes crucial. Although his work pre-dates Farley and Smith (2014), it appears that Khan's argument is built on the definition of neo-sustainability. To continue the metaphor of bridge-building used to head this paragraph, perhaps Khan has not completed a bridge between the northern and southern views of EE, but has laid down a solid foundation, alongside southern academics like Freire, upon which a critical, radical eco-pedagogy can be build which will meet the needs expressed by the both the brown and the green agendas. In other words, perhaps he has birthed an olive-green eco-pedagogy?

Blindsided

There are two issues considered here: firstly, that EE is marginalised in higher learning institutions; and secondly, that a hyper-critical stance is unhelpful, especially for developing nations. EE is usually housed in among the sciences, with little or no integration into the humanities or education and it reflects the legacy of a white, male, middle-class environmentalism. It remains an add-on outdoor activity that underscores the dichotomy between humans and the environment (Khan, 2012; Loubser et al., 2014). Greenwood (2010) would argue that every intervention, no matter how small, can build towards a significant EE contribution. This thesis supports Greenwood's (2010) view, rather than Khan's (2010).

To all radicals, everywhere

There is a price to pay whether one is a radical in a developed or developing nation. If one considers the many forms of radical expression in the EE field, some have chosen to challenge convention directly, while others have worked from a "tempered radical" paradigm (Meyer & Scully in Marshall, Coleman & Reason, 2011) and others still have worked as "insider outsiders" or taken the road of a radical pragmatism (Swilling & Annecke, 2012).

Regardless of the route, as stated above, Marshall, Coleman and Reason (2011) acknowledge the personal and organisational cost of being a radical in the EE and sustainable development space.

In summary, an attempt has been made to present a broad view of the radical perspective of EE. It is a topic with many contributors presenting diverse angles. In an attempt to deal with this diversity, the topic was presented in seven strands. The Orwellian Turn revealed the idea that EE may well be exacerbating ecological degradation rather than improving it. Critical Eco-pedagogy was presented next, as it is seen by some as the antidote to the Orwellian turn. This was followed by The Bright Greens and the Developed and Developing sections, which described problematic perspective. This roughly correlates with the global North and the global South respectively. Building a Conceptual Bridge came next as there is some attempt in this approach to reconcile the contesting factions within the radical paradigm. The critique was completed by looking at Blindsided and To all Radicals, as both these issues are the preserve of all radicals, regardless of position in the flank.

A section on place-based education follows as many radicals have found a comfortable theoretical home and a productive expression of the radical pedagogy in this concept. It is also presented because place-based education has exerted a gravitational pull on the research process of this thesis. I was unaware of place-based education at the start of this thesis, yet as I researched the articles and books, searched through databases, and read accounts of successful interventions, I ended up its doorstep time and again.

Place-based Education (PBE)

A steady heartbeat seemed to pulse through each chapter – that of place-based education. Consider the road-signs that point in this direction throughout the thesis:

- The introduction (chapter 1) outlined a motivation inspired by the needs of a *specific place* – South Africa.
- The *place* of the researcher is discussed in the methodology (chapter 2).

- The context sketched (chapter 3), especially with regard to the perspective of national development and sustainable development, points to a *specific geo-political zone* – SADC.
- The theory reviewed (chapter 4), is dominated by themes of *space and place.*
- The practical outworking of EE (chapter 5) happens at *specific geographic co-ordinates.*
- Many radicals (chapter 6) find a *place* to work out their views in the embrace of place-based education.

Although it is not new (Mason, 1904; Orr, 2004), little account is taken of it in conventional schooling, as place is considered inconsequential. The assumption is that the classroom routines are sufficient, "and that the only kind of achievement that really matters is individualistic, quantifiable, and statistically comparable" (Gruenewald, 2003:620). Trans-national education (Hayden, 2012) and many private and international schools are geared to provide an internationally competitive education. This could also be described as an education for *any-where*, or *no-where*. Place has been commodified. Place-based education aims to connect the child to a particular place, and in so doing, forge a long-term appreciation of, and accountability to, that place. Place-based education would require a new set of indicators that would take account of the social and ecological well-being of the school's community. Ecological theologian, Thomas Berry suggested that "we have gradually become 'autistic' and have forgotten how to hear, communicate, and participate in meaning making with or places on the living earth" (Berry in Gruenewald, 2003:624). Foucault (1977 in Gruenewald 2013:624) argues that if schooling is analysed from a spatial perspective it is apparent that the system is one that exerts bodily control on students, isolating them from their local culture, community and ecosystem. It seems that schooling can either stunt or construct a student's awareness of, and connection to, place. Some schools have gone as far as moving "beyond simply beautifying the grounds towards using the school grounds as an educational tool for students. Creating a sense of place and community and enabling the community to become stewards of the site" (maryesilveira, 2014). Green School is attempting an "edible campus" (GreenSchool, 2014). This kind of relationship is one of the antidotes for third-culture kids suggested by Hayden (2012) and discussed in chapter 4.

The practical expression of place-based education is not limited to a single formula, but is manifold, including the following: experiential learning, context-based learning, problem-solving education, outdoor education, environmental/ecological education, bioregional education, natural history, critical pedagogy, service learning, community-based education and indigenous education – occurring in community schools, small schools, rural schools and charter schools (Gruenewald, 2003)

Given the inclination towards place-based education, it is proposed that it could be considered as a "holding space" for this work. It would also provide a launching pad for the future research suggested below in section 6.6.

6.3.3 Research objective 3: key learnings

To gain insight into the practical application of EE.

Link to food

There appears to be a strong link between EE and food. In almost all cases cited in this thesis – Green School, Sustainability Institute, Rethinkers; A Rocha Santa Barbara and the Centre for Ecoliteracy – there is an emphasis on healthy eating and growing food. There is also evidence to suggest that urban food-growing initiatives extend their reach into the school yard (Averbach, 2014). As it was not the focus of the research, there is not enough evidence to determine the nature of the link between EE and food systems. I do wish to make explicit the relationship between the consumer and the producer of food and I use the voice of Carlo Petrini, the founder of Slow Food, to do so:

> Let us become co-producers ... to consume means to destroy ... in the act of eating, we are already participating in production ... Eaters are, therefore, also co-producers, both because their relationship with small producers is a critical link in creating a sustainable, just, healthy food system, and because we are what we eat, and in making food choices, we make choices about who we are. (Petrini in Shiva, 2005:162).

This link is not apparent in South Africa, with the Lynedoch Eco-village as one of the very few exceptions, particularly as a place of learning.

The learning for this country is that EE and food/healthy eating are mutually enhanced when they are articulated. It would be interesting to understand why this dimension is missing from South Africa's EE, what could be gained from including it into EE and how this could be achieved.

Use of measurements and the development of capabilities

If EE is important, what are the qualitative and quantitative measurements of such an education, both at an individual and at a school level? The answer to this question is important for two reasons: Firstly, if EE is advocating adding to the head, the hands, the heart and the spirit, a line must be walked between an emergent pedagogy and good science versus bad science (Goldacre, 2010). There must be transparency and accountability to peers and students alike. Secondly, if there is an attempt to measure the capabilities, this may help towards avoiding the trap that Krasny and Dillon (2013) lay bare, i.e. the assumed link between teaching EE and actual translation into environmentally responsible behaviour.

In addition to this, returning to section 3.2, consider the developmental state, and the importance of it providing a "capability enhancing" system so that individuals can advance their own skills (Evans, 2010), and the economist Sen's (1999) reference to the development of capabilities leading to freedom and an improved quality of life – the importance of trying to "get the size" of EE capabilities increases.

There is controversy around what represents EE capabilities, for example, evidence exists that demonstrates both the academic grades and the behaviour of students improve when EE is taught (Goleman et al., 2012). This, however, does not necessarily mean that the students are becoming critical thinkers enabled to challenge the *status quo* (Khan, 2010).

Academics and practitioners alike have proposed measurements for EE (McBride et al., 2013; CFE, 2014b, 2014c). To indicate the direction that this research is taking, a number of observable, measurable characteristics follow:

- Affect
- Ecological knowledge
- Socio-political knowledge
- Knowledge of environmental issues
- Cognitive skills
- Environmentally responsible behaviour
- Additional determinants of environmentally responsible behaviour.

Source: McBride et al. (2013:7) adapted from Simmons (1995).

In addition to this, individual capabilities for the head, heart, mind and spirit may be found in appendix 5.1; while characteristics of successful EE schools may be found in appendix 5.2. It is contended that EE measurements could be developed for South Africa, which would be context specific and could build on the work cited.

Youth in (t)ransformation

Horton and Kraftl (2012) indicate that if children are to participate in a school transformation project, then time and money must be committed to the project plan for this purpose. Despite the value of participation to the students themselves, as well as the staff, building professionals and the end product, research indicates that this aspect of a school build/education upgrade is not taken seriously by project initiators or implementers (Horton & Kraftl, 2012).

This is particularly important lesson in South Africa, where historically there has been a top-down, patriarchal approach that is engrained in the fabric of both private and public school transformation. In South Africa, perhaps the kind of participation envisaged may be a key that would open the door to increase the success of EE projects or even education in general.

6.3.4 Research objective 4: key learnings

Consolidate the context, theory and practice of environmental education into relevant key learnings, with particular reference to South Africa and South African teenagers.

The book *Sway* (Brafman & Brafman, 2009) looks at the "irresistible pull of irrational behaviour" that is evident in human behaviour, across varying ages, gender, occupation, IQ and risk profiles. From an EE perspective in South Africa, if we keep taking the same path, we are likely to end up at the same destination. Given the context discussed in chapter 3, and with particular reference to the mounting socio-ecological crisis, EE needs to be radically overhauled. This section reviews key learnings for South Africa. Although, in each chapter in the thesis, and each section in this chapter, South Africa and South African teenagers have been referenced, this section reviews two key learnings derived from the thesis as a whole. The first relates to the opportunity of taking "the [EE] road less travelled" (Peck, 1978) and the second relates to the peculiar challenges that Africans face.

<u>Opportunities</u>

Taking a consolidated view of the learnings emanating from the theory and practice described in this work, if EE is to be effective in SA, it is proposed that the following characteristics ought to be incorporated into such an approach. The points made have been crystallised into practical statements:

- A plurality of approaches: Adopt an all-comers approach. Green fields; moving train; and plug-in EE interventions all move students towards eco-literacy. Start with what one has, where one is, now.
- Olive-green agenda: EE is most effective if the social and ecological agendas are simultaneously addressed.
- Acupressure points in education: Evidence indicates that the most effective time to intervene in education is at the early childhood-development phase; this holds true for all stakeholders – the child, family, community and state (Spies & van Niekerk, 2011; Western Cape Government, 2011; UMN, 2011; Pangeti, 2013). However, about half a million teenagers graduate annually in South Africa (John, 2014) with negligible EE.

- As compulsory education is the last opportunity the state has to provide skills for sustainable living it is proposed that focusing on teens must remain a priority, but not the only one. Successful EE interventions would entail “tunnelling form both ends”, starting with both the pre-schoolers and the teenagers.
- Avoid the over-analyse/criticise/sanitise traps: Paralysis will result if the EE effort is over-analysed, over-criticised or sanitised (the social element is removed). These traps are revealed in the literature discussed above and must be avoided in this country.
- Radical pragmatism (Swilling & Annecke, 2012): This thesis supports a radical perspective. It is suggested that this could find a practical expression through place-based education. Niche EE innovation could be implemented by competent leadership. In all the practical initiatives showcased, these cases could also have been presented as role models of leadership. High quality leadership is an essential ingredient for successful EE. The potential linkage between adaptive and servant leadership (Heifetz, 1994; Marshall, Coleman & Reason, 2011; Ulrich & Smallwood, 2013) and EE warrants further investigation, which is beyond the scope of this thesis.

6.4 Future research

Although this research process has answered some questions, it has raised others. This section explores the possibilities for future research. The first three suggestions relate to work covered in chapters 3, 4 and 5 and the third suggestion is one that takes account of this whole research project, and potentially plants a seed for a PhD.

6.4.1 Creating a timeline

A great deal may be learnt from constructing a detailed timeline of a subject, and in the instance of this thesis, two subjects. It is proposed that the idea of developing a large-scale, detailed timeline that tracks EE in South Africa from pre-school to primary school to high school to institutions of higher learning. This exercise could also be comparative, for example, compared to a timeline for other African countries or countries in the global North or East Asia. It could be also paired with education in general or political developments in South Africa. Such a timeline would be beneficial because it would surface patterns over time and provide comparisons for consideration, which would otherwise invisible due to the lapse of time. A timeline will provide clues as to where key points of intervention in EE may lie in the future.

6.4.2 Trans-nationals and third-culture kids

Given that South Africa is the “Rainbow Nation” and that the country attracts many legal and illegal immigrants, two research possibilities arise under the trans-nationals/intra-nationals/third-culture kids banner.

Firstly, this diversity cannot be ignored, especially in South African high schools. Pinelands High School (PHS, 2014) actively embraces and celebrates the colour, language and culture of all in-coming grade 8 students by engaging the 200 new students in “diversity training” for a week. This course enables to students to explore the differences and similarities that they share and build enduring bonds of friendship. This initiative is cemented throughout the five-year high school tenure of the students through many activities including Rainbow Camp, school assemblies and cultural clubs and activities. These interventions are helpful to the intra-nationals and third-culture kids, as there are a significant number of South Koreans and mixed race (European, Indian and Indonesian) teenagers at the school.

The research question to be asked is can the rootless third-culture kids be given anchors that they can take with them, relationships with the earth and others that will endure and benefit them into adulthood through EE[43] interventions as described?

Secondly, given the techno-apartheid and background of unequal access to education in South Africa, a primary research question arises: How can differential access to "connectivity" be addressed and how can this technological advancement be used to further EE in high schools? A secondary question also arises: Once the teenager is "plugged in", how can that student be "unplugged" so that the vital relationships may be formed with others and with nature?

6.4.3 Environmental education in practice

A number of practical initiatives were showcased in chapter 5; however, during the data-collection phase of this work, a number of other meritorious examples of EE were discovered. Each one of the people or initiatives listed in the following table has a contribution to make to EE in South Africa. Each has been listed along with the place of practice should further research be entertained.

[43] The term EE used in this thesis encompasses the green and brown agendas. EE is unlikely to be successful if issues of culture, race language and so on are not explicitly and actively addressed.

Table 6: People and initiatives with potential to contribute to environmental education

Erkinder and farm schools (Montessori-based education)	USA
SEKEM	Egypt
Ambleside Schools (Charlotte Mason-based education)	United Kingdom, USA and South Africa
Professor Johnathan Jansen	University of the Free State, Bloemfontein
Rocklands High School and Mr Irfaan Abrahams LEADSA (2014)	Mitchell's Plain, Cape Town, South Africa
Centre for Ecoliteracy	USA
Bloemhof High School	Stellenbosch, South Africa
Homeschooling	South Africa and abroad
The Urban Homestead	Bergvliet, Western Cape, South Africa
Sustainability Institute	Lynedoch, Stellenbosch, South Africa
Design Share and the journal Co-design: International Journal of Co-creation in Design and the Arts	Web-based

6.4.4 Suggestion for further research and a potential niche innovation

"It is possible to work within the state-regulated system to create change, but first individuals and groups need to build relationships, demonstrate credibility, and then respond strategically to whatever openings exist" (Greenwood, 2010:7).

This thesis demonstrates that EE for teenagers is possible. The following suggestion may be seen as the next step to this literature review. As stated in chapter 2, one of the weaknesses of literature reviews is that the key learnings remain empirically untested (Mouton, 2011).

The research proposed here seeks firstly to address this weakness and secondly to further the aims of EE in a place-based application in South Africa. In discussion with John van Breda (May, 2014), the following germ of idea was co-created.

The objective of the doctoral research project would be to address the radical development agenda of EE, poverty and food insecurity in particular, through an EE intervention at three high schools, in different socio-economic brackets, in the Western Cape. The rationale behind the need for the study is that most school leavers do not attend an institution of higher learning and EE is not taught effectively in high schools. Therefore, most South Africans enter adult life without the education required to live productive, sustainable lives. High school is the last opportunity of the formal education system in South Africa to provide teenagers with EE.

Research indicates that the communities surrounding the schools practising EE are enriched and that resilient networks are established. One of the sub-objectives would be to emulate this achievement and ensure that surrounding communities were improved, especially with regards to food security. Participants could be Bridge House or Somerset College, Pinelands High School and Langa High or other schools in the Stellenbosch region.

Relevant methodologies and tools include:

- Transdisciplinary – joint problem formulation; log stories – start by doing.
- Social Action Network (this is discussed further below)
- Conceptual underpinning: Learning of learning.
- Making use of “trading zones”, for example:
    - Researching the unplugged versus plugged teenagers at high school: psychology, sustainable development, information technology.
    - Education (curriculum) and sustainable development.
    - Sustainable development and education and social geography: looking at the importance of place/space in the three high schools.
    - Social work and sustainable development (food security) and agriculture.
    - Sustainable development and education and environmental sociology.

The possibilities are broad; combined the research would form a very rich picture of EE in high schools and the communities around them.

Social network analysis may be a useful method of approaching and analysing the data arising from this social action network research (listed above). “Social network analysis developed as a set of methods for the analysis of social structures, methods that specifically allow the investigation of the relational aspects of these structures. The use of these methods, therefore, depends on the availability of relational rather than attribute data.” (Scott, 2013:41) The work of Scott on Social Network Analysis (2013) may be a starting point as it is accessible and current. He gives instruction on the basic building blocks of social network analysis, i.e. representing a network as a graph, points or lines which can indicate ideas like distance, direction and density. Further attention is given to capturing the dynamic nature of these networks over time; and visualising them in 3D models. It also comes to mind that perhaps a new or different network could be visualised and modelled in the educational arena (2013). The mattering map, which gives substance to invisible relational networks may also be of benefit (Kaschak, 2013), as well as the theoretical contribution of relational practice (Fletcher, n.d.). Fletcher’s work foregrounds the “disappearing act” of relational work required to make projects, like EE, successful.

Link between social science and science

South Africa has access to high quality science relating to the sustainability crisis. The disconnect appears to be in the communication of this science to the public, in order to inspire appropriate actions. This research proposal would seek to address this gap by educating the next generation.

Researcher skills

The researcher would need to increase her/his capabilities in order to be able to differentiate roles and to use language appropriately for each role, i.e. activist, academic and facilitator.

Researchers and time frame

The research could be framed in terms of a five-year development project to ensure enduring benefit to the communities and the completion of challenging objectives. The proposal has the capacity to include more than one researcher.

Longitudinal studies could also be entertained, for example, tracking alumni or creating a timeline showing the history and current activities and plotting potential future trajectories of EE in the Western Cape and the effect thereof.

Measurability

Project indicators could be measured, for example, institutional impact, community impact (food security), “leadership for sustainability” skills of teachers and students, legal improvements and curriculum developments.

Extension of the research agenda

EE in high schools is closely allied to the development of an undergraduate qualification in sustainable development or leadership for sustainability at a higher education institution. The possibilities of building bridges between high school and university students could also be explored.

Deliverables of the research/development project

- The first comparative study of the delivery of EE to mixed-income high school students in the Western Cape, and the effect of this education on the surrounding communities.
- An edited book of “trading zones” from a southern perspective.
- The development of an active research dissemination pathway or outreach mechanism to the relevant communities.
- Development of an integrated curriculum.

In summary, this thesis has attempted a comprehensive literature review of EE that may form the foundation of future work. Such EE research could include an engaged socio-critical element.

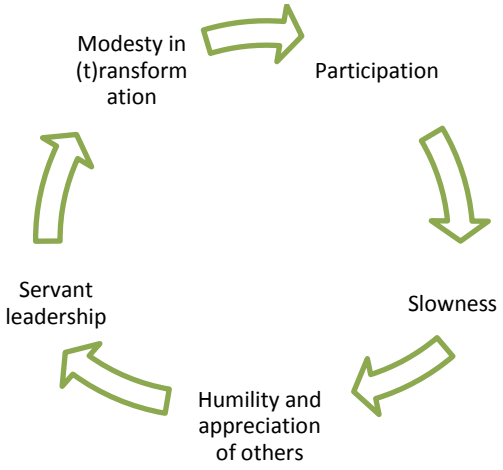
6.6 Concluding chapter 6

“... when my children ask me, what did you do when you knew that climate change was happening, and that we could stop it… I want to be able to say I did everything I could” (James Balog in *Chasing Ice*).

I have done what I set out to do; I have answered the question I asked.

Implicit in the motivation, and encapsulated in the research objectives of this thesis, was this question: If I want to help South African teenagers to live more sustainable lives, how do I do it? The research process and my insights, distilled above in the key learnings, have given me a clue about where to begin. However, as I finish this work, it is my future orientation or attitude towards EE that is most challenged. To be successful, I am aware that I need to demonstrate the following attributes:[44]

Figure 6: Attributes required for success



All encapsulated in the idea that I should do what I can, where I am, with what I have, now. Although this thesis is done, the journey has just begun…

"The question is not, –how much does the youth know?
when he has finished his education--but how much does he care?
and about how many orders of things does he care?
In fact, how large is the room in which he finds his feet set?
and, therefore, how full is the life he has before him."

(Charlotte Mason, 1904)

[44] Slowness = to practice "masterly inactivity" (Mason, 1904) or "wise passiveness" (Wordsworth, n.d). It indicates the power to act, the desire to act, and the insight and self-restraint which forbid action (Ambleside, 2012).

The Journey by Mary Oliver

One day you finally knew what you had to do, and began,

though the voices around you kept shouting their bad advice

– though the whole house began to tremble

and you felt the old tug at your ankles.

“Mend my life!” each voice cried. But you didn’t stop.

You knew what you had to do, though the wind pried with its stiff fingers

at the very foundations, though their melancholy was terrible.

It was already late enough, and a wild night,

and the road full of fallen branches and stones.

But little by little, as you left their voices behind,

the stars began to burn through the sheets of clouds,

and there was a new voice which you slowly recognised as your own,

that kept you company as you strode deeper and deeper into the world,

determined to do the only thing you could do –

determined to save the only life you could save.

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Appendix 1:1 Mainstream documents supporting the poly-crisis

1. United Nations Millennium Eco-system Assessment: eco-system degradation
2. Intergovernmental Panel on Climate Change: global warming
3. www.peakoil.net: oil peak
4. United Nations Human Development Report for 1998: inequality
5. UN Reports 2006: urban majority
6. UN Habitat Report *The Challenge of Slums*: planet of slums
7. International Assessment of Agricultural Science and Technology for Development (IAASTD): food insecurity.

Source: Swilling and Annecke (2012:27–28)

Appendix 1:2 Principles of Earth Democracy

1. Exploration of assumptions, limitations and areas of uncertainty
2. Earth Democracy is based on living cultures.
3. Living cultures are life nourishing
4. Earth Democracy globalizes peace, care and compassion
5. All species, peoples, and cultures have intrinsic worth
6. The earth community is a democracy of all life
7. Diversity in nature and culture must be defended
8. All beings have a natural right to sustenance
9. Earth Democracy is based on living economies and economic democracy
10. Living economies are built on local economies.

Source: Shiva (2005:9–11)

Appendix 1:3 Stories of the "blindside" the "upside" of industrial education and of environmental education, within the current educational system

Local story: World Cup Soccer in Pinelands

On 27 June 2014, the students of Pinelands High School were offered the opportunity of wearing world cup soccer gear to school to celebrate the event. This offer carries with it implicit and uncritical support of the games. There was no attempt to present the other side of the story, neither the hardship wrought on the poor, nor the ecological footprint of the games.

An aside: *The City Reader* (Sello & Karuri-Sebina, 2014) is a book which presents written and pictorial information about the informal, in-between places in a city where the poor live out their lives. This edition covers Accra, Ghana; Nairobi, Kenya; Johannesburg, SA; Bangkok, Thailand; Lima, Peru and Manila, Philippines (Sello & Karuri-Sebina, 2014). In conclusion, William Cobbett writes:

> Globally, the biggest cause of badly managed slums is not rural-urban migration, nor people squatting on public land, nor poverty itself. The biggest factor is wrong-headed policy responses, and ill-informed, out-dated and clumsy administration, all underpinned by a hostile and aggressive attitude to urban and urbanising poor. Quite simply, bad policy creates most slums, and ensures that slums do not improve…Dump the failed policies. Offer land, services, helpful regulations and support. Only then will real solutions emerge. (Sello & Karuri-Sebina, 2014:261)

Is Pinelands High School not educating students to become these kind of mal-policy-makers and administrators? What if these students were taught to *really see* both sides of the game, to make the connections and develop empathy (Goleman et al., 2012)? The *City Reader* (Sello & Karuri-Sebina, 2014) would be an excellent resource to augment the social science or life orientation syllabus from Grade 8 onwards. The World Cup presents an opportunity for niche EE. What if the school had invited students to wear soccer gear on 27 June, and *also* put up a large board displaying some of the facts around the socio-ecological disruption caused by the games?

Perhaps students could have had an opportunity to respond though an informal debate or a graffiti board? Maybe the students' soccer-fever would have been tempered?

In reading this example, it must be noted that this is an isolated instance, and viewed overall, the school does an extraordinary amount to improve the socio-ecological view of the students and the campus.

International story: The World Bank

The World Bank, which deals with public international finance, distributes fifty billion dollars each year, and loses 30% to corruption (Rich, 2013). The institutional flaws and the attempts of reform by Bank presidents James Wolfesohn, Paul Wolfowitz and Jim Yong Kim are well documented. It appears that one of the reasons for the negative influence of the World Bank lies with the internal policies of the bank itself. Officials respond to the indicators that measure individual performance and influence earnings. Lending as much money as possible each year is rewarded, even if the loan is improperly secured and/or may have a negative impact. Rich (2013) argues that if the internal policies of the World Bank were amended to support the stated humanitarian and ecological benefits of the projects, far more good and less harm would have result.

There is a clear link between, the loans offered for projects in developing countries by the World Bank, and the enormous social and ecological damage wrought by such projects. A tragic African example is the Coharra Bassa Dam.

What if Grade 10s were required to read *The Confessions of an Economic Hitman* (Perkins, 2011) as one of the English set-works; and then discuss the book in history, life orientation, accounting or geography?

Perkins describes the role of “economic hit men” as:

> Economic hit men (EHMs) [as] highly paid professionals who cheat countries around the globe out of trillions of dollars. They funnel money from the World Bank, the U.S. Agency for International Development (USAID), and other foreign "aid" organizations into the coffers of huge corporations and the pockets of a few wealthy families who control the planet's natural resources. Their tools included fraudulent financial reports, rigged elections, payoffs, extortion, sex, and murder. They play a game as old as empire, but one that has taken on new and terrifying dimensions during this time of globalization.
>
> (Perkins, 2014).

Perhaps this approach would help the students to look beyond the dominant social paradigm, to question what they are most sure of, and to look for unintended consequences?

A local and an international story: oiling the already turning wheels

Richard Heinberg (Heinberg, 2013) in his book, *Snake Oil: How fracking’s false promise of plenty imperils our future*, explains and substantiates the multi-faceted relationship of the climate change-economics-energy complex. He lays bare the debate between the “Cornucopians” (oil and gas industry, bankers and official agencies, Energy Information Agency and the International Energy Agency) and the “Peakists” (independent or retired energy professionals). The book is well researched, easy to read and could be incorporated in the Grade 9 academic year. It could be linked to a number of compulsory subjects, such as the effect of the discovery of oil in Technology, a personal energy descent plan could be discussed in Life Orientation and the maths of energy-returned on energy –invested could be done in Accounting. Heinberg’s view is that the oil addiction must be broken, and that there is a narrow time window of 10–15 years in which to begin “This is literally humanity’s project of the century, probably the most important in all history” (Heinberg, 2013). The knowledge, skills and affective will required to attempt this project could (and should) be taught during compulsory education. The example provided is a start; and, it is clear from the example above, that this kind of teaching could be extended to incorporate other aspects of the poly-crises.

This presents an opportunity to South African schools as this kind of material could be incorporated into the new Curriculum Assessment Policy Statements system, rather than requiring a re-invention of the curriculum.

These stories are three of thousands that could be written to illustrate the point that, industrial education perpetuates the problem. However, these stories also show that opportunities lie within system for change – a view argued strongly by Greenwood (Greenwood, 2010)

Appendix 2:1 Types of literature review

This appendix juxtaposes two authors' categorisation of the literature review. The types of reviews have been matched on the basis of the in-depth explanations given by the authors.

Table 7: Juxtaposing authors' views of the literature review

Author:	Booth et al. (2012)	Petticrew & Roberts (2006)
Types of literature review	1. Critical review	1. Critical review
	2. Integrative review	
	3. Literature review	2. Traditional review
	4. Mapping review/systematic map	3. Systematic review
	5. Meta-analysis	
	6. Mixed studies review/mixed methods review	
	7. Overview	4. Conceptual review/ conceptual synthesis
	8. Qualitative systemic review/qualitative evidence synthesis	5. Conceptual review/ conceptual synthesis
	9. Rapid review	
	10. Scoping review	
	11. State-of-the-art review	6. State-of-the-art review
	12. Systematic search and review	

Source: Compiled from Booth et al. (2012) and Petticrew and Roberts (2006)

Appendix 2:2 Use of theory in the research design and methodology

Theorist	Theoretical contribution	Use in this thesis	Where?
1. Booth et al. (2012)	Provide theory on systematic literature reviews in the humanities.	Inspiration for the systematic literature review.	Design
2. Campbell Collaboration (2014)	Provide the theory and practice of systematic reviews.	Principles adopted and used as a yardstick.	
Theorist	**Theoretical contribution**	**Use in this thesis**	**Where?**
1. Machi & McEvoy (2012)	Propose a six step technique to write literature review.	Used an iterative approach of the six steps.	Methodology: building the review
2. Stellenbosch University Library and Information Service (SUL&IS, 2014)	Provide training in search strategies and librarian assistance.	Adopted the five methods to find, search and build the literature base (explained in section 2.2.2).	
3. Kelly (2009)	Promote the importance of reflective research.	Provided justification for including my own voice in the thesis and the use of the dialogue boxes.	

Theorist	Theoretical contribution	Use in this thesis	Where?
1. Booth et al. (2012)	Describe the research protocol.	Adopted protocol and modified same to fit the purpose of this thesis.	
2. Campbell Collaboration (2013)	Provide measurable factors that indicate whether or not a study meets the criteria of a C2 systematic review.	Used C2 criterion as a benchmark for this study.	Methodology: Intra-thesis interrogation or evaluation
3. Wallace & Poulsen (2004)	Provide insight into techniques for becoming a critical reader and a critical writer.	Adopted critical review pro forma and modified same to fit purpose of thesis. Utilised a number of definitions of key research tools and concepts.	

Appendix 2.3 What is a systematic review?

The following quote is extracted from Campbell Collaboration (2014).

> The purpose of a systematic review is to sum up the best available research on a specific question. This is done by synthesizing the results of several studies. A systematic review uses transparent procedures to find, evaluate and synthesize the results of relevant research. Procedures are explicitly defined in advance, in order to ensure that the exercise is transparent and can be replicated. This practice is also designed to minimize bias.
>
> Studies included in a review are screened for quality so that the findings of a large number of studies can be combined. Peer review is a key part of the process; qualified independent researchers control the author's methods and results.

A systematic review must have:

- Clear inclusion/ exclusion criteria
- An explicit search strategy
- Systematic coding and analysis of included studies
- Meta-analysis (where possible).

<u>How do Campbell systematic reviews differ from other systematic reviews?</u>

- Campbell reviews must include a systematic search for unpublished reports (to avoid publication bias).
- Campbell reviews are usually international in scope.
- A protocol (project plan) for the review is developed in advance and undergoes peer review.
- Study inclusion and coding decisions are accomplished by at least two reviewers who work independently and compare results.
- Campbell reviews undergo peer review and editorial review.

Appendix 2.4: Quality assurance of research protocol

Table 8: Quality assurance of research protocol

Components of protocol	Evidence of component found in thesis?	Where is the evidence located?	When[45] was the evidence added to the thesis?
Background	Yes	Section 1.1	31 March 2014
Review question	Yes	Section 1.2	31 March 2014; amended 4 August 2014
Search strategy (including search terms and resources to be searched)	Search terms derived for proposal; revised throughout research process based on pearl search method.	Section 1.2 Appendix 2.7 A-E	10 December 2012: proposal 4 August: first draft – last amendments
Study selection criteria and procedures	All relevant literature reviewed to avoid publication bias; no formal selection criteria established.	Quality of data demonstrated throughout the text; quality of references.	1 January – 30 September 2014
Study quality assessment checklist and procedures	Followed basic guidelines provided by library training (SUL&IS, 2014).	Quality of data demonstrated throughout the text; quality of references.	1 January–30 September 2014

[45] The researcher commits her/himself to a research plan before starting the research and not retrospectively.

Components of protocol	Evidence of component found in thesis?	Where is the evidence located?	When[46] was the evidence added to the thesis?
Study quality assessment checklist and procedures (continued from previous page)	Loose adoption of critical reading principles (Wallace & Poulson, 2004).		
Data extraction evidence	Yes	Drafts 1,2, 3	Draft submitted 4 August; 31 August; 30 September
Project timetable	Yes	Research proposal and contract with supervisor.	10 December 2012; Reviewed 12 Dec 2013

Source: This table has been adapted from Booth et al. (2012:58)

[46] The researcher commits her/himself to a research plan before starting the research and not retrospectively.

Appendix 2.5: Quality assurance of internal logic of thesis

Table 9: Internal logic of systematic literature review: words associated with a systematic literature review

Internal logic: Words associated with a systematic literature review					
Systematic	This thesis?	Either	This thesis?	Unsystematic	This thesis ??
explicit	yes	creative	yes	implicit	no
transparent	partial	comprehensive	yes	opaque	no
methodical	yes	imaginative	yes	whimsical	no
objective	partial	publishable	maybe	subjective	partial
standardised	no	stimulating	yes	variable	no
structured	yes	topical	yes	chaotic	no
reproducible	partial	Well-written	yes	idiosyncratic	partial

Source: Adapted from (Booth et al., 2012:18)

Appendix 2.6: Quality assurance of external logic of thesis

All of the following tables have been adapted from Booth et al. (2012:31) and Campbell Collaboration (2014).

Table 10: External logic: Adjudication of thesis against recognised industry standards

Booth et al. (2012)	Performance of thesis	Campbell Collaboration (2014)	Performance of thesis
A priori specification of planned review methods or protocol	partial	An explicit search strategy	partial
A clearly focused question	yes	Systematic coding and analysis of included studies	no
Clear explicit criteria for inclusion and exclusion	no	Meta-analysis (where possible)	partial
Documentation of search process: sources and strategies	partial – majority recorded	Reviews must include a systematic search for unpublished reports (to avoid publication bias	yes
Use of tables and boxes to make methods explicit	yes	Reviews are usually international in scope.	yes

Booth et al. (2012)	Performance of thesis	Campbell Collaboration (2014)	Performance of thesis
Use of tables to summarise study characteristics	yes	A peer-reviewed protocol for the review developed in advance	Partial plan developed; no peer review
An explicit mechanism to handle quality assessment	yes	At least two reviewers, working independently and comparing results, make inclusion and coding decisions	no – beyond scope of MPhil
Use of tables and graphics to support data interpretation	yes	Campbell reviews undergo peer review and editorial review	no – beyond scope of MPhil
Appendices including search strategies, sample data extraction and quality assessment tools	yes		
Explicit declarations of interest	yes		

Appendix 2.7A: Search record I Education for sustainability

DATE	DATABASE	REFINEMENTS	DATE OF PUB	SEARCH WORDS	HITS	COMMENTS
19/5/14	chrome	none	none	Rocklands High School AND Mr Irfaan Abrahams		➢ Wiki on Mitchell's Plein ➢ Lead SA on Mr Irfaan Abrahams ➢ Centre for Popular Memory UCT Difficult to locate info on the school. Ph. (021) 392 71 39
30/5/14	sunsearch	none authors	any	Instituto Paulo Freire Godatti	1433 5	found related authors

30/5/14	chrome	none	any	Instituto Paulo Freire	many	work requires translation Northern uni using this data
3/6/14	SU – Google Scholar	none	2008-2010	Horton & Kraftl (2012) *Involving students in school design*	7670	no access to article through SU
DATE	DATABASE	REFINEMENTS	DATE OF PUB	SEARCH WORDS	HITS	COMMENTS
3/6/14	sunsearch → ejournal	none	any	Co-design: International Journal of Co-creation in design and the arts		nothing
3/6/14	google	none	any	SEKEM	71300	Found home site easily
4/6/14	google	none	any	The Zoo School	4 mil	
4/6/14	google	none	any	TED Talks Zoo School	22 mil	
4/6/14	google	none	any	The Zoo School in Minnesota		Wikipedia useful start
4/6/14	google	none	any	School of Environmental Studies	210T	Found home site

4/6/14	google	none	any	A Rocha international	124h	Found international site
4/6/14	google	none	any	A Rocha meaning → Five Loaves Farm → Living Lightly Campaign	51 m - 67 m	Wiki useful extension of A Rocha extension of A Rocha
10/6/14	sunsearch → books and other	none → physical copies only → physical copies only	any any 2010-2014	Education for sustainability	191 78 23	Encyclopedia of Sustainability Revisit; view electronic books
10/6/14	sunscholar	none	any	Education for sustainability	7	useful – revisit; put hold on some books
DATE	DATABASE	REFINEMENTS	DATE OF PUB	SEARCH WORDS	HITS	COMMENTS
10/6/14	Sabinet Reference	create alert		Charlotte Mason		

10/6/14	Sabinet Reference	create alert		Maria Montessori Erdkinder		
10/6/14	Sabinet → first search → ERIC	none	any	Charlotte Mason AND education	9	
10/6/14	Sabinet → SACat	none	any	Charlotte Mason AND education	61	excellent
10/6/14	Sabinet → SACat	none	2010-2014	Charlotte Mason AND education	14	Excellent - revisit
10/6/14	sunsearch	articles only → peer reviewed → peer reviewed	any 2012-2014	ecoliteracy	203 129 49	

27/6/14	google	none	any	Planetwise by Bookless		
30/6/14	google	none	any	Healdtown		
6/7/14	sunsearch	books and other	1998	Johan Cilliers AND complexity	1	
6/7/14	sunsearch	books and other	2013	systems thinking AND education	8	positive
7/7/14	google	none	any	Generation Green germany	14m	
DATE	DATABASE	REFINEMENTS	DATE OF PUB	SEARCH WORDS	HIT	COMMENTS
7/7/14	sunsearch	none	any	Charlotte Mason	218	
7/7/14	sunsearch	articles	any	systems thinking AND complexity	557	
7/7/14	sunsearch	articles	any	systems thinking AND complexity AND environmental education	13	Amazing!!
7/7/14	google	none	any	Janice Birkeland	25 600	

Appendix 2.7B: Search record I Design and methodology

DATE	DATABASE	REFINEMENTS	DATE OF PUB	SEARCH WORDS	HITS	COMMENTS
17/1/14	sunsearch	title: “exact”	2012-2014	literature review “literature review methodology”	6625 6	too broad irrelevant
20/2/14	sunsearch	books and other	2006	Petticrew and Roberts		book located
21/2/14	sunsearch	books and other	any	systematic literature review	24	great search, took 5 readings
21/2/14	sunsearch	books and other	any	grey literature	63624	took 1 reading, need more time
21/2/14	sunsearch	books and other	any	reflexive researcher	28	
17/4/14	sunsearch	none	2012-2014	academic writing	138	1 useful
17/4/14	sunsearch	strategy builder	2012-2014	?	89942	terms too broad
17/4/14	sunsearch - e-databases	Sage Research	n/a	n/a	n/a	VERY useful site,

		Methods Online → little green books → literature review	n/a	n/a	n/a	easy to navigate refers to quantitative social research context important

Appendix 2.7C: Search record I Research context

DATE	DATABASE	REFINEMENTS	DATE OF PUB	SEARCH WORDS	HITS	COMMENTS
15/5/14	sunsearch	advanced search	2012-2014	industrial education AND high schools AND South Africa	2 500	Still to be mined Chose 1 article from the Economist
15/5/14	ERIC			John Holt		
3/6/14	google	none	any	UN Convention on the Rights of the Child	15 mil	
3/6/14	google	none	any	United Nations	585 mil	difficult to find conventions
8/7/14	google	none	any	Promethean		not useful
8/7	sunsearch	none	any	Promethean	507	
8/7	sunsearch	e-reference → general	any	Promethean		??

		encyclopaedia →Encyclopaedia Britannica → Gale Virtual				

Appendix 2.7D: Search record I Adaptive leadership

DATE	DATABASE	REFINEMENTS	DATE OF PUB	SEARCH WORDS	HITS	COMMENTS
19/9/13	Web of Science	none	2008-2014	Charlotte Mason	5	
19/9/13	Web of Science	none	any	Erdkinder Erdkinder AND Maria Montessori	0 2	 useful
19/614	sunsearch	books and articles	any	“born persons” AND Charlotte Mason	4	
19/6/14	sunsearch	books and articles	any	Maria Montesorri	1142	
19/6/14	google	_	any	Charlotte Mason Approach	570th	
26/6/14	SACAT	_	any	Charlotte Mason	166	great books available
26/6/14	SACAT	_	any	Charlotte Mason AND adolescents	1	

26/6/14	SACAT	_	any	Maria Montessori	280	
26/6/14	SACAT	_	any	Maria Montessori AND erdkinder	4	one great book
26/6/14	sunsearch	books and articles	any	Maria Montessori	0	??

Appendix 2.7E: Search record I Previous academic research and thesis

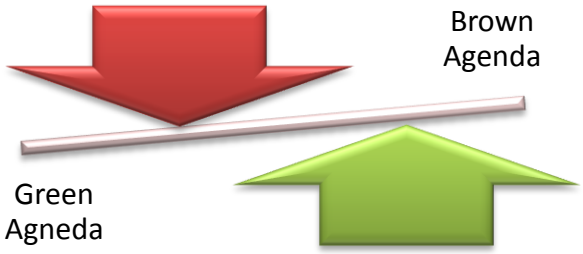
DATE	DATABASE	REFINEMENTS	DATE OF PUB	SEARCH WORDS	HITS	COMMENTS
7/7/2014	sunsearch	e-thesis	any	Education	4928	
7/7/2014	sunsearch	e-thesis	any	Education for Sustainability	9264	
7/7/2014	sunsearch	e-thesis	any	Education for Sustainability AND teenagers AND high schools	13	
7/7/2014	sunsearch	e-thesis	any	Education for Sustainability AND teenagers AND high schools AND environment	0	
7/7/2014	sunsearch	e-thesis	any	Education for Sustainability AND teenagers AND environment	1	saved pdf
7/7/2014	sunsearch	e-thesis	any	Education for Sustainability AND environment	43	worthwhile, return to this site

Appendix 3.1(a): Characteristics of the olive-green agenda

1. As a colour it helps us integrate the brown and green agendas.
2. As a texture it draws us to our earthly context.
3. The olive points us to issues of food sovereignty.
4. The olive branch is a symbol of peace.
5. The olive draws us into a plurality of cultures and religions.
6. As a tree, the olive is pointer to life itself.
7. The olive tree holds before us inter-generational sustainability.
8. The olive is rooted in popular struggles.
9. Olive oil contributes to health.
10. The olive as a Biblical symbol.

Source: de Gruchy (2007:7-13)

Appendix 3.1(b): Measuring the green and brown agendas



Issue	Measurement
ECONOMIC	
Wealth	✓ GDP ✓ GDP income per capita ✓ Household income ✓ Gross value added
Sectoral Importance	✓ Employment per sector
Employment Trends	✓ Unemployment
	✓ Labour Force Participation
SOCIAL	
Crime	✓ Homicide rates per capita
Education	✓ Literacy rates ✓ Proportion with university education
Development	✓ Human Development Index
Inequality	✓ Gini Index
SPATIAL	
Transport	✓ modal splits ✓ car ownership ✓ commuting times
Housing	✓ detached housing ✓ age of housing stock
ENVIRONMENT	
Emissions	CO^2 and GHG
Ecological Footprint	Global hectares
Usage	Water consumption/energy/electricity use
Pollution	Parts per million

Source: Adapted from UNEP (2008:9)

Appendix 3.2: Perspectives and schools of thought of environmental ethics

PARADIGM	SCHOOLS
Human/Anthropocentric Instrumental value: indirect duties towards nature; only valuable ito goods and services offered	✓ ruthless developer ✓ conservation ✓ preservation ✓ extensionism
Nature/Ecocentric Intrinsic value: direct duty; nature valued for itself	✓ biocentric ✓ ecocentric ✓ ecosphere
Radical Transformational agenda: need to re-think root cause; systemic change required	✓ bioregionalism ✓ social ecology ✓ eco-feminism ✓ deep ecology

Source: Synthesised from Hattingh (in Murray, 2012b)

Appendix 3.3: Tbilisi Declaration (1977)

The world's first intergovernmental conference on environmental education was organized by the United Nations Education, Scientific, and Cultural Organization (UNESCO) in cooperation with the U.N. Environment Programme (UNEP) and was convened in Tbilisi, Georgia (USSR) from October 14-26, 1977.

Delegates from 66 member states and observers from two non-member states participated. Representatives and observers from eight U.N. agencies and programs also participated. Three other intergovernmental organizations and 20 international non-governmental organizations also were represented. In all, 265 delegates and 65 representatives and observers took part in the conference.

The Tbilisi Declaration was adopted by acclamation at the close of the intergovernmental conference. The declaration noted the unanimous accord in the important role of environmental education in the preservation and improvement of the world's environment, as well as in the sound and balanced development of the world's communities.

The Role, Objectives, and Characteristics of Environmental Education

The Tbilisi Declaration together with two of the recommendations of the Conference constitutes the framework, principles, and guidelines for environmental education at all levels—local, national, regional, and international—and for all age groups both inside and outside the formal school system.

I. The Conference *recommends* the adoption of certain criteria which will help to guide efforts to develop environmental education at the national, regional, and global levels:

1. Whereas it is a fact that biological and physical features constitute the natural basis of the human environment, its ethical, social, cultural, and economic dimensions also play their part in determining/he lines of approach and the

instruments whereby people may understand and may better use of natural resources in satisfying their needs.

2. Environmental education is the result of the reorientation and dovetailing of different disciplines and educational experiences which facilitate an integrated perception of the problems of the environment, enabling more rational actions capable of meeting social needs to be taken.

3. A basic aim of environmental education is to succeed in making individuals and communities understand the complex nature of the natural and the built environments resulting from the interaction of their biological, physical, social, economic, and cultural aspects, and acquire the knowledge, values, attitudes, and practical skills to participate in a responsible and effective way in anticipating and solving environmental problems, and in the management of the quality of the environment.

4. A further basic aim of environmental education is clearly to show the economic, political, and ecological interdependence of the modern world, in which decisions and actions by different countries can have international repercussions. Environmental education should, in this regard, help to develop a sense of responsibility and solidarity among countries and regions as the foundation for a new international order which will guarantee the conservation and improvement of the environment.

5. Special attention should be paid to understanding the complex relations between socio-economic development and the improvement of the environment.

6. For this purpose, environmental education should provide the necessary knowledge for interpretation of the complex phenomena that shape the environment, encourage those ethical, economic, and aesthetic values which, constituting the basis of self-discipline, will further the development of conduct compatible with the preservation and improvement of the environment. It should also provide a wide range of practical skills required in the devising and application of effective solutions to environmental problems.

7. To carry out these tasks, environmental education should bring about a closer link between educational processes and real life, building its activities around the environmental problems that are faced by particular communities and focusing analysis on these by means of an interdisciplinary, comprehensive approach which will permit a proper understanding of environmental problems.

8. Environmental education should cater to all ages and socio-professional groups in the population. It should be addressed to (a) the general non specialist public of young people and adults whose daily conduct has a decisive influence on the preservation and improvement of the environment; (b) to particular social groups whose professional activities affect the quality of the environment; and © to scientists and technicians whose specialized research and work will lay the foundations of knowledge on which education, training, and efficient management of the environment should be based.

9. To achieve the effective development of environmental education, full advantage must be taken of all public and private facilities available to society for the education of the population: the formal education system, different forms of non-formal education, and the mass media.

10. To make an effective contribution towards improving the environment, educational action must be linked with legislation, policies, measures of control, and the decisions that governments may adopt in relation to the human environment.

II. The Conference *endorses* the following goals, objectives, and guiding principles for environmental education:

The *goals* of environmental education are:

1. to foster clear awareness of, and concern about, economic, social, political, and ecological interdependence in urban and rural areas;

2. to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment, and skills needed to protect and improve the environment;

3. to create new patterns of behaviour of individuals, groups, and society as a whole towards the environment.

The categories of environmental education *objectives* are:

Awareness—to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems.

Knowledge—to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems.

Attitudes—to help social groups and individuals acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection.

Skills—to help social groups and individuals acquire the skills for identifying and solving environmental problems.

Participation—to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems.

Guiding principles—environmental education should

1. consider the environment in its totality—natural and built, technological and social (economic, political, cultural-historical, ethical, esthetic);
2. be a continuous lifelong process, beginning at the preschool level and continuing through all formal and nonformal stages;
3. be interdisciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective;
4. examine major environmental issues from local, national, regional, and international points of view so that students receive insights into environmental conditions in other geographical areas;

5. focus on current and potential environmental situations while taking into account the historical perspective;
6. promote the value and necessity of local, national, and international cooperation in the prevention and solution of environmental problems;
7. explicitly consider environmental aspects in plans for development and growth;
8. enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences;
9. relate environmental sensitivity, knowledge, problem-solving skills, and values clarification to every age, but with special emphasis on environmental sensitivity to the learner's own community in early years;
10. help learners discover the symptoms and real causes of environmental problems;
11. emphasize the complexity of environmental problems and thus the need to develop critical thinking and problem-solving skills;
12. utilize diverse learning environments and a broad array of educational approaches to teaching, learning about and from the environment with due stress on practical activities and first-hand experience.

Source: UNEP & UNESCO (1977)

Appendix 4.1: School of Environmental Studies Program Minnesota Zoo, Apple Valley, Minnesota

This optional high school is the result of a unique partnership developed between ISD 196, the Minnesota Zoological Gardens and the City of Apple Valley with support from Dakota County and the State of Minnesota. The building represents the first of several thematic two-year high schools planned for the district. With a focus on mentorship/internship programs developed through the Zoo and the community, the building incorporates environmental products, energy efficient systems and with the surrounding site serves as both an interpretive center and living laboratory for students and visitors alike. Overlooking Birch Pond to the southeast, the school's communal spaces are grouped to form the heart of the school. A multi-use commons and forum space functions as student commons, gallery, cafeteria, conference center, auditorium and showplace. A somewhat separate IMC acts as central resource for all functions with a focus on technology. Four houses overlook these central spaces sharing views out to Birch Pond and northwest to the woods and prairie beyond. Each house supports 20 five-student workstations grouped around a central lecture/resource space designed to house two large group learning settings. A science lab, teacher planning room, convertible conference room and classroom round out each house.

While athletic and music education are offered off-site, unique specialization opportunities in the school are a botany/zoology laboratory, art/construction studio, multi-media and video studio and outdoor roof terrace and plaza workshops.

Source: Designshare (2014)

Appendix 5.1: Individual capabilities for youth

The Centre for Ecoliteracy has identified a set of 15 core competencies that young people need to develop for living in sustainable communities, these are the ability to:

Head (Cognitive)

- Approach issues and situations from a systems perspective
- Understand fundamental ecological principles
- Think critically, solve problems creatively, and apply knowledge to new situations
- Assess the impacts and ethical effects of human technologies and actions
- Envision the long-term consequences of decisions.

Heart (Emotional)

- Feel concern, empathy, and respect for other people and living things.
- See from and appreciate multiple perspectives; work with and value others with different backgrounds, motivations, and intentions.
- Commit to equity, justice, inclusivity, and respect for all people.

Hands (Active)

- Create and use tools, objects, and procedures required by sustainable communities.
- Turn convictions into practical and effective action, and apply ecological knowledge to the practice of ecological design.
- Assess and adjust uses of energy and resources.

Spirit (Connectional)

- Experience wonder and awe toward nature
- Revere the Earth and all living things
- Feel a strong bond with and deep appreciation of place
- Feel kinship with the natural world and invoke that feeling in others.

Source: CFE (2014c)

Appendix 5.2: Frequently incorporated practices at schools teaching environmental education

- They connect children with the natural world through programs and projects outside the classroom, such as school gardens, habitat restoration, and communicating their experience in nature through painting and poetry.
- They practice place-based education that teaches students about the people, history, culture, and natural features of their local community and region.
- They practice environmental project-based learning, involving students in local projects that are meaningful and make real contributions to their communities.
- They integrate in-class learning with hands-on experiences and with all of the activities (including, e.g., lunch) of the school.
- They address whole children, recognizing that children's ability to learn is affected by their health and well-being, and that these are in turn affected by such factors as nutrition, exercise, and the health of the natural environment.
- They employ the best current understandings of how brains and minds develop and how children learn. They attend to children in all their dimensions, including cognitive, emotional, and aesthetic.

Source: CFE (2014d).