ABSTRACT

This thesis is about the knowledge and beliefs of primary school teachers. The study is aimed at assessing the scope and range of Queensland primary school teachers' knowledge and beliefs about environmental education. More specifically, the thesis addresses a perceived gap within environmental education research and literature which, to date, fails to provide an elaborate account of Australian primary school teachers' knowledge about and beliefs towards environmental education.

In Chapter One, the Background to the Study and Review of Literature, I present an overview of the various international environmental education policy developments and initiatives, and reveal that there are established goals, objectives and principles for environmental education. In Australia, environmental education policies have been developed, although state departments have been slow to incorporate environmental education into key curriculum documents. Environmental education is predominately incorporated into and practised through existing curriculum areas; principally the ‘Studies of Society and the Environment’ (SOSE) key learning area. The implications of concentrating environmental education into specific curriculum domains are yet to be fully explored.

There are a variety of disparate views about the proper role of environmental education. In Australia, the dominant approaches are: education about the environment, education in (or through) the environment and education for the environment. For the past two decades education for the environment has been identified by particular proponents in the field as the preferred approach for environmental education. Notwithstanding, there is a growing number of researchers who argue that education for the environment is theoretically and conceptually flawed. Four issues have been identified as the basis of these criticisms. These are: its indoctrination and anthropocentric tendencies; its definitive usage of the concept sustainable development; its inappropriate use of social-critical theory; and the lack of empirical research concerning the implementation of education for the environment in schools. To this end, I argue that the field of environmental education is characterized by theoretical assumptions, flaws and contradictions and a dearth of empirical research.

To this extent, little is known about the extent to which environmental education has been incorporated into school systems, particularly in primary schools. Despite the various policy advancements in environmental education, the evaluation studies that have been conducted indicate that policy expectations are rarely met. There are many barriers which impede the implementation of environmental education, namely: time and resource constraints for teachers; lack of teacher knowledge and skills; lack of knowledge of departmental regulations regarding environmental education; and differences and gaps between the theories (with respect to environmental education) held by policy makers, curriculum developers and educational researchers and the theories held by practitioners. In this way, environmental education research has tended to conclude that the provision of further or restructured teacher education is the ‘priority of priorities’ for environmental education. However, such propositions tend to be based on both a lack of empirical evidence and a flawed theoretical presumption that environmental education and the structure, politics and organisation of school systems are unproblematic.

The identified theoretical and empirical ‘gaps’ formulated the impetus and justification of this study. In so doing, Chapter Two presents a theoretical framework for the thesis problem set out
in Chapter One. This framework is utilised later in the thesis for the interpretation, analysis and synthesis of data reported in Chapter Four. The theoretical framework establishes links between the major concepts of teachers' knowledge, teachers' beliefs and environmental education. As such, complex pedagogical content knowledge underpins the conceptual framework of this thesis, which is positioned within a theoretical model based upon eco-literacy and adaptive management. Eco-literacy comprises complex pedagogical knowledge centred on ecological, sociological and educational concepts. Adaptive management, in addition, shows what happens with individual learners and the capacities of teachers with the practical interest of conceptualising how an ecologically literate population might be developed through participation in an education system.

Chapter Three outlines the combined-methods approach utilised to investigate primary school teachers' knowledge and beliefs (eco-literacy) about environmental education. To this extent, the methodological approach consisted of two stages. For stage one, a total of twenty-six primary school teachers volunteered and participated in one intensive ethnographic interview. So as to elucidate the findings discovered in the stage one phase of data collection, a quantitative survey (stage two) was administered in five Education Queensland state primary school districts.

In Chapter Four I present and analyse the data collected in 'Stage One' and 'Stage Two' of this study. The data are presented in four sections, namely: Teachers' Preparedness; Teachers' Knowledge; Teachers' Beliefs; and Correlating Teachers' Preparedness, Knowledge & Beliefs – A Path Analysis. In short, the data revealed that the participants: had received no or very little in-service and/or pre-service training in environmental education; possessed misconceptions and simple understandings of environmental education and environmental concepts; either did not practise environmental education or practised it incidentally through curriculum areas such as Studies of Society and Environment; did not consider it a priority in their teaching or in schooling generally; perceived time constraints, over-crowded curriculum, constant change and ongoing professional demands as the major barriers preventing and/or limiting the implementation of environmental education; revealed a general concern for the environment, although various views about the environmental crisis were apparent (between stage one and stage two); and displayed a range of environmental philosophies, with participants agreeing most with the 'Ecocentric Eco-socialist' and 'Ecocentric Gaia' perspectives. Essentially, the participants' knowledge, beliefs and amount of in-service training significantly influenced their priority for and level of intention to implement environmental education in the primary school classroom. Significant trends are also reported between male and female teachers of different age-groups.

In Chapter Five I synthesis the data, presented in Chapter Four, in relation to the theoretical framework and overall research problem. Based upon the data presented, I contend that current primary school teachers are likely to be functioning at a level of eco-illiteracy and/or nominal eco-literacy. I conclude that the introduction of eco-literacy in educational policy and the espousal of adaptive management strategies may advance the goals of environmental education, although such initiatives are unlikely to significantly change the current 'status' of environmental education unless there is a system-wide commitment to environmental education and knowledge management on the part of governments, education departments, pre-service and in-service teacher education providers, schools and teachers themselves.
Eco-Literacy: 
The "Missing Paradigm" in Environmental Education

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School of Education and Innovation

November 2003
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Always for Chris...
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DECLARATION

To the best of my knowledge and belief, the work presented in this thesis is completely original, except where acknowledged in the text. This material has not been submitted, in whole or in part, for a degree at this or any other university.

Amy Cutter-Mackenzie
PUBLICATIONS

The following publications have been generated from this thesis:

2003 –


2002 –


2001 –


1 Refereed and peer-reviewed publications appear in Appendix Twenty-Four.


Our reflective intellects inhabit a global field of information, pondering the latest scenario for the origin of the universe as we absently fork food into our mouths, composing presentations for the next board meeting while we sip our coffee or cappuccino, clicking on the computer and slipping into cyberspace in order to network with other bodiless minds, exchanging information about gene sequences and military coups, "conferencing" to solve global environmental problems while oblivious to the moon rising above the rooftops.

Our nervous system synapsed to the terminal; we do not notice that the chorus of the frogs by the nearby stream has dwindled, this year, to a solitary voice, and that the song sparrows no longer return to the trees ...


Introduction

This thesis is about the knowledge and beliefs of primary school teachers. The study is aimed at assessing the scope and range of Queensland primary school teachers' knowledge and beliefs about environmental education. More specifically, the thesis addresses a perceived gap within environmental education research and literature which, to date, fails to provide an elaborate account of Australian primary school teachers' knowledge about and beliefs towards environmental education.

In the remainder of this Chapter, I discuss the condition of the field and set out the background to the study, identifying reasons for undertaking the work. Thereafter, I review the relevant environmental education literature and research. The review positions the research question in context and clearly outlines the main concepts that form the discourse for the thesis. I conclude the Chapter by refining the research problem and presenting the associated research objectives, before outlining the structure of the thesis as a whole.
Positioning the Field

The international meetings inspired by the UNESCO (1976; 1977a; 1977b; 1997; 2002; 1976; 1978; 1988; 1989; 1990; 1992; 1993; 1995; 1996; 1997) and United Nations (1992; 2002a; 2002b; 2002c; December 2002), in addition to the writings of the 1970s, heralded a period of rapid growth in the field of environmental education. The field was exploited so that rapid colonisation of disturbed areas provided opportunities for the motivated and persuasive. This period was followed by the colonisation and producer-capture of the field by a few figures seeking academic reputations and monopoly over the field rather than effective practices in school systems (see Bourdieu & Coleman, 1991). There has been a slow accumulation and storage of energy and material in the debates about sub-fields and particular academic, curriculum and policy development interests. This period of conservation was followed by the increasing critical tenor of published contributions to the environmental education field and the subsequent collapse of the field once the realisation that the prescriptions of the experts for schooling had failed and schools in turn had not fulfilled the promises of the policy rhetoric. The creative destruction of a field suddenly releases the accumulation of intellectual biomass and nutrients stored in the 'normal science' of the environmental education literature. In these circumstances, the boundaries and internal connections of the field are tenuous as its exponents seek new conceptual maps and there are contests between paradigms. Like an environmental system, re-organisation follows as the field is re-thought and reformulated. Reorganisation can involve the transient appearance of fads (curriculum packages) or as I interpret the works of Sustainable Futures (2001), the expansion of more substantial intellectual work that begins to capture new but unpredictable opportunities. Figure 1.1 shows this process in diagrammatic form.
This model derived from the comparative study of ecosystems (see Holling, 1986) and is a metaphorical tool for thought rather than a faithful representation of a scientific process. It shows how an intellectual domain bodes and reorganises, as well as growing and conserving. Thinking about the emergence of new models of environmental education in this way suggests that a system can easily adapt or be reorganised by small inputs. Factors such as the growth of previously suppressed ideas, germinating theories stored in the environmental field, the migration of concepts, theories and practices from other disciplines or cultures, invasion by exotic concepts or practices and chance events, enable a system to morph into a new type of organisation of knowledge and practice (Sustainable Futures, 2001). This suggests that environmental education has the potential to replicate its past or it may become something entirely new.

Paraphrasing Holling (1986, cited in Sustainable Futures, 2001, pg.2), the slow sequence from exploitation (early works) to conservation (dominant practices), connectedness (bridging works) and stability increase and a capital of nutrients and biomass (new ideas and concepts) is slowly accumulated and sequestered. Such processes lead to “a few species becoming dominant, with diversity retained in residual
pockets preserved in a patchy landscape" (Sustainable Futures, 2001, pg.2). While “accumulated capital is sequestered for the growing, maturing ecosystem, but it also represents a gradual increase in the potential for other kinds of ecosystems and futures” (Sustainable Futures, 2001, pg.2). For an environmental education system or field, the accumulating potential lies in the literature, the skills, the scholarly and professional networks of academics, teachers, curriculum developers and educational administrators, and the state of the protagonists in the field as it moves from conservation to growth. This capital is a potential developed and used in the field as it is known today, and is available in transformed fields that one might imagine or towards which one strives. The movement in the field can be summarised as three separate points.

One, the system has been dominated by both a relatively high capital input and stable conditions represented by the top right quadrant of Figure 1.1. This capital derives from and is nurtured by an intellectual field intent on discussion of a limited range of concepts and futures and a quiescent schooling sector that has ‘taken’ rather than developing its own environmental education agendas. Both the intellectual field and the domain of schooling are in turn dominated by the technocentric world view. This incorporation includes even the ‘left’ and radical elements of the environmental movement and environmental education because both rely on the capitalist state and its infrastructure as conditions of existence.

Two, the connectedness of the system and the depth of its capital nevertheless generate tides of change that have inexorably pushed the environmental education field towards release and reorganisation. There are critical voices in the field that point to different futures to those that dominate the field. Moreover, the march of history alters the meaning of core symbols in the environmental education field so that sustainability for
example takes on new urgency and deeper practical relevance when juxtaposed with border protection issues, the September 11 aftermath and the public realisation that environmental ‘problems’ affect life-style and cost of living.

Three, posed in these terms, teachers’ knowledge and beliefs are effects of both capital and connectedness. Again, they are consequences of both popular culture glossed as generational cultural experience and the symbolic meanings given to curriculum models, what and how things are taught in teacher education and school systems. To reiterate, the environmental education field, hypothesised as being at the top right quadrant of Figure 1.1 at the time of writing, is bound to generate or perpetuate dominant practices. However, if this proposition proves correct, just as the field contains dissident voices, there will be evidence of movement towards release in teachers’ knowledge and beliefs about the environment and environmental education. This thesis is an attempt to intervene in the process. I now commence this process and turn to the background of the study.

Background to the Study

Introduction

In this section I briefly discuss reasons for undertaking the work. I initially outline a justification for environmental education and thereafter set out the significance of the study. The justification for and significance of this study is three-fold.

One, over the past four decades there has been a growing understanding that the continued economic, environmental, social and technological developments instigated...
by human beings have changed the biosphere. There are substantial concerns among some scientific experts that the limits of the earth's capacity to provide for human existence are within sight (see Meadows, Meadows, Randers, & Behrens, 1972; Merchant, 1992; Starke, 1998; Suzuki, 1993; Suzuki & Dressel, 1999; Suzuki & McConnell, 1997; World Commission On the Environment Development, 1987). These concerns have led many researchers, including the above-mentioned pundits, to re-examine prevailing cultural norms about the nature of the earth as an infinite resource for human exploitation, and promoted moves to more sustainable patterns of development.

Two, environmental education has been identified at the international policy level, specifically by the 'United Nations Educational, Scientific and Cultural Organisation' (UNESCO) and the 'United Nations Environment Programme' (UNEP), as an important change agent for sustainable development. The focus upon environmental education has resulted in efforts being made over the past three decades, once again initiated by UNESCO and UNEP, to incorporate environmental education into international, national and state education policy and curriculum documents. In the case of Australia, efforts have been made to incorporate environmental education into state curriculum and policy documents, although education departments have been slow to take-up environmental education and, consequently, implement it into school systems. Quite critical for this thesis, in Queensland, environmental education is predominantly incorporated into the recently developed 'Studies of Society and Environment' (SaSE) syllabus (Queensland School Curriculum Council, 2000a) and associated policy documents.
At the policy and theoretical level, three approaches to environmental education have been developed and subsequently dominated the field, namely education about the environment, education in the environment and education for the environment. For the past two decades education for the environment has been identified by particular proponents (Fien, 1988, 1992, 1993a, 1997, 2000; Fien & Trainer, 1993b; Huckle, 1991) in the field as the preferred approach for environmental education. In recent times, this approach has been the centre of much debate, leading to the conclusion that environmental education approaches and theories are dated and inappropriate for preparing students for a sustainable future. This is coupled with scant evidence of the successful implementation of 'education for the environment', nor any other forms of environmental education, in primary school systems. Thus, little is known about the success of dominant and subsidiary environmental education approaches in the teaching and learning of environmental education. This is particularly the case with respect to primary schools.

Three, there is a dearth of empirical research about teachers' knowledge and beliefs about environmental education in primary schools. In particular, no Australian studies to date have investigated primary school teachers' knowledge about environmental education and/or environmental issues. As such, little is known about what primary school teachers know or believe about the environment or environmental education. There are then theoretical and empirical 'gaps' in environmental education research that require further investigation. In order to further elaborate this agenda, I now substantiate the above claims by briefly reviewing the arguments.

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It is important to verify that there is no more known about the teaching and learning of environmental education in primary schools than secondary or tertiary education. However, this thesis only focuses upon primary school level environmental education.
A Justification for Environmental Education

In 1992 the Union of Concerned Scientists, representing more than sixteen hundred senior members of the scientific community, including 102 Nobel Prize recipients, warned that:

Human beings and the natural world are on a collision course. Human activities inflict harsh and often irreversible damage on the environment and on critical resources. If not checked, many of our current practices put at serious risk the future that we wish for human society and the plant and animal kingdoms, and may so alter the living world that it will be unable to sustain life in the manner that we know. We the undersigned, senior members of the world's scientific community, hereby warn all humanity of what lies ahead. A great change in our stewardship of the earth and the life on it is required, if vast human misery is to be avoided and our global home on this planet is not to be irretrievably mutilated (cited in Suzuki, 1993, pg.4)

These concerns reflect an abundance of research indicating that human activities are presently contributing to severe and potentially irreversible changes to the biosphere. Among the environmental issues giving rise to these concerns are:

- climatic changes and altered weather patterns (see Agarwal & Narain, 1992; International Union for the Conservation of Nature., 1980; Middleton, O'Keefe, & Moyo, 1993; Pickering & Owen, 1994; World Commission On the Environment Development, 1990; Wright, 1993);
• depletion of the ozone layer (see Milbraith, 1989; Orr, 1992; Suzuki & McConnell, 1997; Washington, 1991; World Commission On the Environment Development, 1987; Wright, 1993);
• depletion of forests (see Beale & Fray, 1990; Meadows et al., 1972; Orr, 1992; Pickering & Owen, 1994; Starke, 1998; UNEP, 1983; World Commission On the Environment Development, 1987; Wright, 1993);
• loss of species habitat and loss of biodiversity (see Beale & Fray, 1990; Carson, 1965; Ehrlich & Ehrlich, 1991; Middleton et al., 1993; Starke, 1998; Suzuki, 1993; Suzuki & Dressel, 1999; Suzuki & McConnell, 1997; UNEP, 1983; World Commission On the Environment Development, 1990; Wright, 1993); and

Complementing the body of scientific research identifying environmental changes, there is a growing body of literature that identifies the present pattern of technological, economic, environmental and social developments by human beings as the primary cause of what some coin an ‘environmental crisis’ (see Carson, 1965; Durning, 1992; Ehrlich, 1986; Evernden, 1989; Gore, 1992; Hillcoat, 1999; Milbraith, 1989; Orr, 1992;
Schumacher, 1973; Suzuki & Dressel, 1999; Weston, 1994, 1999). There are predictions that the current pattern of development is causing critical, irreversible changes to the biosphere, in turn jeopardising the earth’s capacity to sustain human life as presently known. As such, a view has been put forth which asserts that the human race is not only witnessing, but giving rise to an environmental crisis (see Carson, 1965; Durning, 1992; Ehrlich, 1986; Evernden, 1989; Gore, 1992; Hillcoat, 1999; Milbraith, 1989; Orr, 1992; Schumacher, 1973; Suzuki & Dressel, 1999; Weston, 1994, 1999).

Fien reported in 1995 (pg.1) that “public concern for the environment is at unprecedented levels throughout the world” and endorsed that:

> What is needed is a fundamental transformation of peoples’ attitudes and practices... Only a new world view and morality can change the basic relation of people to the earth. Peoples’ behaviour is a matter of choice based upon values ... The need for a world ethic of sustainability – an ethic that helps people cooperate with one another and nature for the survival and well-being of all individuals and the biosphere – could not be greater (IUCN, UNEP & WWF, 1990, cited in Fien, 1993a, pg.4-5).

However, in recent times such concern has declined with research by the Organisation for Economic Co-operation and Development (OECD) (2001, pg.1) identifying that concern for the environment has decreased on an international level. Such data are consistent with the Australian Bureau of Statistics findings that in 2001: “concern about environmental problems among Australian households dropped to its lowest level since

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2 It must be noted that the existence of an environmental crisis is not universally accepted, with commentators such as Kahn et al. (1976), Manes (1990), Ray et al. (1992) and Lomborg (2001) contending that the predictions of catastrophe arising out of research identifying changes to various environmental indicators are ill-conceived and overly pessimistic.
recording by the Australian Bureau of Statistics (ABS) started, with 62% of Australian households reporting being concerned over the environment in 2001 compared with 75% in 1992... Increasingly, more people stated 'no time' as the main reason for not being involved...” (Australian Bureau of Statistics, 2001, pg.1).

Whatever the debates, and despite conflicting views about the existence of a crisis and the varying degrees of concern for the environment, the concept of sustainable development has remained the dominant policy goal for future development in many developed and developing countries (UNESCO-UNEP, 1992). However, sustainable development is a fluid concept, encompassing a range of technological and ecological perspectives. Technological perspectives of sustainable development promote the view that advances in technology and the operation of free market economic forces will be sufficient to remedy the effects of an environmental crisis. In contrast, ecological perspectives of sustainable development promote radical world-views towards more fundamental, transformative cultural changes (O'Riordan, 1981). This theoretical divide has given rise to much conflict between and among academics, environmental groups, governments and educators with regards to determining the preferred sustainable development model for future development.

Coupled with the endorsement of sustainable development, at least since the United Nations Conference on the Human Environment held in Stockholm in 1972, there has been strong support “for the development of environmental education as one of the most critical elements of an all-out attack on the world’s environmental crisis” (UNESCO-UNEP, 1976, pg.2). This same support is reiterated in the more recent discussion paper authored by Environment Australia (1999, pg.13) which asserts: “It is widely agreed that education is the most effective means that society possesses for
confronting the challenges of the future. Indeed, environmental education will shape
the world for tomorrow”. The foundation of this support, particularly during the 1990s,
primarily laid with the search for sustainable methods of development and living
(World Commission On the Environment Development, 1990). In this regard, Agenda
21, a lengthy blueprint for global implementation of sustainable development,
particularly emphasised the role of education as an agent of change for sustainable
development:

Education is critical for promoting sustainable development and improving the
capacity of the people to address environment and development issues.... It is
critical for achieving environmental and ethical awareness, values and attitudes,
skills and behaviour consistent with sustainable development and for effective
public participation in decision-making (UNESCO-UNEP, 1992, pg.2).

Numerous definitions for environmental education have been developed which reflect
this definition in whole or in part. Due to the changing nature of environmental
problems and solutions, environmental education conceptions change with each
generation and, thus, so too does its definition. For example, environmental education
has also been described as “a study of nature” and a learning area which “is all about
learning how to care for the earth, other people and ourselves” (Queensland Department
definitions all contain common ground and therefore differences in the definition of
environmental education need not hinder the progress and implementation of
environmental education. In contrast, Jickling (1994) claims that environmental
education has a “definitional problem” which is problematic for future environmental

3 The ‘actual’ levels of support which extend beyond policy statements for environmental education in
Australia and abroad is yet to be fully explored.
education theory and practice. To these ends, it is noted that no universally accepted
definition for environmental education exists.

Notwithstanding, environmental education is viewed as a lifelong process
encompassing all levels of education, both within and beyond the formal school system
(see Abraham, Lacey, & Williams, 1990; Queensland Department of Education, 1993;
primary, secondary and tertiary levels has an important role to play in the development
of students who are capable of understanding and who are motivated to respond to the
issues which give rise to an environmental crisis (see Abraham et al., 1990; Fien, 1996;
Central to this thesis, it is considered that the primary school years have a particular
importance as:

... young learners develop most of their final adult physio-neurological capacity
quite early in life, and therefore learning, especially of attitudes and values is so
important to imaginative action in environmental problems, is vital and needs to
be considered carefully early in these sequences of lifelong learning (Fien, 1996,
pg.41).

As might be expected, there are a variety of disparate views about the proper role of
environmental education (see Clacherty, 1993; Fien, 1992, 2000; Gough, 1997; Jickling
& Spork, 1998; Orr, 1992; Rossen, 1995; Walker, 1997). In this vein, a number of
approaches have been developed and are the subject of many debates in the
environmental education field. This is particularly the case in Australia. These
approaches include: education about the environment, education in (or through) the environment and education for the environment. More specifically:

Learning how to care for our environment involves understanding concepts about the environment, developing sensitivities through (in) the environment and fostering values that commit us to acting for the environment. This last aspect is perhaps the most important; knowledge about and experience of the environment have limited value unless they are accompanied by a desire to actively care for the Earth, other people and ourselves (Queensland Department of Education, 1993, pg.5) (emphasis added).

For the past two decades education for the environment has been identified, by particular proponents in the environmental education field, as the preferred approach (Fien, 1988, 1992, 1993a, 2000, 1996; Fien & Trainer, 1993b; Huckle, 1991; Queensland Department of Education, 1993). Fien (1992; 1993) situates environmental education in various philosophical, political and environmental visions, such that he categorises education for the environment in a socially critical framework\(^4\) embedded in

\(^4\) There are a variety of values and beliefs embedded within educational ideology and, as such, numerous philosophers have attempted to explain this phenomena (see Bennett & Jordan, 1975; Brandt, 1988; Ennis & Hooper, 1988; Hammersley, 1977; Kemmis, Cole, & Suggett, 1983; Miller & Seller, 1985). For example, Kemmis, Cole and Suggett (1983) use three orientations to explain educational ideology, namely the vocational/neo-classical orientation, the liberal/progressive orientation and the social-critical orientation. I have selected this example because it is often utilised in environmental education literature. The socially-critically orientation maintains that individual action is an inadequate strategy in the improvement of society. Moreover, the socially-critical orientation maintains that collective social action is the most effective strategy with regards to bringing about societal change. With this in mind, this ideology propounds that “education must engage society and social structures immediately, not merely prepare students for later participation” (Kemmis et al., 1983, pg.9).
a communalist, ecosocialist (red-green) environmental ideology. Fien (1992) claims that education about the environment and education in the environment should play a subsidiary role providing the necessary skills and knowledge to support education for environment. To this extent, it is often argued “that it is only when the overall intention is education for the environment that real environmental education is actually taking place” (Board of Teacher Registration, 1993). In recent times, this contention has been the centre of debate (see Cutter-Mackenzie & Walker, 2003; Jickling, 1992, 1994; Jickling & Spork, 1998; Walker, 1997). Issues such as indoctrination and anthropocentric tendencies, inappropriate use of social critical theory and lack of empirical evidence to support the application of education for the environment in primary schools are just a few of the concerns giving rise to the various debates.

For example, Jickling and Spork (1998), in a critique of education for the environment, argued that education for the environment is valued-loaded and possesses indoctrination tendencies through its espousal of one specific way of knowing and believing, namely the red-green ecosocialist position. Jickling and Spork (1998, pg.319) maintained the argument put forth in an earlier paper by Jickling (1991, pg.154-155) stating that students should participate “as intelligent individuals in the constant re-examination and re-casting of society”.

Jickling and Spork (1998, pg.317) further argue that the combination of a socially critical approach and a communalist environmental ideology blurs “personal

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5 There are two broad environmental ideologies which Pepper (1984) classifies as anthropocentric and ecocentric. At the simplest level, the anthropocentric perspective, also known as the technocentric perspective, is grounded on the belief that the environment is a resource to be used, whereas the ecocentric perspective is said to value the environment for ‘its own sake’ (see Eckersley, 1992). The ecocentric communalist perspective, also referred to as ecosocialism (see Frankel, 1990) and/or human welfare (see Eckersley, 1992), is the integration of current economic system values and the ecocentric ideology (see Naess & Rothenberg, 1989; O'Riordan, 1981, 1989). It portrays the environment as socially constructed and seeks to achieve harmonious relationships between society and nature and individuals and groups (O'Riordan, 1981).
commitment with the role of education". In other words, they raise the question is a "red-green ecosocialist position" appropriate to the "aim of or heart of or central to education"? (Jickling, 1998, pg.317). Jickling and Spork (1998) contend that education for the environment, defined in this sense, "begins to look like education for a red-green future", which in their minds ignores the breadth and the emergence of environmental philosophy and poses the false proposition that knowledge about the notion of a 'red-green future' is real and readily available. To this end, they conclude that education for the environment "is conceptually and linguistically flawed and that we may not need, or want, the structures that it imposes" (Jickling & Spork, 1998, pg.309). The works of Walker (1997), Cutter (2002), Cutter-Mackenzie (2003), Cutter-Mackenzie and Smith (2001a; 2001b; 2003) and Cutter-Mackenzie and Walker (2003) reiterate the latter view. Walker (1997, pg.155) concluded "if environmental education is to become important in school education a more adequate theory is required".

Furthermore, in the debates, there is little evidence of the regular and successful take-up of 'education for the environment', nor any other forms of environmental education, in primary schools. I interpret such findings to mean that little is known about the implementation and/or effectiveness of dominant and subsidiary environmental education approaches in the teaching and learning of environmental education, especially in primary schools. Thus, it can be seen that a study of environmental education is timely and essential if the field is to evolve. This thesis is a contribution to the endeavours outlined by such research and I now set out its significance.
The Significance of this Thesis

"The world’s teachers"... are said to “have a crucial role to play” in bringing about the extensive social changes needed to address an environmental crisis (World Commission On the Environment Development, 1987, pg.xiv), yet little is known about the extent to which environmental education has been incorporated into primary schools. In Australia, in particular, there have been few empirical investigations of primary teachers’ knowledge, beliefs and practices of environmental education. Despite the varying levels of support for environmental education, the evaluation studies that have been conducted indicate that policy expectations are rarely met (see Cutter, 1998; Cutter & Smith, 2001a, 2001b; Cutter-Mackenzie, 2003; Cutter-Mackenzie & Smith, 2003; Cutter-Mackenzie & Tilbury, 2002; Cutter-Mackenzie & Walker, 2003; Gough, 1997; Greenall, 1981; Linke, 1980; Murdoch, 1989; Phipps, 1991; Spork, 1990, 1992; Walker, 1995a, 1995b)\(^6\).

In 1973 and 1974 Linke (1980) conducted a national study in Australia, utilising both quantitative and qualitative methodologies, concerning the implementation of environmental education at all levels (primary, secondary and tertiary) of education. Linke’s (1980) study indicated that the practice of environmental education was limited in Australia and most often taught through curriculum domains such as science and social studies. The implications of concentrating environmental education into specific curriculum domains are yet to be fully explored.

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\(^6\) There are many studies which have also been undertaken outside of Australia (see Buethe & Smallwood, 1987; Ham & Sewing, 1987; Rickinson, 2001; Tilbury, 1992; Todt, 1995; Wisconsin Center for Environmental Education, 1997). These studies are discussed later in this Chapter.
Like Linke (1980), Robottom et al. (2000) also found in a case study of five schools, that environmental education is most often incorporated into subjects such as 'Studies in Society and Environment'. They also reported that, in some cases, "environmental education curriculum has moved out of the school and into the community" (Robottom et al., 2000, pg.146). In short, Robottom et al. (2000, pg.157) concluded that "behind every successful environmental education program is a committed teacher".

Stapp and Stapp (1983) also conducted a qualitative study which listed over one hundred issues and recommendations for the improvement of environmental education in Australia. However, this study was limited in that neither primary nor secondary school teachers' knowledge, beliefs and/or practices of environmental education were thoroughly investigated. Other than the Linke 1973/4 (1980), Robottom et al. (2000) and Stapp and Stapp (1983) studies, only small-scale regional (see Clark & Harrison, 1997; Cutter, 1998; Phipps, 1991; Skamp, 1996; Spork, 1990, 1992; Walker, 1995b) and state (see Cutter & Smith, 2001a, 2001b; Cutter-Mackenzie & Smith, 2003; Cutter-Mackenzie & Walker, 2003; Education Department of Victoria, 1981; Greenall, 1981) investigations have been carried out.

All of these studies (see Cutter, 1998; Cutter & Smith, 2001a, 2001b; Cutter-Mackenzie & Smith, 2003; Cutter-Mackenzie & Walker, 2003; Education Department of Victoria, 1981; Greenall, 1981; Phipps, 1991; Spork, 1990, 1992; Walker, 1995a, 1995b), save Skamp (1996) and Clark and Harrison (1997), claim that the implementation of environmental education in primary schools does not achieve the outcomes communicated in policy documents. In contrast, Skamp's (1996) and Clark and Harrison's (1997) New South Wales regional studies suggest that teachers are practising environmental education action components. Clark and Harrison (1997,
hypothesise that “many Australian primary schools are addressing environmental education, although they might not call it that”. However, what they might ‘call it’ is far from self-evident.

Nonetheless, Spork (1990; 1992) claims that primary school teachers consider environmental education to be an important learning area, but seem to lack the skills and knowledge to successfully teach environmental education. Similar statements have also been echoed in the works of Cutter-Mackenzie and Smith (2001a; 2001b; 2003), Cutter-Mackenzie and Walker (2003), Murdoch (1989), and Phipps (1991)7.

Further, no Australian studies to date have investigated primary school teachers’ knowledge about environmental education and/or environmental issues. As such, little is known about what primary school teachers know or believe about the environment or environmental education.

To date, Spork’s (1990) study remains as the only Queensland study8 of primary school teachers’ beliefs and practices of environmental education since Linke’s (1980) national study. Therefore, her study is particularly significant, and I now briefly recount the conclusions of Spork’s (1990) investigation.

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7 There are many barriers which impede the implementation of environmental education in primary schools. Such barriers are discussed later in this Chapter.

Spork (1990; 1992) randomly selected and surveyed 300 state primary school teachers from the Brisbane north region and achieved a seventy-six percent (228 teachers) response rate. The purpose of her study was to determine the level of environmental education practice particularly in relation to education about the environment, education in the environment and education for the environment. She found that the practice of education for the environment among the primary school teachers in question was relatively low even though the research and literature argues that education for the environment is central to environmental education. Similarly, it was noted, in relation to teachers' beliefs about the different levels of importance of education about, in and for the environment, that the sampled teachers considered education about and in the environment to be of more importance than education for the environment. However, the sampled teachers conveyed positive attitudes towards environmental education as a whole.

This sample had received relatively little professional preparation to teach environmental education. Only 4.9% of these teachers received pre-service environmental education training and only 6.6% received in-service training.

Among the reasons offered for low levels of environmental education practice were a perceived lack of teacher training in environmental education and time and resource constraints for teachers (Spork, 1990, 1992). As a consequence of this study and the other studies (see Fien, 1996; Tilbury, 1992; UNESCO-UNEP, 1990) indicated earlier, environmental education research has tended to conclude that the problems associated
with the implementation of environmental education are due to a lack of adequate pre-
service and in-service environmental education training. Thus, the provision of further
or restructured teacher education has been identified as the 'priority of priorities' for
environmental education (see Ballantyne, 1995; Fien, 1996; Tilbury, 1992; UNESCO-

Such propositions are primarily based on both a lack of reliable empirical evidence and
a theoretical presumption that the 'content' of environmental education is
unproblematic. Spork's (1990, pg.101) study has contributed to this phenomenon
through her recommendation that more teacher-education was warranted because
teachers possess inadequate "knowledge of how to do environmental education or what
environmental education is". Yet her study was not a dedicated study of teachers'
questionnaire only questioned teachers about general concepts in the three different
approaches, particularly education for the environment. Environmental education
consists of many concepts and varied forms of pedagogy which Spork (1990) did not
include in her research design. Further, Spork (1990) did not pay heed to the contested
nature of 'education for the environment', nor environmental education generally.9
Thus, it appears that her conclusions about primary school teachers and what they might
or might not know about environmental education were indicative but require further
and deeper investigation. In order to further elaborate this agenda, I now conclude this
section and then present a review of the relevant literature.

9 It is important to note that Spork's recent works (see Jickling and Spork, 1998) pay heed to the
problematic nature of 'education for the environment' and 'environmental education' generally.
Summary

In this section, three points have been established. First, it has been shown that there is a growing belief that development instigated by human beings has changed the biosphere. There are concerns that such development in turn limits the earth’s capacity to provide for human existence. The idea of an ‘environmental crisis’ has gained popularity and so too has skepticism about the ideas that the earth is an infinite resource for human exploitation. This has, in turn, promoted calls for more sustainable patterns of development. However, ‘sustainable development’ is a fluid concept, embracing both technological and ecological perspectives, resulting in a theoretical divide in the field about the preferred methods for sustainable development.

Second, environmental education has been identified at the international policy level as a potential change agent for sustainable development. The focus upon environmental education over the past three decades has led to environmental education being included into national and state education policy and curriculum documents. Three dominant approaches in environmental education have been developed, namely, education about the environment, education in the environment and education for the environment. For the past two decades education for the environment has been identified as the preferred approach for environmental education. However, in recent times, this approach has been the centre of much debate, leading to the conclusion that environmental education approaches and theories are dated and inappropriate for preparing students for a sustainable future.

10 Other approaches also exist in the field, although the approaches ‘education about, in and for the environment’ have dominated environmental education policy and curriculum initiatives particularly in Australia. The latter approaches have also been dominant in the academic literature. Alternative environmental education approaches are discussed in Chapter Two.
Whatever the debates, there is a dearth of empirical research about the implementation or 'take-up' of 'education for the environment', nor any other forms of environmental education, in primary schools. I interpret such findings to mean that little is known about the success of dominant and subsidiary environmental education approaches in the teaching and learning of environmental education, especially in primary schools. Thus, it can be seen that a study of environmental education is timely and essential in the interests of bringing clarity and direction to environmental education.

Third, although research about environmental education at the primary school level is limited, evaluation studies indicate that policy expectations are rarely met. However, there is a dearth of research about teachers' knowledge and beliefs of the environment or education in and about the area. In short, it is intended that this research will bring greater focus and direction, both theoretically and conceptually, to environmental education. I now turn to a review of the environmental education literature and research.

Literature Review

Introduction

The purpose of this review is to identify and analyse the major concepts for this study. The review is contained under four sub-sections: Environmental Education - Policy Directions and Premises; Policy Developments - The Australian Case; Dominant Environmental Education Approaches - The Academic Perspectives and Arguments; and Environmental Education in Australian Primary Schools – Policy versus Practice.
I now turn to the first sub-section of this review 'Environmental Education - Policy Directions and Premises'.

Environmental Education -
Policy Directions and Premises

In order to conceptualise the stated research problem, it is necessary to review the process by which environmental education has come to be part of the education lexicon. Historically, environmental education was perceived as a study of the environment or nature, co-extensive with ecology. Growing global awareness of unprecedented environmental changes and the threat these changes pose to continued human existence, has seen a new view evolve (UNESCO-UNEP, 1995). Indeed it was these environmental changes which "instigated a paradigm shift away from a predominantly natural science framework for the interpretation of problems and solutions" (Tilbury, 1994, pg.2). To this extent, the environmental education movement emerged over the previous three decades with a distinctive name (Gough, 1997). Such developments occurred through a number of international, national and state initiatives predominantly directed and developed by UNESCO and UNEP. In essence, these initiatives were consecutively directed through eight international environmental education developments. Table 1.1 presents these influential developments by illustration of a time line.

The efforts of UNESCO and UNEP have significantly influenced environmental education teaching and learning theories. It is, therefore, necessary to recount these milestones in history so as to convey the development of and influences upon
environmental education. I now present a review of the historical background of environmental education.

Table 1.1. Time Line of Significant Environmental Education Landmarks

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<th>Year</th>
<th>Event</th>
<th>Development</th>
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<tr>
<td>1975</td>
<td>United Nations Belgrade Workshop</td>
<td>The Belgrade Charter Statement</td>
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<td>1977</td>
<td>The UNESCO Intergovernmental Conference on Environmental Education, Tbilisi, the former USSR.</td>
<td>'Tbilisi Declaration'</td>
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<td>1997</td>
<td>The United Nations International Conference on Environment and Society, Thessaloniki, Greece.</td>
<td>'Thessaloniki Declaration'</td>
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<tr>
<td>2002</td>
<td>World Summit on Sustainable Development, Johannesburg, South Africa.</td>
<td>'Plan of Implementation' and the 'Key Outcomes' Statement</td>
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The Stockholm-Belgrade-Tbilisi Phase

The term 'environmental education' came into prominence during the 1960s. It was not until the 1972 United Nations Conference on the Human Environment carried out in Stockholm that the term was recognised and accepted internationally. As Fensham (1978, pg.446) states, this conference presented substantial evidence about an environmental crisis, and in doing so captured the attention of the international political stage:
Among international meetings, the conference at Stockholm stands out as one that did capture a concern that had a world-wide appeal and from which a great deal of activity has followed. More than enough evidence was presented about problem after problem to indicate that the crises of the environmental situation in the world are not those of just a few countries. Some or most of the issues of population, threats to resources, over-and-under consumption, wealth and poverty, pollution and urbanization existed in all sectors of the globe and often transcended national frontiers... There was general recognition that the environmental situation of our planet was indeed very serious, but few regarded it has hopeless.

The traditional resolutions of technology and science were dismissed, and environmental education was considered to be the governing solution (Fensham, 1978). In fact, it was the passing of Recommendation 96 that called “for the development of environmental education as one of the most critical elements of an all-out attack on the world’s environmental crisis” (UNESCO-UNEP, 1976, pg.2). Furthermore, recommendation 96 stated that UNESCO and member states:

... should after consultation and agreement take the necessary steps to establish an international programme in environmental education (IEEP), interdisciplinary in approach, in school and out of school, encompassing all levels of education and directed towards the general public (UNESCO, 1972, cited in Tilbury, 1994, pg.3).

The initiatives developed at this conference gave rise to the UNESCO-UNEP International Environmental Education Programme (IEEP). The objective of IEEP was
“to develop an overall framework and direction for a co-operative international program to further environmental education” (Gough, 1997, pg.18). To meet such ends three meetings were organised for participants of member countries of UNESCO (Tilbury, 1994). These were: the Belgrade Workshop (1975); regional seminars (1976); and the Intergovernmental Conference held in Tbilisi (1977).

The 1975 UNESCO-UNEP international ten-day environmental education workshop carried out in Yugoslavia, Belgrade, was considered to be one of the greatest landmarks in environmental education history (Tilbury, 1994). The agenda was “to review the trends and emerging issues in environmental education and formulate guidelines and recommendations for advancing the movement internationally” (Robottom, 1987, pg.87). The conference resulted in the origination of the Belgrade Charter policy statement. The Charter was the first international statement to constitute goals, objectives, concepts and guiding principles relevant for all environmental education programmes, including both formal and non-formal education (Tilbury, 1994). To these ends, the Belgrade Charter states that the goal of environmental education is:

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-UNEP 1976, pg.2).

This goal incorporates attitudes, motivations and commitment together with knowledge and skills for protecting and improving the environment. Previously a skills and knowledge-based approach dominated the field. The incorporation of attitudes,
motivations and commitment can also be seen in the objectives set out by the Charter. These are:

1. **Awareness**: to help individuals and social groups acquire an awareness of a sensitivity of the total environment and its allied problems.

2. **Knowledge**: to help individuals and social groups acquire a basic understanding of the total environment, and its associated problems, and humanity's critically responsible presence and role in it.

3. **Attitudes**: to help individuals and social groups acquire social values, strong feelings of concern for the environment and the motivation for actively participating in its protection and improvement.

4. **Skills**: to help individuals and social groups acquire the skills for solving environmental problems.

5. **Evaluation Ability**: to help individuals and social groups evaluate environmental measures and education programmes in terms of ecological, political, economic, social, aesthetic and educational factors.

6. **Participation**: to help individuals and social groups develop a sense of responsibility and urgency regarding environmental problems to ensure appropriate action to solve those problems (UNESCO-UNEP, 1976, pg.2).

In order to implement these goals and objectives, a set of guiding principles appropriate for environmental education programmes were established. Table 1.2 identifies eight recommended principles to be achieved through all environmental education programmes.
Table 1.2. Guiding Principles for Environmental Education

1. Environmental education should consider the environment in its totality - natural and man-made [sic] (UNESCO, 1997), ecological, political, economic, technological, social, legislative, cultural and aesthetic.

2. Environmental education should be a continuous lifelong process, both in-school and out-of-school.

3. Environmental education should be interdisciplinary in approach.

4. Environmental education should emphasize active participation in preventing and solving environmental problems.

5. Environmental education should examine major environmental issues from a world point of view, while paying due regard to regional differences.

6. Environmental education should focus on current and future environmental situations.

7. Environmental Education should examine all development and growth from an environmental perspective.

8. Environmental education should promote the value and necessity of local, national and international cooperation in the solution of environmental problems (UNESCO-UNEP, 1976, pg.2).

The intention was that the Charter would guide curriculum development, but it received diverse reactions from both government and environmental education commentators. Victor Hugo's (UNESCO-UNEP, 1976, pg.1) maxim describes the general reaction of the international political community: "There is no greater force than that of an idea whose time has come". On the other hand, Gough (1997, pg.18) considered that the Belgrade Charter:

... was an attempt to clarify previously vague concepts, but the goals, objectives and guiding principles of environmental education contained therein were still too general to be of much assistance beyond the broadest policy development.
Notwithstanding the debates, the Belgrade Charter's goals, objectives and guiding principles recognise the political, economic, social and global issues which are said to underlie environmental education (Tilbury, 1994). As such, the 1977 'Tbilisi Intergovernmental Conference on Environmental Education' was organised so as to further develop and clarify environmental education.

The Tbilisi conference was based upon the initiatives developed at the Belgrade Charter and the Stockholm conference. Seventy countries met at the Tbilisi conference for the sole purpose of promoting the development of environmental education internationally, nationally and locally (UNESCO, 1977a). More than thirty countries constructed formal reports detailing accounts of environmental education progress. In so doing, such reports recognised that the initiatives composed since Stockholm had been neither developed nor fulfilled as otherwise expected. To address this situation, these issues dominated the main agenda of the Tbilisi conference:

- major environmental problems in contemporary society;
- the role of education in facing the challenges of environmental problems;
- current efforts at the national and international levels for the development of environmental education;
- strategies for the development of environmental education at the national level; and
- international and regional co-operation for the development of environmental education (UNESCO, 1977a, pg.i-ii).
The Tbilisi conference produced some of the most authoritative statements about the goals, objectives and guiding principles of environmental education programmes (see Board of Teacher Registration, 1993; Fensham, 1978; Gough, 1997; Palmer, 1998; Tilbury, 1994; Wheeler, 1982). Many in the field believed that these statements established policy-level unity amongst countries (see Board of Teacher Registration, 1993; Fensham, 1978; Gough, 1997; Palmer, 1998; Tilbury, 1994; Wheeler, 1982). To this extent, the Tbilisi conference further developed the key environmental education initiatives emphasised in the Charter and at Stockholm by presenting forty-one detailed recommendations relating to the aims, objectives and guiding principles for environmental education programmes. The recommendations emphasised the need for all education bodies to strengthen the relationship between education and everyday life, with particular focus upon the inter-relationships between ethical, social, cultural and economic factors associated with many human activities. The conference’s aims, as summarised in the Tbilisi Declaration (UNESCO-UNEP, 1978, pg.1), for environmental education reiterates this view:

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

The environmental education aims set out in the Tbilisi Declaration extended previously written aims established at the Belgrade Charter by embracing what Tilbury
(1994) described as a more holistic and meaningful outlook. The Tbilisi developments included: the inextricable inter-links between social, economic, political and ecological interdependence; the opportunities for all people to acquire environmental education; and the addition of individuals, groups and society to work collectively as a whole towards improving the environment in lieu of only individuals working towards a better environment.

The environmental education objectives outlined in the Belgrade Charter (UNESCO-UNEP, 1976) underwent some changes in the Tbilisi Declaration (UNESCO-UNEP, 1978). Two objectives described in the Belgrade Charter, namely ‘evaluation ability’ and ‘participation’, were deleted from the Tbilisi objectives. According to Gough (1997, pg.44), the evaluation ability objective was removed for political reasons, thus:

Tbilisi was an Intergovernmental conference so it was unlikely that the participants in such a meeting would endorse an objective that had as its aim a potential critique of government programs.

The participation objective was reworded to read “to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems” (UNESCO, 1977a, pg.11). As stated earlier in this Chapter, the Belgrade Charter’s participation objective included the phrase “to help individuals and groups develop a sense of responsibility...”. Both Fensham (1978) and Gough (1997) insinuate that the Belgrade Charter’s ‘evaluation ability’ and ‘participation’ objectives had specific connotations of ‘blame the victim’, which they state may account for their deletion and modification.
Similar to the Belgrade Charter objectives, the Tbilisi Declaration objectives presupposes that awareness, knowledge, skills and participation, to do with the environment and its allied problems, would equally disseminate into education. In doing so, UNESCO (1977a) further developed its guiding principles for environmental education programmes contained in the Belgrade Charter. Four guiding principles were added to this list, although the remaining principles were expanded upon in detail and meaning. In all, these principles placed great significance on community and individual environmental problem-solving and participation. Table 1.3 lists the modified guiding principles for environmental education.

Table 1.3. Modified Guiding Principles for Environmental Education (UNESCO-UNEP, 1978, pg. 1)

1. Consider the environment in its totality – natural and built, technological and social (economic, political, cultural-historical, moral, aesthetic).

2. Be a continuous lifelong process, beginning at the pre-school level and continuing through all formal and non-formal 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 different geographical conditions.

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. Emphasise the complexity of environmental problems and thus the need to develop critical thinking and problem-solving skills.

12. Utilise diverse learning environments and a broad array of educational approaches to teach/learning about and from the environment with due stress on practical activities and first-hand experience.
A definition for environmental education was also developed from the goals, objectives and guiding principles formed at the Tbilisi Conference. It states:

Environmental education, properly understood, should constitute a comprehensive lifelong education, one responsive to changes in a rapidly changing world. It should prepare the individual for life through an understanding of the major problems of the contemporary world, and the provision of skills and attributes needed to play a productive role towards improving life and protecting the environment with due regard given to ethical values (Tilbury, 1994, pg.8).

At this time, this definition was repeated in international, national and state policy documents, although as conceptions changed so did the definition for environmental education. However, it was the Stockholm-Belgrade-Tbilisi phase which initially provided the impetus to work towards environmental solutions through the means of environmental education. Although these conferences heightened environmental education as a major contributor to international, national and state environmental problems, little attention was directed toward environmental problems per se (Gough, 1997). The latter has attracted comment and intent since the 1980s resulting in initiatives such as the World Conservation Strategy (International Union for the Conservation of Nature, 1980), Our Common Future (World Commission On the Environment Development, 1987), the Earth Summit (UNESCO-UNEP, 1992), the Thessaloniki Declaration (UNESCO, 1997) and the recent World Summit on Sustainable Development (United Nations, 4 September 2002, 2002b). These initiatives specifically emphasised ‘sustainable development’ as the most appropriate response for future environmental, social and economic development. Suzuki (1993,
In the two decades between Stockholm and Rio, new names became a part of our lexicon – Bhopal, Exxon Valdez, Chernobyl – while a host of issues made the news: chemicals spilled into the Rhine Basel, poisoned Beluga whales in the Golf of St. Lawrence, the burning of rainforest of the Amazon, unswimmable beaches, record hot summers, the Arab oil embargo, Ethiopia, and the Gulf War. During the 1980s, poll after poll revealed that the environment was at the top of peoples’ concerns. In 1987, the Brundtland Commission report, Our Common Future, documented in painstaking detail the perilous state of the Earth and popularized the phrase that has become the rallying cry of politicians and businesspeople alike – sustainable development.

There are two concepts which require clarifying here, namely ‘environmental crisis’ and ‘sustainable development’. In order to finalise this section I now discuss these concepts and their relevance to environmental education.

'Environmental Crisis'

There is no universal definition of the ‘environmental crisis’. This may be a consequence of the changing nature of environmental problems and the complexity of these issues. It is usually assumed in the literature that an environmental crisis is the conglomeration of a collection of pressing environmental problems and issues (World Commission On the Environment Development, 1987, 1990). On a worldwide scale, there is overwhelming evidence that the environment is indeed in a state of crisis (see...

There are few works that criticise the idea of an environmental crisis. Lomborg (2001), Manes (1990), Ray and Guzo (1992) and Kahn et al. (1976) are the main advocates of this approach and provide a range of critiques about the environmental crisis. The key themes discussed in these works are: that current and future environmental problems do not constitute an environmental crisis; and that environmental problems are a predicament of any industrial society. I briefly consider the various positions of these authors, before outlining the arguments supporting the idea of an environmental crisis.

Kahn et al. (1976) agree that environmental problems do exist, but maintain that they do not constitute an environmental crisis and can be solved or managed with scientific and technological innovations. Kahn et al. (1976, pg.151) state:

We take the position that nearly every measurable environmental blight or hazard can be corrected by a combination of technology, a reasonable amount of money, sufficient time to make the required changes, and (occasionally or temporarily) some (otherwise undesirable) self-restraint.

Ray and Guzo (1992) and Lomborg (2001) maintain similar positions. In particular, Lomborg (2001, pg.5) challenges propositions about the state of the environment and
claims that “our problems are getting smaller and not bigger, and that frequently offered solutions are grossly inefficient”. Lomborg (2001) argues that the state of the environment is improving on a global level and dismisses reported incidences of environmental disasters as “deeply flawed exaggerations and prevarications’. He claims to use the same empirical data utilised by the Worldwatch Institute, Ehrlich (1971; 1981; 1986) and Meadows et al. (1972), and concludes that these data “should tell us not to abandon action entirely, but to focus our attention on the most important problems and only to the extent warranted by facts” (Lomborg, 2001, pg.5).

The second position stems from the works of Manes (1990), who maintains that the environment is affected by industrial societies, culture and lifestyles. However, he takes the position that environmentalists must choose between the natural and industrial (human-made) worlds. His claim is that the ideas of environmentalists who argue for changed human life-styles, are against and uncompromising about “the modern thrust of technological society” (Manes, 1990, pg.226). In this way, Manes (1990, pg.227-228) endorses the position of Roselle (1988, pg.23) and argues that:

The only way you can have industrial society is to trample on other nonhuman communities. If you really believe that we’re just one of the five, ten or twenty million species that inhabit this beautiful planet, then I don’t think you could conceive of a system that could do so much to degrade the whole system as industrialism.

To date, the arguments of Lomborg (2001), Manes (1990), Ray and Guzo (1992) and Kahn et al. (1976) have not been critically analysed in the environmental education literature.
Notwithstanding the abovementioned works, the idea of an environmental crisis has gained credence and support internationally and, in turn, influenced fields such as environmental education (see Abram, 1996; Berry, 1996; Carson, 1965; Clacherty, 1993; Durning, 1992; Ehrlich & Ehrlich, 1991; Evernden, 1989; Gore, 1992; Hillcoat, 1999; Meadows et al., 1972; Middleton et al., 1993; Milbraith, 1989; Orr, 1992; UNEP, 1983; UNESCO-UNEP, 1992, 1997; White, 1967; World Commission On the Environment Development, 1987, 1990). I now review the main arguments.

Rachael Carson’s *Silent Spring*, first published in 1962, is regarded as seminal work about the impact of human development on ecological processes. Carson’s (1965) work documented the impact of insecticides and pesticides on bird, wildlife and human health, showing that then-prevailing agricultural methods were progressively poisoning the planet. In doing so, Carson (1965) reminded the world that human beings are but one part of a complex and fragile web of life. As White (1967, pg.1203) later noted, “changes in human ways often affect nonhuman nature” in unexpected ways. In White’s (1967) examination of the historical roots of human impact upon the environment, she wrote of the impacts amounting to an ‘ecologic crisis’. Following this, a number of authors (see Ehrlich, 1971; Meadows et al., 1972; Schumacher, 1973) presented broader assessments of the state of the environment and issued concerns that the overall effect of human development caused a range of impacts on the biosphere that threatened the future survival of the human race. These works concluded: “if we continue on this disastrous road of overconsumption and overpopulation the human race may not survive” (Meadow et al, 1976, cited in Baarschers, 1996, pg.20). It was these works which predominantly provided the impetus for the Stockholm, Belgrade and Tbilisi conferences.
One decade later, the report ‘Our Common Future’ (World Commission On the Environment Development, 1987) provided scientific evidence of further global and local environmental degradation such as ozone layer depletion, deforestation, erosion, acid rain and the greenhouse effect. And just five years later, at the Earth Summit conference, further issues were added to this list and a divide in the level of priority was overwhelmingly present between rich and poor countries. Suzuki (1993, pg.9) further explains:

Industrialised nations... were preoccupied with biodiversity, overpopulation, atmosphere change, and ocean pollution, while the priorities of the poor countries... were debt relief, technology transfer, and overconsumption in the rich countries. The “solution” was to horse-trade away the issues. Thus, overpopulation was dropped from the agenda and in return for the deletion of overconsumption.

In contemporary times, ‘overconsumption’ and ‘overpopulation’ are considered to have “major ramifications on the depletion of natural resources, pollution of ecological life support systems and issues of social justice” (Hillcoat & Rensburg, 1998, pg.58). As indicated earlier, Meadows et al. also identified this same conclusion in 1972. Hillcoat (1999) explains that these two issues are inextricably linked as, for example, population expansion leads to the development of houses, infrastructure, farms and industries which require the exploitation (or consumption) of raw materials from forests, soils, oceans, waterways and the like (World Commission On the Environment Development, 1990). In this respect, some argue that increasing population numbers places immense strain upon the environment, particularly as human beings in wealthy countries
endeavour to live at increasingly higher standards (see Ehrlich, 1981; Milbraith, 1989; World Commission On the Environment Development, 1987, 1990; Wright, 1993; Zweers & Boersema, 1994). In addition, the world population has doubled since 1960, such that the world population is now approximately six billion and is expected to increase, especially in poorer nations, to ten billion by 2050 (U. S. Bureau of the Census, 2001). Factors such as these prompt Suzuki (1993, pg.10) to note that “it is clear that 80 percent of humanity is being forced to exist on 20 percent of the planet’s resources while the 20 percent in the industrialized world is using up the rightful heritage of all future generations”. Suzuki (1993, pg.10) concludes that overconsumption is ignored by rich, industrialised countries because these countries continue to “demand economic growth that can come only at the expense of the rest of humankind and the planet”.

The significance of these arguments are that ‘overconsumption’ and ‘overpopulation’ were barely mentioned in the documents coming out of the Earth Summit (UNESCO-UNEP, 1992) and the recent World Summit on Sustainable Development (United Nations, 2002). Moreover, the various environmental education models recommended thereafter ignored these issues. For example, Agenda 21, a lengthy blueprint of the Earth Summit, positioned environmental education as an imperative solution for improving and preserving the environment (UNESCO-UNEP, 1992). It was the treaty, however, concerning Environmental Education for Sustainable Societies and Global Responsibility (1992) that stipulated sixteen guiding principles for environmental education, ten of which differed notably from the Belgrade Charter and Tbilisi guiding principles11. Table 1.4 lists the additional and modified guiding principles suggested

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11 To date, the World Summit on Sustainable Development (WSSD) has not produced any policies or programmes pertaining to environmental education.
for all environmental education programmes. The scant regard for overconsumption and overpopulation is apparent.

Table 1.4. Modified Guiding Principles (Earth Summit)

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<td>2.</td>
<td>Environmental education ... should be grounded in critical and innovative thinking in any place or time, promoting the transformation and construction of society.</td>
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<td>3.</td>
<td>Environmental education is both individual and collective. It aims to develop local and global citizenship with respect for self-determination and the sovereignty of nations.</td>
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<td>4.</td>
<td>Environmental education is not neutral but is values based. It is an act for social transformation.</td>
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<td>5.</td>
<td>Environmental education must involve a holistic approach and thus an interdisciplinary focus in the relation between human beings, nature and the universe.</td>
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<td>7.</td>
<td>Environmental education should treat critical global issues, their causes and interrelationships in a systemic approach within their social and historical contexts. Fundamental issues in relation to development and environment, such as population, health, peace, human rights, democracy, hunger, degradation of flora and fauna, should be perceived in this manner.</td>
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<td>10.</td>
<td>Environmental education should empower all peoples and promote opportunities for grassroots democratic change and participation. This means that communities must regain control of their own destiny.</td>
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<td>11.</td>
<td>Environmental education values all different forms of knowledge. Knowledge is diverse, cumulative and socially produced and should not be patented or monopolized.</td>
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<td>13.</td>
<td>Environmental education must stimulate dialogue and cooperation among individuals and institutions in order to create new lifestyles which are based on meeting everyone's basic needs, regardless of ethnicity, gender, age, religious, class, physical and mental differences.</td>
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<td>15.</td>
<td>Environmental education must integrate knowledge, skills, values, attitudes and actions. It should convert every opportunity into an educational experience for sustainable societies.</td>
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<td>16.</td>
<td>Education must help develop an ethical awareness of all forms of life with which humans share this planet, respect for all life cycles ad impose limits on humans' exploitation of other forms of life (Gough, 1997, pg.35-36).</td>
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The marginalisation of concepts such as overpopulation and overconsumption is not a singular case of omission. Although these concepts have gained more credence (see Hillcoat, 1999; Hillcoat & Rensburg, 1998; Orr, 1990; 1992; 1994) in recent years, environmental education policy and curriculum documents have neither focused upon nor appropriately dealt with these issues. The significance of this is if sustainable development is the most tenable solution for environmental preservation and
improvement, yet issues such as 'overpopulation' and 'overconsumption' are dealt with insufficiently, then the sustainable development model offered (and the environmental education model for that matter) is bound to be problematic (see Orr, 1992). I now turn the present discussions to the issue of sustainable development and its inclusion in environmental education international policy documents.

'Sustainable Development'

In 1980 the International Union for Conservation of Nature (IUCN), Natural Resources, The United Nations Environment Programme and World Conservation Foundation officially introduced the term 'sustainable development' as a catch-all idea in the 'World Conservation Strategy' (WCS) (International Union for the Conservation of Nature., 1980, pg.iv). As indicated earlier, seven years later, Our Common Future (World Commission On the Environment Development, 1987), also known as The Brundtland Report, further examined the types of issues raised in the World Conservation Strategy. In particular, the key concept of Our Common Future (World Commission On the Environment Development, 1987, pg.8) was the advocacy of sustainable development, which was defined as "development which meets the needs of the present without compromising the ability of future generations to meet their needs".

As with any theory which seeks legitimacy in the political arena, there are those who oppose the fundamental concepts which underpin sustainable development (see Blowers, 1997; Diesendorf, 1999; Jacobs, 1991; Redclift, 1989). Perhaps the most enduring criticism of sustainable development has been that even its advocates have "not yet been able to identify sufficient criteria to elucidate common meaning and coherence" for the phrase (Jickling, 1994, pg.115). As mentioned earlier, there are two
views about sustainable development, namely ‘technological sustainability’ and ‘ecological sustainability’. Both views are locked in a struggle for supremacy. These two competing theories are defined as:

- **technological sustainability** maintains the view that advances in technology and market forces will resolve ecological and social crises; and

- **ecological sustainability** promotes a radical and transformative world-view where ecological considerations set the parameters of acceptable human endeavour (see Jickling, 1994; Orr, 1992; Rossen, 1995).

Despite the tension between them and the debate between the advocates of the different approaches, technological and ecological sustainability are not mutually exclusive concepts\(^\text{12}\). I now present the arguments in accordance with the various international environmental education policy developments.

**The Transition to Sustainable Development**

Since the late 1980s the concept of sustainable development has infiltrated the field of environmental education. Both modes of sustainable development have been adopted in the various different world-wide initiatives, although the values of ‘ecological sustainability’ continue to dominate environmental education which can be seen in the following UNESCO-UNEP (1992, pg.2) definition developed at the Earth Summit in 1992:

\(^{12}\) The two different modes of sustainable development are complex and locked in philosophies about the environment. Such issues are dealt with later in this Chapter and further in Chapter Two.
Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues... It is critical for achieving environmental and ethical awareness, values and attitudes, skills and behaviour consistent with sustainable development and for effective public participation in decision-making.

In December of 1997, eighty-one countries were represented at the UNESCO Thessaloniki conference which was said to celebrate the 20th anniversary of the Tbilisi conference and "to reorient to education for sustainability (EFS) for the 21st century" (Knapp, 2000, pg.32). However, this conference was considered by Knapp (2000, pg.32) as "the beginning of the end for environmental education". Knapp (2000, pg.32) states that "only two out of the twenty-nine statements outlined in the declaration was environmental education mentioned". And one of those statements suggested that "environmental education be referred to as education for sustainability in the 21st century" (UNESCO, 1997, pg.20). Knapp (2000, pg.32) suggests that environmental education is "being swallowed by another more fashionable approach-education for environment and sustainability". He argues that this modification changes the very nature of environmental education through including it among other fields such as conservation education and outdoor education. He concluded:

The basis and spirit of environmental education was begun at Tbilisi. We should defend its true intent to the world and prohibit its extinction through documents such as the Thessaloniki Declaration. It is our responsibility to see that this crucial educational process be a mainstay of society and guidepost to the responsible stewardship of our planet (Knapp, 2000, pg.37).
Notwithstanding Knapp’s (2000) view, some works have supported the Thessaloniki Declaration and welcomed the change to ‘education for sustainability’ (Fien, 1997, 1996; Fien & Trainer, 1993b; Huckle, 1991). However, like Knapp (2000), there are other works (see Jickling, 1992, 1994; Jickling & Spork, 1998) which see this change as problematic for environmental education. The phrase ‘environmental education’ is utilised in this thesis for various reasons, as identified by Jickling (1992, 1994, 1998), which are discussed later in this Chapter.

At the recent World Summit on Sustainable Development a new phrase for environmental education was apparent, namely education for sustainable development. Similar to the UNESCO Thessaloniki conference, environmental education was neither a focal point nor key outcome of the Summit. For example, environment education received no mention in the World Summit on Sustainable Development declaration (United Nations, 4 September 2002), and was neither listed in the key outcomes document of the Summit (United Nations, 2002b). The Summit ‘Plan of Implementation’ further pays scant regard to environmental education, with only eight indicators listed out of one hundred and fifty-three indicators as outlined in Table 1.5.

The key environmental education development noted at the World Summit on Sustainable Development was recommendation 117 (d) proposing “a decade of education for sustainable development starting in 2005” (United Nations, 2002c). At the recent United Nations General Assembly (Japan) the latter recommendation was adopted (United Nations, December 2002). In order to contextualise the international environmental education developments, I review the Australian environmental education policy initiatives and directions, after concluding this section of the review.
Table 1.5. Key Environmental Education Indicators Listed in the WSSD Plan of Implementation Document (United Nations, 2002c)

105. Establish regular channels between policy makers and the scientific community for requesting and receiving science and technology advice for the implementation of Agenda 21, and create and strengthen networks for science and education for sustainable development, at all levels, with the aim of sharing knowledge, experience and best practices and building scientific capacities, particularly in developing countries.

109. Education is critical for promoting sustainable development. It is therefore essential to mobilize necessary resources, including financial resources at all levels, by bilateral and multilateral donors, including the World Bank and the regional development banks, by civil society and by foundations, to complement the efforts by national governments to pursue the following goals and actions:
   
a) meet the development goal contained in the Millennium Declaration of achieving universal primary education, ensuring that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling; and

b) provide all children, particularly those living in rural areas and those living in poverty, especially girls, with the access and opportunity to complete a full course of primary education.

110. Provide financial assistance and support to education, research, public awareness programmes and developmental institutions in developing countries and countries with economies in transition in order to:
   
a) sustain their educational infrastructures and programmes, including those related to environment and public health education; and

b) consider means of avoiding the frequent, serious financial constraints faced by many institutions of higher learning, including universities around the world, particularly in developing countries and countries in transition.

111. Address the impact of HIV/AIDS on the educational system in those countries seriously affected by the pandemic.

112. Allocate national and international resources for basic education as proposed by the Dakar Framework for Action on Education for All and for improved integration of sustainable development into education and in bilateral and multilateral development programmes, and improve integration between publicly funded research and development and development programmes.

113. Eliminate gender disparity in primary and secondary education by 2005, as provided in the Dakar Framework for Action on Education for All, and at all levels of education no later than 2015, to meet the development goals contained in the Millennium Declaration, with action to ensure, inter alia, equal access to all levels and forms of education, training and capacity-building by gender mainstreaming, and by creating a gender-sensitive educational system.

114. Integrate sustainable development into education systems at all levels of education in order to promote education as a key agent for change.

115. Develop, implement, monitor and review education action plans and programmes at the national, subnational and local levels, as appropriate, that reflect the Dakar Framework for Action on Education for All and that are relevant to local conditions and needs leading to the achievement of community development, and make education for sustainable development a part of those plans.
116. Provide all community members with a wide range of formal and non-formal continuing educational opportunities, including volunteer community service programmes, in order to end illiteracy and emphasize the importance of lifelong learning and promote sustainable development.

117. Support the use of education to promote sustainable development, including through urgent actions at all levels to:

   a) integrate information and communications technology in school curriculum development to ensure its access by both rural and urban communities, and provide assistance particularly to developing countries, inter alia, for the establishment of an appropriate enabling environment required for such technology;

   b) promote, as appropriate, affordable and increased access to programmes for students, researchers and engineers from developing countries in the universities and research institutions of developed countries in order to promote the exchange of experience and capacity that will benefit all partners;

   c) continue to implement the work programme of the Commission on Sustainable Development on education for sustainable development; and

   d) recommend to the United Nations General Assembly that it consider adopting a decade of education for sustainable development, starting in 2005.

Summary

This section presented an overview of the various international environmental education policy developments and initiatives, and revealed that there are established goals, objectives and principles in environmental education. These developments and initiatives have been predominantly instigated by UNESCO, UNEP and the United Nations by way of international conferences from 1972, Stockholm, to 2002, the World Summit on Sustainable Development. It is also shown that although environmental education received much international support from 1972 to 1992, recent international meetings have focused significantly less on environmental education, such that environmental education has been excluded from key policy documents.

Notwithstanding, such international initiatives ensured that conceptions change with each generation. Hence, from the initial belief of environmental education being a study of nature, the term has expanded in scope and range to include numerous
concepts. In particular, two concepts, namely environmental crisis and sustainable development, have infiltrated the field of environmental education.

The first concept, environmental crisis, is noted as problematic because of its complexity and ambiguity. Environmental crisis is interpreted to mean a conglomeration of environmental problems and issues. There is general recognition of an environmental crisis in the literature, although the severity and extent of environmental problems is questioned by some pundits. These opponents contend that current and future environmental problems do not constitute an environmental crisis, and that environmental problems are a predicament of any industrial society. Such opposition has not been critically analysed in the environmental education literature.

In contrast, there is support among the scientific community that the environment is in a state of decline. The reasons for such decline are complex, locked in economic, political, social and cultural circumstances. However, it is noted that particular environmental issues, namely ‘overpopulation’ and ‘overconsumption’, are excluded from world-wide forums. This is problematic for both sustainable development and environmental education models.

The second concept, sustainable development, is a catch-all phrase which is fluid in its meaning and encompasses two broad views, namely ecological sustainability and technological sustainability. Accordingly, it is often asserted that sustainable development is the end purpose of environmental education. It is also noted that environmental education, at the international policy level, has embraced this recommendation. In this way, environmental education policy tends to adopt ecological sustainability characteristics. In recent times, UNESCO and other key environmental
education commentators have attempted to rename environmental education as 'education for sustainability' (EFS). This notion has received some opposition, such that the name change neutralises the term 'environmental education' and modifies the intended purpose of environmental education. So that these international policy developments can be contextualised in accordance with the research problem, I now review the policy developments and initiatives in Australia.

**Policy Developments – The Australian Case**

I discuss significant national developments and then review the relevant developments in the individual states and territories. As Queensland is the chosen location for the data collection of this thesis, I review these developments at length. I now tend to these tasks.

**Environmental Education in Australia**

Environmental education as a concept “received its first formal recognition in Australia in April 1970 at the Australian Academy of Science Conference on Education and the Environmental Crisis” (Greenall, 1986, pg.9). During the 1970s, education departments in Australia produced few policy documents about environmental education. However, in 1980 the book ‘Environmental Education for Schools’ (Curriculum Development Centre, 1981) was published and sent to all Australian schools. The contents of the document contained the principles of the UNESCO-UNEP (1976; 1977a; 1976; 1978) meetings.
Most developments in environmental education have occurred both at the national and the state and territory level in Australia. At the national level, there have been some attempts to include environmental education in the ‘agenda’. In July 1989 Prime Minister Hawke (1989, pg.iv) published ‘Our Country Our Future’ which stated that “the Commonwealth, in co-operation with State governments, will examine ways of increasing awareness and understanding of our global environment in Australia’s schools”. Five years later, the Australian Education Council (AEC) (1994) proposed ten national goals for Australian schools in the ‘Hobart Declaration’ document. One goal was dedicated to environmental education, namely to “achieve an understanding of, and concern for, balanced development and the global environment” (Australian Education Council, 1994, pg.43).

Furthermore, in 1989 the AEC as a part of the national curriculum developed eight broad learning areas four of which incorporated environmental education to varying degrees. The first area, Studies of Society and Environment (SOSE), significantly draws upon the UNESCO-UNEP environmental education principles, which the following statement illustrates:

> The area promotes the knowledge, skills, attitudes and values that enable students to participate as active and informed citizens in a democratic society and within a global community. Students deal with significant matters such as ethics, social justice and ecological sustainable development and are actively engaged in participatory action research and democratic decision making.

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13 The national curriculum was an initiative of the Keating Government in the early 1990s. It was a curriculum mapping exercise which included eight key learning area statements and profiles. It influenced state education providers from 1990 until 1993. However in 1993 Australia’s education ministers “refused to endorse the national curriculum statements and profiles” (Donnelly, 2003, pg.1). Wilson (cited in Donnelly, 2003, pg.1), the head of the Australian Curriculum Cooperation, described the national curriculum as “an unsatisfactory political and intellectual compromise”. In 2003, at a meeting of the Australian education ministers, it was decided that a national curriculum would be redeveloped and implemented in Australia.
involved in gaining knowledge and making decisions and choices (Australian Education Council, 1994, pg.3).

Gough (1997, pg.159) notes that this development is problematic as it only includes the knowledge components of environmental education, and excludes other key areas such as attitudes, skills, evaluation and participation. The implications of this will be discussed later in this section.

The other learning areas, namely Science, Technology and Health and Physical Education, also incorporate environmental education into their respective curriculum and policy documents. Technology and Health and Physical Education only include environmental education principles marginally. However, the Science learning area incorporates some environmental education principles, particularly with regards to understanding the relationships between the evolution of scientific knowledge, human endeavour and the environment.

Notwithstanding, the dominant environmental education association in Australia, the Australian Association for Environmental Education (AAEE) (2001, pg.1), states that its purpose is to “promote environmental education as defined by UNESCO-UNEP”. AAEE (2001, pg.1) further maintain that “education for a sustainable future” is their primary objective. In addition, Environment Australia (1999, pg.25), the national department of the environment in Australia, strongly advocate environmental education, as indicated in the following statement:

"The responsibility of environmental education is a shared one. The Federal Government has an important role to play in terms of national leadership,
coordination, and acting as a catalyst for positive educational initiatives in a wide range of community settings.

As such, state and territory governments have developed environmental education policies in accordance with the recommendations suggested at the national and international levels. I now briefly review such policy developments.

**Environmental Education within the States and Territories**

New South Wales (New South Wales Department of Education, 1989, 1993; NSW Council on Environmental Education, 2000, 2002; NSW Department of Education and Training Curriculum Support Directorate, 2001), Queensland (Queensland Department of Education, 1977, 1988, 1993), Victoria (Victoria Government of Victoria, 1987; Victoria Ministry of Education, 1990), South Australia (South Australia Education Department, 1987), Western Australia (Western Australia Education Department, 1977; Western Australia Ministry of Education, 1990), Australian Capital Territory (Australian Capital Territory Department of Education and Training, 1994) and the Northern Territory (Northern Territory Department of Education, 1994) education departments have all produced various policy documents for environmental education. Tasmania does not have an official policy, although a statement has been published (see Tasmania Education Department, 1976). All of these states and territories have predominantly drawn upon the recommended international and national goals, objectives and guiding principles for environmental education in the development of such policy documents. Furthermore, all states and territories have incorporated the national curriculum statements to varying degrees into their curriculum frameworks.
To this extent, some developments have been made within the different education departments in Australia, although the development of associated curriculum documents is scant (Gough, 1997). Thus, I interpret this to mean that policy goals have not transited into school systems. This is problematic because environmental education predominantly remains at the policy level, while curriculum areas such as 'Studies of Society and the Environment' (SOSE) and ‘Science Education’ which include elements of environmental education are implemented. Gough (1997, pg.159) reports "where SOSE is being implemented in schools it is just the previously taught history and geography (or humanities) under a different name, with no attention being given to the additional environmental component of the SOSE area". Such assertions are based upon no empirical research or evidence and therefore cannot be taken as conclusive. The ramifications of environmental education being primarily included (implemented) among other curriculum areas, such as SOSE and science education, are yet to be fully explored.

In 2000, the newly developed ‘Studies of Society and Environment’ learning area was implemented in Queensland schools and consequently received widespread media publicity. As Queensland is the chosen site for data collection in this thesis, this development is particularly significant. I now discuss the environmental education developments in Queensland, including the debates surrounding the ‘Studies of Society and Environment’ key learning area.

*The ‘Queensland’ Case*

In 1993 the Queensland Department of Education published the ‘P-12 Environmental Education Curriculum Guide’. This policy document was developed to assist teachers
in the implementation and integration of environmental education into their school curricula. Once again, the policy document draws upon the recommended UNESCO-UNEP goals, objectives and guiding principles for environmental education. Furthermore, it strongly advocates the integration of the three dominant environmental education approaches, namely education about the environment, education in the environment and education for the environment. Interestingly, the works of Spork (1990; 1992), Cutter (1998; 2002), Cutter-Mackenzie (2003) and Cutter-Mackenzie and Smith (2001a; 2001b; 2003) indicate that the majority of Queensland primary school teachers are not aware of, let alone implement, the P-12 Environmental Education Curriculum Guide. Such findings are further discussed later in this Chapter.

Notwithstanding, the recently developed ‘Studies of Society and Environment’ syllabus and supporting policy documents significantly incorporate environmental education principles. According to the Queensland School Curriculum Council (2000a, pg.1), the years 1 to 10 Studies of Society and Environment key learning area:

... centres on human fascination with the way people interact with each other and with environments. Studies of Society and Environment involves investigations of controversial and challenging issues and promotes critical thinking in the development of optimistic future visions. This key learning area encourages young people to be active participants in their world. Students bring to Studies of Society and Environment their understandings about what it means to be young at this time. They appreciate and apply different perspectives to deepen their understandings. Students develop abilities to reflect on the values of democratic process, social justice, economic and ecological sustainability and peace to make decisions about issues related to societies and environments.
The SOSE syllabus (Queensland School Curriculum Council, 2000a) also adopts an outcomes approach which describes what students should know and can do at each level. The syllabus is based upon four key values, namely: democratic process; social justice; ecological and economic sustainability; and peace. In addition, the syllabus consists of four strands namely: time, continuity and change; place and space; culture and identity; and systems, resources and power. Of these four stands, three strands promote, among others, the key environmental education concept ecological sustainability\(^\text{14}\). In this way, environmental education is seen to be dominant in the syllabus.

On its release, the syllabus was the centre of debate and controversy, especially the environmental education components. The debate was an interchange of opinions about the syllabus, published in Queensland’s major newspaper ‘The Courier Mail’. Reviewing the published articles, it can be seen that the basis of opposition to environmental education is related to five separate issues as set out in Table 1.6.

In response to these criticisms, the Queensland School Curriculum Council published a formal response (2000b). The Queensland School Curriculum Council (2000b) argued that such criticisms were ‘extremist’ and ‘unfounded’, and failed to consider the present state of the earth and society. They also noted that the syllabus “has received a positive response from teachers” (Queensland School Curriculum Council, 2000c, pg.2). Further, it was stated that “the education community has responded positively due to the timeliness of the syllabus and the broad consultation during its development”

\(^{14}\) According to Fraser (2001), “the key value of ecological and economic sustainability is based on the interrelationship between ecological systems and economies. It is based on a belief in the integrity of natural environments, their importance as the basic source of life support, and the wise, equitable and sustainable use of resources".
Overall, teachers were excited about the trialling and introduction of the new SOSE syllabus and sourcebook modules. The general feeling that emerged during our evaluation was that, despite some ‘teething problems’, the documents are addressing the needs of teachers, students, parents and the community.

Table 1.6. Key (Environmental Education) Criticisms Reported in the Media

<table>
<thead>
<tr>
<th>Issue</th>
<th>Media Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenpeace Curriculum</td>
<td>The curriculum “requires teachers to pay homage to the efforts of one environmental organisation, Greenpeace, over all others” (Courier Mail Editorial, 2000).</td>
</tr>
<tr>
<td>Indoctrination of Extreme Left-Winged Values</td>
<td>“The SOSE curriculum has been condemned as a plan to indoctrinate children into espousing left-wing values” (Courier Mail Editorial, 2000).</td>
</tr>
<tr>
<td>Dominance of Environmental Views, Over Economic Values</td>
<td>“The syllabus ruthlessly pushes strong environmental views and teaches next to nothing about the economy that pays the bill” (Bolt, 2000, pg.33).</td>
</tr>
<tr>
<td>Radical Environmental Perspective</td>
<td>The syllabus tells teachers that the “key value of ecological and environmental sustainability... is based on a belief in the integrity of natural environments”. The syllabus rejects the idea that the Earth is ours to use wisely. Instead it proclaims: “Get your hands off that ore, you naughty man (sic). Don’t touch that tree” (Bolt, 2000, pg.33).</td>
</tr>
<tr>
<td>Disproportionate Pro-Environment Preaching</td>
<td>The strand of Systems, resources and power is “stuffed to the gills with pro-environment preaching” (Bolt, 2000, pg.33).</td>
</tr>
</tbody>
</table>

This evaluation was conducted by an external university-based researcher. Forty-five schools were included in the evaluation. Teachers were interviewed and surveyed about the ‘structure’ and ‘framework’ of the syllabus. It must be noted that ‘students’ were not consulted in the external evaluation and review of the ‘SOSE’ syllabus. In

---

15 Personal communication with Joanne Crawford (2000) at the ‘SOSE’ Forum.
addition, the evaluation did not investigate teachers' content and/or process knowledge of the syllabus\(^{16}\). This is problematic as ‘Studies of Society and Environment’ is a relatively new area in the school curriculum and in teacher education. Therefore, it can be assumed that teachers, particularly as the average age of Queensland teachers is 41 years (Cheong, 15 February 2002), may not be trained to teach ‘Studies of Society and Environment’. The evaluation study could be interpreted as quite limited and in need of further investigation.

Nonetheless, several academics and politicians endorsed the ‘Studies of Society and Environment’ syllabus and submitted various articles extending their support (see Bartlett, 2000; Gilbert, 2000; Hoepper, 2000). For instance, Senator Bartlett (2000, pg.1) asserted that the criticisms of the ‘Studies of Society and Environment’ syllabus were ‘extremist attacks’ and noted that:

\[
\ldots \text{the Courier-Mail seems to be an ally of those bent on destroying this new curriculum, despite its own articles highlighting the inadequacies of the existing system. The opponents of the curriculum seem intent on simply ridiculing a school curriculum which has been developed over a long period of intensive consultation by experts.}
\]

Furthermore, Fien (cited in Queensland School Curriculum Council, 2000d, pg.2) said:

\[
\text{We live in a production-consumption society. What makes this syllabus exciting is the way it helps young people develop the ethical discernment that balance economic and environmental needs in their own lives.}
\]

\(^{16}\) Personal communication with Joanne Crawford (2001).
The environmental education literature includes these skirmishes in a limited way (see Cutter, 2001; Fraser & Uusimaki, 2001; Gough, 1997; Robottom et al., 2000). For example, Gough (1997) asserts that the ‘Studies of Society and Environment’ national curriculum consists mainly of knowledge-based components, rather than experiential and action-based components and that the action component of environmental education, education for the environment, is neglected. In contrast, Cutter (2001), in a review of the Queensland SOSE syllabus, concluded that the ‘outcomes framework’ is opinion driven rather than fact or content driven. To this extent, Cutter (2001) concludes that teachers’ content and process knowledge of the syllabus core content, processes, strands and values have been ‘taken-for-granted’. Cutter (2001) challenges the assumption that teachers are prepared (trained) to teach the SOSE syllabus.

In a different context, Robottom et al.’s (2000) case study of five schools found that some environmental issues are marginalised in the national curriculum, although the specific issues were not identified. Robottom et al. (2000, pg.151) concluded that environmental education was marginalised by the national curriculum because:

... it shapes how teachers respond to local environmental issues; it expresses itself in the marginalisation of environmental education and in the professional dilemmas that teachers experience in their environmental education work; it places demands on teachers’ environmentalist commitments; and it is ameliorated by the support that teachers and students gain from their local community in their collaborative environmental investigations.

17 It is important to note that the document, the Queensland state SOSE Syllabus, critiqued by Cutter is different to the national curriculum document critiqued by Gough and Robottom.
There is limited research about environmental education and its inclusion in the 'Studies of Society and Environment' key learning area. This issue is dealt with in Section Four of this Chapter and later in Chapter Four.

Summary

In this section I reported that developments in environmental education have occurred at the national and state and territory levels in Australia. At the national level, environmental education has been incorporated into several learning areas. In particular, 'Studies of Society and the Environment' draws upon the UNESCO-UNEP environmental education principles. Furthermore, leading environmental education groups promote environmental education as defined by UNESCO-UNEP.

New South Wales, Queensland, Victoria, South Australia, Western Australia, Australian Capital Territory and the Northern Territory education departments have all produced policy documents for environmental education, although the development of associated curriculum documents is scant. However, environmental education is predominately incorporated into and practised through existing curriculum areas; principally the 'Studies of Society and the Environment' (SOSE) key learning area. This is problematic because environmental education largely remains at the policy level, while curriculum areas such as 'Studies of Society and the Environment' (SOSE) are implemented. Teachers' preparedness in SOSE and the extent to which SOSE is practised, specifically its environmental education components, has not been explicitly investigated. The implications of concentrating environmental education into specific curriculum domains are yet to be fully explored. In order to investigate the research
problem, which necessarily involves exploring this issue, I now review the underlying philosophies, ideologies and approaches of environmental education.

**Environmental Education Approaches -**

*The Academic Perspectives and Arguments*

In this section I review the subsidiary and dominant approaches in environmental education, namely education *about* the environment, education *in* the environment and education *for* the environment. In this review I critically review various perspectives and arguments. I now proceed with this task.

*Education ‘About’, ‘In’ and ‘For’ the Environment*

As might be expected, there are a variety of views about the role of environmental education. A number of approaches have been developed, including: education *about* the environment, education *in* (or *through*) the environment and education *for* the environment. In Australia, these approaches are the “common slogans of the environmental education movement” (Gough, 1997, pg.xi).

For the past two decades education *for* the environment has been identified as the preferred environmental education approach, with education *about* the environment and education *in* the environment considered to have subsidiary roles insofar as providing the necessary skills and knowledge to support education *for* environment (Fien 1992, 1993b, 2000). To this extent, it is often argued that “only education *for* the
environment, or combinations including this class, could be classified as environmental education” (Linke 1980, cited in Jickling & Spork, 1998, pg.312).

In 1983 Huckle analysed different approaches by positioning them within educational and environmental ideologies to identify their assumptions, intentions and effects (see Fien, 1992). Figure 1.2 conveys Fien’s (1992) interpretation of these findings. Specific educational and environmental ideologies formulate the theoretical basis for these three approaches and therefore describing and defining such concepts is necessary before reviewing the different approaches.

**Figure 1.2. Environmental Education Ideologies (Fien, 1992, pg.44)**

<table>
<thead>
<tr>
<th>ENVIRONMENTAL IDEOLOGY</th>
<th>EDUCATIONAL IDEOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vocational / Neo-classical</td>
</tr>
<tr>
<td>Technocentric</td>
<td>Cornucopian</td>
</tr>
<tr>
<td></td>
<td>Accommodation Managerialism</td>
</tr>
<tr>
<td></td>
<td>Communalism Ecosocialism</td>
</tr>
<tr>
<td></td>
<td>Gaianism Utopian</td>
</tr>
</tbody>
</table>

**Educational Ideology**

An educational ideology provides an orientation to guide educational decisions,
together with explaining associated consequences. There are a variety of values and beliefs embedded within educational ideology and, as such, numerous philosophers have attempted to define, theorise and elucidate the term ‘ideology’ (see Bennett & Jordan, 1975; Brandt, 1988; Ennis & Hooper, 1988; Hammersley, 1977; Kemmis et al., 1983; Miller & Seller, 1985). For example, Kemmis, Cole and Suggett (1983) use three orientations to explain educational ideology, namely the vocational/neo-classical orientation, the liberal/progressive orientation and the social-critical orientation. I have selected this example because it is often utilised in the environmental education literature.

The **vocational/neo-classical** orientation:

... is vocational in two senses: in the sense that it prepares students for work, and in the sense that it identifies and develops the sense of vocation students reveal through their participation in school life. It is ‘neo-classical’ in the sense that its view of the substance of education is based on time honoured beliefs about what is worth knowing (skills and disciplinary knowledge), revived and reinterpreted for the modern world (Kemmis et al., 1983, pg.9).

Proponents of this orientation “see themselves as ‘realist’: the world is hierarchically-ordered and the best endowed (in ability and background) will in any case find their way to the most rewarding positions” (Kemmis et al., 1983, pg.9).

The **liberal/progressive** orientation adopts an individualist position through its proposition that the development of the autonomous person is the aim of education. As such, this orientation:
... sees education as for the 'whole person' rather than as instrumental; as a personal value to be developed rather than as a set of tools to be used in work. And it sees society as open to (and needing) reconstruction.

In contrast, the social-critical orientation maintains that individual action is an inadequate strategy in the improvement of society. Moreover, the social-critical orientation maintains that collective social action is the most effective strategy with regards to bringing about societal change. With this in mind, this ideology propounds that "education must engage society and social structures immediately, not merely prepare students for later participation" (Kemmis et al., 1983, pg.9).

Later in this section of the Chapter I critically review these ideologies. However, I now define 'environmental ideology', before outlining their significance to the three different environmental education approaches.

Environmental Ideology

There are two broad environmental ideologies which Pepper (1984) classifies as anthropocentric and ecocentric. At the simplest level, the anthropocentric perspective, also known as the technocentric perspective, is grounded upon the belief that the environment is a resource to be used, whereas the ecocentric perspective is said to value the environment for 'its own sake' (see Eckersley, 1992). O’Riordan (1990, pg.143) argues that this dichotomy represents:
... the clash of two world views ... between those who believe that the earth is capable of being improved or manipulated for the benefit both of human kind as well as for life on earth itself, and those who believe that human beings should at best be only equal with other forms of life on the planet and that societies must learn to adjust their economics and aspirations so as to cohabit with the imperatives of earth and life processes for the survivability, or sustainability, of the earth.

Figure 1.3 represents O'Riordan’s (1981) work and outlines the different perspectives as a continuum.

Table 1.7 illustrates the key indicators of each perspective, in addition to the results of European opinion polls about environmental politics and resources management. The contrary position to the ecocentric perspective is the technocentric perspective which is "the application of rational and 'value-free' scientific and managerial techniques by a professional elite, who regard the natural environment as 'neutral stuff' from which man (sic) could profitably shape his (sic) destiny" (Hays, 1959, cited in O'Riordan, 1981, pg.1). The technocentric perspective is made up of two perspectives, namely the 'accommodationist' perspective and the 'cornucopian' (intervention) perspective. The 'cornucopian' position maintains that progress is a result of science, technology and
politics, and any obstacles can be resolved by these means (see Cotgrove, 1982; O'Riordan, 1981). Further, the 'accommodationists' are those who acknowledge that:

... some concessions must be made towards redistribution and environmental protection but who do so by accommodating to the demands of the ecocentrists rather than responding with radical reforms (O'Riordan, 1981, pg.377).

Table 1.7. European Perspectives on Environmental Politics and Resource Management: Contemporary Trends in Environmentalism (O'Riordan 1989, pg.85)

<table>
<thead>
<tr>
<th>Ecocentrism</th>
<th>Technocentrism (Anthropocentrism)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaianism</td>
<td>Communalism</td>
</tr>
<tr>
<td>Faith in the rights of nature and of the essential need for co-evolution of human and natural ethics</td>
<td>Faith in the cooperative capabilities of societies to establish self-reliant communities based on renewable resource use and appropriate technologies</td>
</tr>
<tr>
<td>Green' supporters; radical philosophers</td>
<td>Radical socialists: committed youth: radical-liberal politicians; intellectual environmentalists</td>
</tr>
<tr>
<td>0.1-3% of various opinion surveys</td>
<td>5-10% of various opinion surveys</td>
</tr>
<tr>
<td>Demand for redistribution of power towards a decentralised, federated economy with more emphasis on informal economic and social transactions and the pursuit of participatory justice</td>
<td></td>
</tr>
<tr>
<td>Communalism</td>
<td>Accommodation</td>
</tr>
<tr>
<td>Faith in the co-operative capabilities of societies to establish self-reliant communities based on renewable resource use and appropriate technologies</td>
<td>Faith in the adaptability of institutions and approaches to assessment and evaluation to accommodate to environmental demands</td>
</tr>
<tr>
<td>Radical socialists: committed youth: radical-liberal politicians; intellectual environmentalists</td>
<td>Middle-ranking executives; environmental scientists; white collar trade-unions; liberal-socialist politicians</td>
</tr>
<tr>
<td>5–10% of various opinion surveys</td>
<td>55–70% of various opinion surveys</td>
</tr>
<tr>
<td>5–10% of various opinion surveys</td>
<td>55–70% of various opinion surveys</td>
</tr>
<tr>
<td>Belief in the retention of the status quo in the existing structure of political power, but a demand for more responsiveness and accountability in political, regulatory, planning and educational institutions</td>
<td></td>
</tr>
</tbody>
</table>

Conversely the ecocentric ideology maintains that:
... no habitable future is possible without a fundamental change of attitude away from a sense of technological hubris towards a much more humble and humane approach of harmony with ecological processes and a sense of true association with the earth (O’Riordan, 1981, pg.377).

The ecocentric ideology also includes two perspectives, namely the Gaianist perspective and the communalist perspective. The Gaianist perspective is based upon Lovelock’s (1979, pg.vii) Gaia hypothesis which proposed that “the earth’s living matter, air, oceans, and land surface form a complex system which can be seen as a single organism and which has the capacity to keep our planet a fit place for life”. The Gaianist promotes a relationship of reverence between human kind and the environment. Seed et al. (1988, cited in Fien, 1993a, pg.28) characterizes this relationship as “the self ennobled and extended... as part of landscape and the ecosystem, because the beauty and complexity of nature ... (are) continuous with ourselves ... (and) affirm that the world is a being, a part of our own body”. To this end, the Gaianist maintains that “ecological laws should regulate social relationships and institutions so that the ‘Utopian’ ideal of man (sic) as a cooperative being living in harmony with his (sic) natural surroundings in a classless society can govern human behaviour” (O’Riordan, 1977, cited in Fien, 1993a, pg.28).

The other ecocentric perspective is the ‘communalist’ perspective (O’Riordan, 1981). This perspective is also referred to as ecosocialism (see Frankel, 1990) and/or human welfare (see Eckersley, 1992). According to O’Riordan (1989, pg.89-90), in the communalist mode:
... economic relationships are intimately connected with social relationships and 
feelings of belonging, sharing, caring, and surviving... Communalism feeds on 
idealism, in faith in the inherent cooperative character of humankind, and in the 
ability of cooperative people to realise that they can achieve their ends more 
safely and expediently through cooperation rather than conflict.

The Communalist perspective is considered to be the integration of current economic 
system values and the ecocentric ideology (see Naess & Rothenberg, 1989; O'Riordan, 
1981, 1989). It portrays the environment as socially constructed and seeks to achieve 
harmonious relationships between society and nature and individuals and groups.

Gough et al. (2000, pg.45) argue that the O’Riordan analysis (model) is flawed, such 
that they maintain that the “radical (eco) socialist (communalism) perspective can be 
seen as much interventionist and hierarchical as other techno anthropocentric positions – 
simply brokered by the institutions of the state rather than by the market”. This 
analysis is particularly relevant in a critique of education for the environment as this 
approach encompasses a communalist disposition. Such arguments are reviewed in the 
analysis of education for the environment which appears later in this section. I now 
discuss the three environmental education approaches, education about, in and for the 
environment.

*Education ‘About’, ‘In’ and ‘For’ the Environment – A Critique*

For the past three decades the three different approaches, education about, in and for the

\[18\] Of course, there are various different perspectives about the discussed educational and environmental 
ideologies. However, such issues become particularly relevant in Chapter Two and will be discussed 
there accordingly. Nonetheless, the debates will be highlighted in the next section and the terminology 
will be utilised to position the various environmental education approaches.
environment, have dominated the academic literature in environmental education. This is particularly the case in the Australian academic literature. The key pundits are Fien (1988; 1992; 1993a; 2000; 1996; 1993b), Huckle (1983; 1986; 1991), Gough (Greenall) (1997; 1981; 1986), Gough (1987), Linke (1980) and Robottom (1987). These positions dominate the field, but as Gough (1997, pg.48) points out, "there has been little questioning of the categorisation of environmental education as education in, about and/or for the environment". Thus, I now discuss, describe and critique the approaches education about the environment, education in the environment and education for the environment.

Education about the Environment

According to Fien (1992) and Huckle (1983), the approach education about the environment is derived from the technocentric environmental ideology through its emphasis on teaching scientific facts and concepts about environmental processes, issues and problems. As such, Fien (1992) and Huckle (1983) consider that its education ideology is vocational and liberal. Further, this approach, similar to that of the technocentric ideology, consists of two forms. In Fien's (1992) view, this approach is a taxonomy and includes two versions.

The first version of education about the environment promotes the cornucopian environmental ideology and the assumptions of vocational and neo-liberal classical education. In Fien's (1992) opinion, this approach positions the environment as the lowest common dominator for which humans should control and manipulate with science and technology.
According to Fien (1992), the second version of education about the environment is typically reflected in geography and SOSE (Studies of Society and the Environment) courses. He hypothesises that these courses usually incorporate liberal/progressive values and the accommodationist, technocentric ideology. He also asserts that inquiry-based learning techniques, such as problem solving, are often utilised to develop the students’ abilities to accommodate to environmental problems. To this end, both forms of education about the environment, according to Fien (1992) and Huckle (1983), assume that all environmental problems can be solved through scientific and technological innovations, such that the patterns of human behaviour and development are ignored. In Robottom’s (1987, pg.103-104) view education about the environment is:

... one centred on rationality, objectivity, truth and control – environmental education as education about the environment creates the impression that environmental problems are susceptible to resolution through technical, applied science means… The impression is that, given sufficient time and knowledge about an environmental issue, an appropriate course of action will emerge and the best solution will be discovered… The technocentric worldview promoted by education about the environment ignores the important qualitative dimension of the majority of environmental issues which involve ‘quality of life’ or ‘social need’ concerns – emotions, beliefs, aspirations, aesthetics and, perhaps most important of all, vested interested.

For these reasons, education about the environment has gained little support in the field of environmental education. However, little debate exists with regards to explaining why this particular approach is not desirable. Interestingly, the environmental
education components in the ‘Studies of Society and the Environment’ key learning area are said to predominantly draw upon education about the environment (Gough, 1997). This issue has not been discussed in the environmental education literature and is thus problematic for environmental education because education about the environment is considered to be an undesirable approach (see Fien, 1992, 1993a, 1995, 1997, 2000, 1996; Fien & Trainer, 1993b; Huckle, 1983; 1986; 1991).

Education in the Environment

Fien (1992) states that education in the environment, also known as education through the environment, is an experiential approach which seeks to develop students’ interests and values in the natural environment. Gaianist ecocentric values are reflected in this approach which in Huckle’s (1986, pg.13) view leads to “a rather naïve respect for both children and ecology” as “nature and the child are thought to have rights and education and society (are) reshaped to take account of laws of natural development and ecology”. In this vein, Huckle (1986) argues that education in the environment is a romantic approach to environmental education which ignores the capitalist and materialistic nature of society.

Similarly, Uzzell, Rutland and Whitance (1995, pg.179) argue that the experiential approach in environmental education only further separates children from the environment as, in their minds, children cannot “relate the scientific (environmental) content of their lessons to the social world they inhabit”. For these reasons, Fien (1988; 1992; 1993a; 2000; 1996; 1993b), Huckle (1983; 1986; 1991), Maher (1986) and Uzzell, Rutland and Whitance (1995) argue that environmental education must link social and political issues and the relationships of such issues with environmental
In this way, Fien (1988; 1992; 1993a; 2000; 1996; 1993b) and Huckle (1983; 1986; 1991) have strongly advocated the approach education for the environment, also referred to as education for sustainability. Notwithstanding, education in the environment has received very little discussion and critique in the literature and, as an approach, is in need of further investigation.

Education for the Environment

Commentators of education for the environment (see Fien, 1988, 1992, 1993a, 2000, 1996; Fien & Trainer, 1993b; Huckle, 1983; 1986; 1991; Maher, 1986; Randle, 1989; Uzzell et al., 1995) position this approach as the most radical approach in environmental education. To this extent, education for the environment has dominated the field (especially in Australia), at the theoretical level, through maintaining a socially critical approach in education and a strong communalist (ecosocialist) environmental ideology.

According to Fien (1992, pg.48), “education for the environment seeks to develop (what) is often summed up under the rubric of think globally – act locally”. Fien (2000, pg.183) argues that it is “based upon and embodies education in and about the environment”. However, Fien (1988; 1992; 1993a; 2000; 1996; 1993b) has often implied that education in and about environment are inappropriate approaches, which therefore highlights a contradiction in his works because if education for the environment is based upon these approaches then surely the problems he identified will also reoccur. This issue has not been mentioned in the literature and thus requires further theorising.
Although education for the environment has been endorsed by some environmental educators as the end purpose of environmental education, there are a growing number of researchers who argue that education for the environment is theoretically flawed (see Cutter-Mackenzie & Walker, 2003; Gough, 1987; Jickling, 1991, 1992, 1994; Jickling & Spork, 1998; Walker, 1997). In the literature, four issues have been identified as the basis of these criticisms. These are:

1. its indoctrination and anthropocentric tendencies;
2. its definitive usage of the concept sustainable development;
3. its inappropriate use of social-critical theory; and
4. the lack of empirical research concerning the implementation of education for the environment in school systems.

I now discuss these criticisms in further detail.

One, Fien (1988; 1992; 1993a; 2000; 1996; 1993b) maintains that education for the environment addresses the weaknesses and anthropocentric tendencies of other environmental education approaches, such as education about the environment, through its adoption of the eco-socialist position. Gough (1987, pg.50), however, challenges this proposition:

... there has been little exploration of what it might mean to have a deeply ecological understanding of education itself. Environmental educators have largely been content to see ecology as a subject matter – something transferred to learners. While it has been recognised that environmental education ought not to be merely education in or about environments, I am not convinced that
the popular slogan of ‘education for the environment’ is much of an improvement. Apart from being somewhat patronising and anthropocentric (who are we to say what is ‘good for’ the environment, and which environment is ‘the environment’, anyway?), this slogan maintains the sorts of distinctions that tend to work against a deeply ecological worldview – distinctions between subject and object, education and environment, learner and teacher.

As such, Jickling and Spork (1998, pg.321) also criticise the use of the word ‘for’ in the approach ‘education for the environment’, as in their view it “implies that there is a valuer who is external to the environment and who is capable of determining what is good for the environment”. Jickling and Spork (1998, pg.321) argue that “this is the essence of anthropocentrism” as the construct of language reinforces the dominance of human beings over the non-human (environment) world. To this extent, Jickling and Spork (1998, pg.314-315) utilise the following example to stress the point:

Consider the impact of announcing you will teach education for the environment in a community which is heavily resource dependent, especially one embroiled in controversial decisions of the kind which pit environmental protection against the loss of jobs. Taken literally, the woodchipper from Queensland or the pulp maker from British Columbia would naturally, and quite justifiably, be up in arms; there is a very clear inference that your programme would, in being for the environment, be against them. There would be immediate suspicion and speculation about the values that you may plan to promulgate. It should not surprise the various researchers that education for the environment has been slow to be adopted. Both the literal interpretation and the historically descriptive definitions point to the same thing. This semantic construction
employs the language of activists, not educators... To educate is not to promulgate, indoctrinate, propagandise or in any other way coerce students into adhering to predetermined attitudes, assumptions or values.

Moreover, Jickling and Spork (1998) suggest that environmental education ought to encourage students to study and critique the ideologies which underpin the very relationships which make up society, rather than being indoctrinated into one particular ideology. I interpret this research to mean that ‘education for the environment’ is problematic because its advocates assume that its chosen ideology is non-problematic and therefore position it as the only appropriate solution for a sustainable future. However, its chosen ideologies have been critiqued extensively and the field of environmental ideology is not as conclusive as Fien (1988; 1992; 1993a; 2000; 1996; 1993b) implies. For example, Fien (2000, pg.181) argues that the values and principles underlying the eco-socialist (or communalist) ideology “have been extensively analysed in the literature and justified in terms of particular educational, social and ecological criteria”. This is true inasmuch as that this ideology has been reviewed, although justification for its usage in education has been limited to the works of Fien (1988; 1992; 1993a; 2000; 1996; 1993b) and Huckle (1983; 1986; 1991).

Gough et al. (2000) argue that the eco-socialist (communalist) position is ultimately flawed. They contend that the eco-socialist perspective is anthropocentric (technocentric) because of its ‘big-business, government and state (hierarchical) controlled’ characteristics. The authors offer Table 1.8 as an alternative approach.
Table 1.8. An Alternative to O’Riordan’s Model – Organised Along the Single Dimension of Ecocentrism and Anthropocentrism (Gough et al. 2000, pg.45)

<table>
<thead>
<tr>
<th>Ecocentric</th>
<th>Anthropocentric (Technocentric)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaianism</td>
<td>Accommodation</td>
</tr>
<tr>
<td>Trust ‘Gaia’ above all</td>
<td>Value ‘life’ above all</td>
</tr>
<tr>
<td>Communalism</td>
<td>Intervention (Cornucopian)</td>
</tr>
<tr>
<td>Value ‘fairness’ above all</td>
<td>Value ‘progress’ above all</td>
</tr>
</tbody>
</table>

Two, as mentioned earlier, sustainable development has infiltrated the field of environmental education. In this vein, education for environment is also referred to as education for sustainability (EFS). The chosen model of sustainable development represents both ecological and technological views of sustainability, as shown in Gough’s (1997, pg.30) definition:

For development to be sustainable it must take account of social and ecological factors, as well as economic ones; of the living and non-living resource base; and the long term as well as the short term.

Jickling and Spork (1998), once again, insisted that this definitive stance offered in education for the environment is indoctrination. Jickling (1992, cited in Jickling, 1994, pg.116) argues that students must be taught to engage in the various debates:

I would like my children to know about arguments that support it and attempt to clarify it. But, I would also like them to know that sustainable development is being criticized, and I want them to be able to evaluate that criticism and participate in it if they perceive a need. I want them to realize that there is a debate going on between a variety of stances, between adherents of an ecocentric worldview and those who adhere to an anthropocentric worldview. I want my children to be able to participate intelligently in that debate. To do so,
they will need to be taught that those various positions also constitute logical arguments of greater or less merit, and they will need to be taught to use philosophical techniques to aid their understanding and evaluation of them.

Fien and Trainer (1993b, pg.16) assert that Jickling’s (1992) argument about treating all positions equally “ignores fundamental questions of power and social reproduction in the formation of individual identity and personal decision making” and further ignores the value-laden aspect of education. With respect to the first point, Fien and Trainer (1993b) allege that all liberal theorists ignore issues of power and social reproduction, thus clearly omitting the possibility that “the interests of labelled liberals” are not necessarily irreconcilable with those interests of political and critical theorists (Jickling & Spork, 1998, pg.319).

Fien and Trainer (1993b) also argue that Jickling’s (1992) arguments ignore the value-laden aspect of education as they maintain that education for the environment is not value neutral and that education cannot be neutral. However, Fien and Trainer (1993b) ignore the issue that education is based upon hidden value assumptions and education, as a system, rarely encourages its students to be critical of it (see Orr, 1992). This is the case, according to Orr (see 1990; 1992; 1994) and Weston (1996), because some current education practices are part of the problem and therefore contrary views that question this are dismissed. Interestingly, Fien (2000) did not address this issue in his analysis of Jickling and Spork’s (1998) critique. Rather, Fien (2000, pg.187) reinforces the point by stating “education for the environment seeks not to indoctrinate but to educate for a body politic comprised of people able to act to maintain the best of what we have, to change the unsustainable, and to build the desirable”.

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Three, Walker (1997, pg.158-159) argues that the use of social-critical theory in ‘education for the environment’ is an inappropriate theory because “socially critical environmental education does not cohere, in many cases, with practitioners’ theories of teaching, learning and curriculum”. Robottom (1987, pg.95) further maintains:

… if conventional curriculum is a jigsaw puzzle made of subject pieces, then environmental education may be a piece of a different puzzle altogether.

Walker (1997, pg.161) argued that environmental education, especially education for the environment, is yet to be implemented successfully because “for many practitioners the social critical theory not only fails to give them an implementation theory, it de facto denies their own practical knowledge”. As such, she concluded that “a more adequate theory is required” for environmental education (Walker, 1997, pg.161).

Walker (1995a) further explains that the humanist socially critical framework which has dominated the field of environmental education, tends to oppose scientific (and environmental) research and knowledge. No Australian studies to date, other than the recent works of Cutter-Mackenzie and Smith (2001a; 2001b; 2003), Cutter-Mackenzie and Walker (2003) and Cutter-Mackenzie and Tilbury (2002), have actually investigated Australian primary school teachers' knowledge, specifically ‘pedagogical content knowledge’, about environmental education and environmental concepts19. In this respect, the need for theoretical advancement in environmental education is evident and timely.

19 The content of these publications was largely generated from this study. The relevant findings are presented later in this thesis.
Four, in the debates there is little evidence of the successful implementation of ‘education for the environment’, nor any other forms of environmental education, in primary school systems. I interpret such findings to mean that little is known regarding the implementation and/or effectiveness of dominant and subsidiary environmental education approaches in the teaching and learning of environmental education. Furthermore, there is a dearth of empirical research about teachers’ knowledge and beliefs about the environment and education in and about the area. In order to begin the process of assessing primary school teachers’ knowledge and beliefs about environmental education (including its approaches), in the next section I review the various studies which have investigated the latter. Before proceeding to this discussion, I now conclude this section.

Summary

There are a variety of disparate views about the role of environmental education. The various approaches include: education about the environment, education in (or through) the environment and education for the environment.

Education about the environment, encompassing technocentric ideologies, has gained little support and received limited discussion in the field of environmental education. Interestingly, the environmental education components in the ‘Studies of Society and the Environment’ key learning area are said to predominantly draw upon education about the environment. This issue has not been discussed in the environmental education literature and is thus problematic for environmental education because education about the environment is considered to be an undesirable approach.
Education in the environment, which incorporates Gaianist ecocentric values, is considered to be a ‘naïve’ and ‘romantic’ approach which ignores the capitalist and materialistic nature of society. For these reasons, certain environmental educators have strongly advocated the approach education for the environment, also referred to as education for sustainability.

There are a growing number of researchers who argue that education for the environment is theoretically and conceptually flawed. Four issues have been identified as the basis of these criticisms. These include: its indoctrination and anthropocentric tendencies; its definitive usage of the concept sustainable development; its inappropriate use of social-critical theory; and the lack of empirical research concerning the implementation of education for the environment in primary school systems.

To this end, it appears that the field of environmental education is characterized by theoretical assumptions, flaws and contradictions and a dearth of empirical research. Thus, it can be seen that a review of teachers’ practices, knowledge and beliefs about environmental education is a necessary step in unraveling some of the empirical and theoretical gaps in the field of environmental education.

**Environmental Education in Australian Primary Schools – Policy ‘versus’ Practice**

In this section, I describe and critically review the empirical research concerning primary school teachers’ practices of, knowledge about and beliefs towards

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20 As mentioned earlier, this study does not focus specifically on teachers’ practices of environmental
environmental education. I discuss the national, state and regional studies which have been undertaken in Australia. I now tend to this task.

Environmental Education Practice

There are over 60 million teachers in the world – and each one is a key agent for bringing about the change in lifestyles and systems that we need (UNESCO, 2002, pg.11).

Many authoritative international documents confirm the important role that teachers play in bringing about the social change needed to address environment and sustainable development concerns (Tilbury 1993; 1994; 2002). Teachers are seen as key multipliers who can help society learn from past actions, question current relationships with the environment and consider actions towards a sustainable future. In this vein, Fien and Tilbury (1996, pg.33) stress that:

The key to successful environmental education is the educator. If teachers do not have the knowledge, skills and commitment to environmentalize their curriculum, it is unlikely that environmentally literate students will be produced.

Notwithstanding, little is known about the extent to which environmental education has been incorporated into school systems, particularly in regards to primary schools21. In Australia, there have been relatively few empirical investigations of primary level education. This study focuses on teachers' knowledge and beliefs about environmental education. The issue of practice was only explored to the extent that it related to knowledge and beliefs. 
21 As indicated earlier, there is no more known about environmental education at the primary school level than there is at the secondary and tertiary levels. However, this thesis specifically focuses upon primary level environmental education.
environmental education. Despite the rising levels of policy advocacy for environmental education, the evaluation studies that have been conducted indicate that policy expectations are rarely met (see Cutter, 1998; Cutter & Smith, 2001a, 2001b; Cutter-Mackenzie, 2003; Cutter-Mackenzie & Smith, 2003; Cutter-Mackenzie & Tilbury, 2002; Cutter-Mackenzie & Walker, 2003; Gough, 1997; Greenall, 1981; Linke, 1980; Murdoch, 1989; Phipps, 1991; Spork, 1990, 1992; Walker, 1995a, 1995b).

Only three large-scale (national) studies about environmental education practice at the primary school level have been undertaken in Australia. I now discuss these studies, before reviewing the state-wide and regional investigations which have been carried out.

In 1973 and 1974 Linke (1980) conducted a national study of environmental education, utilising both quantitative and qualitative methodologies. In short, Linke’s (1980) study revealed that teachers’ practice of environmental education is scant, and that primary school teachers’ knowledge of environmental education was quite limited. Linke (1980) also discovered that environmental education was occasionally included with other discipline areas, namely science education and social studies (Studies of Society and Environment).

Robottom et al. (2000) conducted a qualitative study, using a case study methodology, in five different Australian primary schools. Like Linke (1980), Robottom et al. (2000) also found that environmental education is most often incorporated into subjects such as ‘Studies of Society and Environment’. They also reported that, in some cases, “environmental education curriculum has moved out of the school and into the community” (Robottom et al., 2000, pg.146). As such, Robottom et al. (2000, pg.160)
discovered five issues which have impeded the implementation of environmental education. These are:

1. the systemic and institutional marginalisation experienced by environmental education in this time of a national curriculum;
2. the links that schools, active in environmental education, establish with the community;
3. the diversity and contextuality of the environmental education curriculum work;
4. the professional dilemmas regularly experienced by teachers of environmental education; and
5. the level of personal commitment to environment evinced by teachers of environmental education.

Robottom et al. (2000, pg.157) concluded that “behind every successful environmental education program is a committed teacher”.

Stapp and Stapp (1983) conducted 530 interview sessions about environmental education with various people, including primary and secondary school teachers, students, educational organisations, ministers of education and the environment, business and industrial representatives and the general public. This study outlined over one hundred items identifying the environmental education advancements, with regards to policy and curriculum, at the state and territory levels in Australia. Despite a rigorous methodological approach, this study was limited as issues to do with teachers’ practices, knowledge and beliefs about environmental education, for example, were not thoroughly investigated.
Other than the studies of Linke (1980), Robottom et al. (2000) and Stapp and Stapp (1983), only small-scale regional (see Clark & Harrison, 1997; Cutter, 1998; Phipps, 1991; Skamp, 1996; Spork, 1990, 1992; Walker, 1995a, 1995b) and state (see Cutter & Smith, 2001a, 2001b; Cutter-Mackenzie & Smith, 2003; Cutter-Mackenzie & Walker, 2003; Education Department of Victoria, 1981; Greenall, 1981) investigations have been carried out.

All of these studies, save Skamp (1996) and Clark and Harrison (1997), claim that the present state of environmental education practice is substandard. Contrary to wider belief (see Cutter, 1998; Cutter & Smith, 2001a, 2001b; Cutter-Mackenzie, 2003; Cutter-Mackenzie & Smith, 2003; Cutter-Mackenzie & Walker, 2003; Education Department of Victoria, 1981; Greenall, 1981; Phipps, 1991; Spork, 1990, 1992; Walker, 1995a, 1995b), Skamp’s (1996) and Clark’s and Harrison’s (1997) New South Wales regional studies suggest that teachers are practising environmental education action components, namely education for the environment. Clark and Harrison (1997, pg.34), hypothesise that “many Australian primary schools are addressing environmental education, although they might not call it that”.

Notwithstanding, Spork (1990; 1992) claims that primary school teachers consider environmental education to be an important learning area, but seem to lack the skills and knowledge to effectively practice (teach) environmental education. Similar statements have also been echoed in the works of Cutter-Mackenzie and Smith (2001a, 2001b, 2003), Cutter-Mackenzie and Walker (2003), Gough (1997), Greenall (1981), Murdoch (1989) and Phipps (1991)\(^\text{22}\). To date, Spork’s (1990) study remains to be the only Queensland study, since Linke’s (1980) national study, of primary school teachers’

\(^{22}\) There are many barriers which impede the implementation of environmental education in primary schools. Such barriers are discussed in the subsequent section, The 'Queensland' Case.
knowledge, beliefs and practices of environmental education. Therefore, her study is particularly significant, and I now briefly recount the conclusions of Spork's (1990) investigation.

*The 'Queensland' Case*

Spork (1990; 1992) randomly selected and surveyed 300 state primary school teachers from the Brisbane north region and achieved a 76 percent (228 teachers) response rate. Spork (1992) noted that this study was neither conclusive nor representative of all Queensland and Australian primary school teachers. In effect, the purpose of her study was to determine the level of environmental education practice, particularly in relation to education *about* the environment, education *in* the environment and education *for* the environment.

As illustrated in Figure 1.4, Spork (1992, pg.151) found that education *in* and *about* the environment are the dominant approaches used in classroom programs by primary school teachers in the south-eastern region of Queensland. As such, she found that the practice of education *for* the environment among the primary school teachers in question was relatively low even though the research and literature argues that education *for* the environment is central to environmental education. Similarly, it was noted, in relation to teachers' beliefs about the different levels of importance of education *in, about* and *for* the environment, that the sampled teachers considered education *in* and *about* the environment to be of more importance than education *for* the environment.
The sampled teachers also conveyed positive attitudes towards environmental education. As indicted, this sample of primary school teachers ranked environmental education to be the second most important learning area, out of eight non-key learning areas, for inclusion into classroom programs:

Figure 1.4. Aspects of environmental education included in classroom programs over the last twelve months by full-time state primary classroom teachers (Spork, 1992, pg.151)23

1. HRE (Human Relationships Education);
2. Environmental Education;
3. Sports and Recreation Education;
4. Computer Education;
5. Multi-cultural Education;
6. Music Education;

23 Printed with the permission of author (Spork, 1992).
7. Drama;
8. LOTE (languages other than English) (Spork, 1992).

Notwithstanding the relative importance given to environmental education as a whole, this sample had received relatively little training to teach environmental education. Figure 1.5 indicates that only 4.9% of these teachers received pre-service environmental education training and only 6.6% received such in-service training.

Figure 1.5. Types of training in environmental education received by full-time state Primary classroom teachers in Brisbane North region (Spork, 1992, pg.152)

Among the reasons offered for low levels of environmental education practice are a perceived lack of teacher training in environmental education and time and resource constraints for teachers (Spork, 1990, 1992). Spork (1992) suggests that this lack of professional development may be the reason why, although primary school teachers consider environmental education to be an important learning area, fail to effectively

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24 Printed with the permission of author (Spork, 1992).
implement environmental education programs. The teachers in this sample identified several major concerns consistent with this analysis, including:

(a) lack of time;
(b) lack of resources;
(c) lack of own knowledge and skills in this area; and
(d) lack of own knowledge of departmental regulations on such activities (Spork, 1992, pg.159).

These concerns are echoed in similar studies conducted in Australia by Linke (1980), Greenall Gough (1981) and Walker (1995a; 1995b). Additionally, similar concerns have been noted among European teachers (Blackwell & Harris, 1996) and United States of America teachers (Ham & Sewing, 1987).

Spork’s (1992) analysis emphasised issues (c) and (d) as the primary cause for the implementation of environmental education being less effective than it otherwise might be. Walker’s (1997, pg.160) findings add to Spork’s (1992) conclusions, such that it was found that “a difference, or ‘gap’ between theories held by policy makers, curriculum developers and educational researchers and the theories held by practitioners” hamper the implementation of environmental education.

As a consequence of Spork’s (1990; 1992) study and the other studies indicated earlier (see Board of Teacher Registration, 1993; Fien, 1996; Greenall, 1981; Linke, 1980; Tilbury, 1992), environmental education research has tended to conclude that the problems of effective implementation of environmental education are due to a perceived lack of adequate pre-service and in-service environmental education training.
Thus, the provision of further or restructured teacher education has been identified as the ‘priority of priorities’ for environmental education (UNESCO-UNEP, 1990).

However, such propositions tend to be based on both a lack of empirical evidence and a theoretical presumption that environmental education and the structure, politics and organisation of school systems are unproblematic (Walker 1995a; 1995b; 1997). Spork’s (1990; 1992) study has contributed to this phenomenon through her recommendation that more teacher-education was warranted because teachers possess inadequate “knowledge of how to do environmental education or what environmental education is”. However, her study was not a dedicated study of teachers’ environmental education knowledge. Her questionnaire only questioned teachers about general concepts in the three different approaches, particularly education for the environment. Environmental education consists of many concepts and varied forms of pedagogy which Spork (1990; 1992) failed to include in her research design. Further, Spork (1990; 1992) did not pay heed to the problematic nature of ‘education for the environment’, nor environmental education for that matter. Thus, it appears that her conclusions about primary school teachers and what they might or might not know about environmental education were indicative but require further and deeper investigation.

In this way, Spork’s (1990; 1992) study offers a valuable, but partial view of the state of environmental education in primary schools at that time, and as Walker (1994, cited in Clark & Harrison, 1997, pg.28) says “the problem of incorporating environmental education in the school curriculum is not much closer to being resolved in the 1990s than it was in the 1970s”. As indicated earlier, there is a dearth of research about primary school teachers’ personal environmental orientations (ideologies) and their
'base-line' knowledge about environmental education and environmental issues. Thus, little is known about what teachers know about the environment or education in and about the area. To this end, if environmental education is to be an 'agent of change', then it seems imperative to know whether teachers are equipped to embrace this responsibility.

Summary

In this final section, it has been identified, at the national, state and regional levels, that teachers have an important role to play in the development of environmentally active and informed citizens. However, little is known about the extent to which environmental education has been incorporated into school systems, particularly in primary schools. Despite the various policy advancements in environmental education, the evaluation studies that have been conducted indicate that policy expectations are rarely met.

Spork's (1990; 1992) study is the only evaluation of environmental education practice in Queensland. She found that education in and about the environment are the dominant approaches used in classroom programs by primary school teachers in the south-eastern region of Queensland. As such, she concluded that the practice of education for the environment among the primary school teachers in question was relatively low even though the research and literature argues that education for the environment is central to environmental education. Similarly, the sampled teachers considered education in and about the environment to be of more importance than education for the environment.
There are many barriers which impede the implementation of environmental education, namely: time and resource constraints for teachers; lack of teacher knowledge and skills; lack of knowledge of departmental regulations regarding environmental education; and differences and gaps between the theories (with respect to environmental education) held by policy makers, curriculum developers and educational researchers and the theories held by practitioners. In this way, environmental education research has tended to conclude that the provision of further or restructured teacher education is the 'priority of priorities' for environmental education. However, such propositions tend to be based on both a lack of empirical evidence and a flawed theoretical presumption that environmental education and the structure, politics and organisation of school systems are unproblematic.

Environmental education has apparent theoretical and empirical gaps which require further investigating. In order to do this task, I now conclude this Literature Review and restate the research problem in accordance with the literature presented.

Conclusion

In this review of literature, I have presented an overview of the various international environmental education policy developments and initiatives, and revealed that there are established goals, objectives and principles for environmental education. In Australia, environmental education policies have been developed, although state departments have been slow to incorporate environmental education into key curriculum documents. Environmental education is predominately incorporated into and practised through existing curriculum areas; principally the 'Studies of Society and the
Environment’ (SOSE) key learning area. The implications of concentrating environmental education into specific curriculum domains are yet to be fully explored.

There are a variety of disparate views about the proper role of environmental education. The various approaches include: education about the environment, education in (or through) the environment and education for the environment. Education about the environment, encompassing technocentric ideologies, has gained little support and received limited discussion in the field of environmental education. Interestingly, the environmental education components in the ‘Studies of Society and the Environment’ key learning area are said to predominantly draw upon education about the environment. This issue has not been discussed in the environmental education literature and is thus problematic for environmental education because education about the environment is considered to be an undesirable approach.

Education in the environment, which incorporates Gaianist ecocentric values, is considered to be a ‘naïve’ and ‘romantic’ approach which ignores the capitalist and materialistic nature of society. For these reasons, certain environmental educators have strongly advocated the approach education for the environment, also referred to as education for sustainability.

There are a growing number of researchers who argue that education for the environment is theoretically and conceptually flawed. Four issues have been identified as the basis of these criticisms. These are: its indoctrination and anthropocentric tendencies; its definitive usage of the concept sustainable development; its inappropriate use of social-critical theory; and the lack of empirical research concerning the implementation of education for the environment in primary school systems. To
this end, it appears that the field of environmental education is characterized by theoretical assumptions, flaws and contradictions and a dearth of empirical research. A review of teachers' knowledge and beliefs about environmental education is a necessary step in unraveling some of the empirical and theoretical gaps in the field of environmental education.

To this extent, little is known about the extent to which environmental education has been incorporated into school systems, particularly in primary schools. Despite the various policy advancements in environmental education, the evaluation studies that have been conducted indicate that policy expectations are rarely met. There are many barriers which impede the implementation of environmental education, namely: time and resource constraints for teachers; lack of teacher knowledge and skills; lack of knowledge of departmental regulations regarding environmental education; and differences and gaps between the theories (with respect to environmental education) held by policy makers, curriculum developers and educational researchers and the theories held by practitioners. In this way, environmental education research has tended to conclude that the provision of further or restructured teacher education is the 'priority of priorities' for environmental education. However, such propositions tend to be based on both a lack of empirical evidence and a flawed theoretical presumption that environmental education and the structure, politics and organisation of school systems are unproblematic. Thus, conclusions made about primary school teachers and what they might or might not know about environmental education requires further and deeper investigation.
In order to further investigate the identified research 'gaps', I restate the research problem and associated objectives. I then proceed to Chapter Two, Theoretical Framework.

Restatement of the Research Problem & Outline of Research Objectives

This thesis is aimed at assessing the scope and range of Queensland primary school teachers’ knowledge and beliefs about environmental education. More specifically, the thesis problem is a perceived gap within environmental education research and literature which, to date, fails to provide an elaborate account of Australian primary school teachers’ knowledge about and beliefs towards environmental education.

The research problem and my allied theoretical framework provide the 'frames' or 'lenses' for my scrutiny of environmental education theory and practice. In order to investigate the research problem, this thesis focuses on the following three objectives:

1. to determine the current condition of environmental education in Queensland primary schools;

2. to determine Queensland primary school teachers’ knowledge and beliefs about environmental education; and

3. to determine the factors which impede the implementation of environmental education in Queensland primary schools.
While the chosen objectives are fundamental, by no means do they cover the entirety of concerns in respect to environmental education. They have been identified as being more pressing due to the apparent condition of environmental education within primary schools. Before turning to Chapter Two, I now outline the balance of the thesis framework.

Structure of the Thesis

This thesis is organised under five chapters. Chapter One sets the scene for this study through establishing its scope and importance. The Chapter identifies the research problem and objectives, positions the field and presents a background discussion about the foundation of the research problem, before presenting an extensive review of the literature.

Chapter Two sets out a model and series of propositions for understanding primary school teachers' knowledge and beliefs about environmental education. The Chapter also presents an alternative theory and model for environmental education.

In Chapter Three, I describe the combined-methods approach utilised to interrogate the research questions and theoretical framework. An ethnographic qualitative approach was utilised to interview twenty-six primary school teachers, followed by a state-wide quantitative survey of teachers' knowledge and beliefs about environmental education.

In Chapter Four, I present and analyse the data gathered during the empirical fieldwork of this study. The data presentation and analysis are organised under four headings.
These are: Teachers’ Preparedness; Teachers’ Knowledge; Teachers’ Beliefs; and Correlating Teachers’ Preparedness, Knowledge & Beliefs – *A Path Analysis*.

Chapter Five provides a comprehensive discussion and synthesis of the data presented in Chapter Four in relation to my theoretical framework and research problem. I then conclude the thesis and link the research problem and objectives, theory, data presentation and data synthesis.
CHAPTER TWO
Theoretical Framework

... not only are we failing to teach the basics about the earth and how it works, but we are in fact teaching a large amount of stuff that is simply wrong. By failing to include ecological perspectives in any number of subjects, students are taught that ecology is unimportant for history, politics, economics, society, and so forth. And through television they learn the earth is theirs for the taking. The result is a generation of ecological yahoos without a clue why the colour of the water in their rivers is related to their food supply, or why storms are becoming more severe as the planet warms. The same persons as adults will create businesses, vote, have families, and above all, consume. If they come to reflect on the discrepancy between splendor of their private lives in a hotter, more toxic and violent world, as ecological illiterates they will have roughly the same success as one trying to balance a checkbook without knowing arithmetic (Orr, 1992, pg. 85-86).

Introduction

Environmental educators often maintain that primary school education should endeavour to improve and protect the environment through producing an 'environmentally informed, committed and active citizenry', yet the existing research discussed in the previous Chapter shows that the implementation of environmental education in Australian primary schools is problematic and has had limited success. The reasons for these shortcomings are far from clear, with the weight of research merely speculating about barriers to effective implementation.

To this extent, Chapter One identified that the field of environmental education is limited and potentially invalidated by the scarcity of empirical research associated with Australian primary school teachers’ practices of, knowledge about and beliefs towards environmental education.

Chapter Two presents a theoretical framework for the thesis problem set out in Chapter One. This framework is utilised later in the thesis for the interpretation, analysis and
Section One presents the various approaches to knowledge, particularly in the context of teachers' knowledge. In Section Two, I utilise the concepts of ‘environmental philosophy’ and ‘generations’ (social change) to contextualise and further elucidate beliefs and teachers' beliefs. The Third Section presents a theoretical model, together with a series of propositions, based upon the principles of ‘ecological literacy’ and ‘adaptive management’. I now turn to these tasks.

Section One

In this Section, I define the concept of ‘knowledge’ for this study. Thereafter, I review different interpretations of teachers' knowledge. In particular, I focus upon Shulman’s (1987) concept of ‘pedagogical content knowledge’ as a means of understanding teachers' knowledge.

What is Knowledge?

Confucius wrote “when you know a thing, to recognize that you know it, and when you do not know a thing, to recognise that you do not know it. That is knowledge” (cited in Noble, 1995, pg.141). This approach to knowledge illustrates the difficulties in defining the concept. No one agreed definition for knowledge exists and the field is characterised
by a multiplicity of interpretations and propositions. I now review various explanations of knowledge in order to identify the ‘types’ of knowledge utilised in this thesis.

Shafritz, Koeppe and Soper (1988, pg.262) define knowledge as “the accumulated body of facts, information, and beliefs that one acquires through education and experience”. Johnson (2000, pg.165-166) further defines knowledge as:

... ‘what’ we perceive to be real and true. It can be as simple or commonplace as how to tie a shoe or as rarified and complex as particle physics. Knowledge is sociologically significant because it is socially created and because we depend on it for our sense of reality (emphasis added).

Such definitions that focus upon perceptions and the social construction of knowledge raise questions about ‘what constitutes knowledge’. Barrow and Milburn (1990, pg.165) are more specific when they attempt to define the ‘what’ of knowledge by distinguishing propositional and skill knowledge. Thus, “it is common to distinguish propositional knowledge (knowing that...), skill knowledge (knowing how to...) and knowledge by acquaintance (knowing Smith or Paris)” (Barrow, 1990, pg.165). According to Barrow and Milburn (1990), ‘to know’ in the propositional sense is “having a belief; that it is true; and that one has adequate evidence for”. It is the latter statement, ‘that one has adequate evidence for’, that distinguishes knowledge from belief.

The differentiation between propositional knowledge and skill knowledge is not a new concept. Ryle (1949) distinguished between propositional knowledge and what he termed procedural (skill) knowledge. Turner-Bisset (2001, pg.23) defines propositional
knowledge as "the substance or content of the discipline: its facts and concepts, which are put together in propositions, for example heat is a form of energy", and procedural knowledge as "ways of proceeding within the discipline: in other words, skills and processes". It is the latter, procedural knowledge, or what some coin ‘process learning and/or process knowledge’, that has dominated teaching and learning (Bernstein, 1971; 1990; 1996).

In this respect, the exclusion of discipline knowledge is reflected in the popularity of learning theory that has dominated educational thinking in westernised countries. Thus, Bernstein's (1990) position is that an emphasis on the internal workings of the learner rather than measurable learning outcomes have subjugated developments in pedagogy and indeed teaching in schooling and teacher education for at least 30 years. Reigeluth (1999, pg.12) illustrates the point: “Learning theories...describe how learning occurs...But how does that understanding help me to teach, say English grammar?”

The OECD (2001) argue that the ‘know-what’, what Ryle (1949) coined propositional knowledge, is the anchor of all other types of knowledge. The OECD (2001, pg.29) further contend that “the implication of rapid change and ‘knowledge decay’ is that schools must lay a very sound foundation on which the other...forms of knowledge can be developed and maintained’. Thus, according to the OECD (2001), the latter ‘foundation’ is the ‘know-what’; this is propositional knowledge.

However, Novins and Armstrong (1997) argue that there are other ways of classifying knowledge that have little to do with the qualities of disciplines or specific content. For example, a knowledge element can be based on its origin as opposed to its domain or

25 Schwab (1964) also made the distinction between propositional and procedural knowledge. Schwab (1964) further developed and expanded the meaning of propositional knowledge through what he coined ‘substantive structures’ and ‘syntactic structures’; in effect the structures of the disciplines.
discipline. Novins and Armstrong (1997, pg.47) identify that there are other characteristics that might guide knowledge classification, including:

**Recipient:** Who is likely to need to use it?

**Applicability:** How broadly does the knowledge apply? Is it local or global in nature?

**Transferability:** How easy is it to impart the knowledge to others, and how difficult for them to apply correctly?

**Richness:** How much is the knowledge dependent on its context, and how much meaning would be lost through simplification?

**Currency:** How old is the knowledge? How timeless?

**Trustworthiness:** Is it easy to test? Does it come from a reliable source?

That is, deciding how knowledge is described need not be expressed as ‘knowledge about x or y’. Indeed, the literature on primary schooling and teachers’ work (see Hatton, 1987, 1988) suggests that thinking about knowledge as knowledge domains or disciplines is not very useful in understanding teachers’ work and the management of curriculum knowledge. Instead, the literature suggests that insight into what teachers do and achieve is associated with relative levels of applicability and transferability of knowledge (Novins & Armstrong, 1997).

Curriculum knowledge then can be locally or globally applicable. One can imagine children undertaking activities in the local creek and making connections to global climate conditions for example. It can also have properties of transferability in the sense of being either unique or programmable. Together, these dimensions yield a matrix containing types of curriculum knowledge as shown in Figure 2.1.
For the purposes of this thesis, I focus upon propositional knowledge. In Novins and Armstrong (1997) terms this is 'complex knowledge'. Much of what happens in the dynamic of teaching and learning is complex indeed. When a knowledge element is broadly applicable but not easily transferable, it is best transferred through structured teaching and learning efforts.

Traditionally, the learning and managing of complex knowledge transfer is the apprenticeship. In that pedagogical relationship, there is a recognition that the learner must develop in ways that can only be gained through proximity with the context or by the focused attention of someone already knowledgeable about the requisite knowledge field. Complex knowledge requires the highest level of learning management by knowledgeable mentors. The management of complex knowledge learning by knowledgeable teachers then represents a source of leverage on the stated goals of environmental education.
Accordingly, I focus on knowledgeable (and unknowledgeable) teachers in this study. So that ‘knowledgeable’ (and unknowledgeable) can be understood in the context of teachers and teaching, I now turn to a discussion of the literature and theoretical arguments concerning teachers' knowledge, specifically teachers' complex knowledge.

**Teachers' Knowledge**

Palonsky (1993, pg.7) maintains that the profession of teaching assumes "that good teachers possess a special knowledge base - "a codified or codifiable aggregation of knowledge, skill, understanding, and technology, of ethics and disposition, of collective responsibility" - as well as a means for representing and communicating it". Shulman’s (1987) work has brought focus to this view. Shulman (1987) identifies seven categories of teacher knowledge. These are:

1. *content knowledge*;
2. *general pedagogical knowledge*, with special reference to those broad principles and strategies of classroom management and organization that appear to transform subject matter;
3. *curriculum knowledge*, with particular grasp of the materials and programs that serve as ‘tools of the trade’ for teachers;
4. *pedagogical content knowledge*, that special amalgam of content and pedagogy that is uniquely the province of teachers, their own special form of professional understanding;
5. *knowledge of the learners and their characteristics*;
6. *knowledge of educational contexts*, ranging from the workings of the group or classroom, the governance and financing of school districts, to the character of communities and cultures; and

7. *knowledge of educational ends, purposes, and values and their philosophical and historical grounds* (Shulman, 1987, pg.8).

Together these domains are included in Novins and Armstrong’s (1997) categories of knowledge. The important issue for this thesis is that Shulman (1987, pg.8) maintains that ‘pedagogical content knowledge’ lies at the heart of teaching because it represents the ways in which teachers “blend academic content with teaching methods, organize instruction, and unite all these elements with the interests and abilities of the students in their class”.

Notwithstanding, Good (1990), Reynolds (1989) and McMeniman et al. (2000) claim that teacher education is now able to equip pre-service and in-service teachers with ‘state-of-the-art’ instructional knowledge. It must be noted that such authors fail to mention ‘what’ is ‘state-of-the-art’ instructional knowledge and how this is utilised to equip student teachers and practicing teachers. My point relates to a previous argument of Shulman’s (1986a) which states “major elements of teacher knowledge have not yet been uncovered or sufficiently defined” (cited in Palonsky, 1993, pg.8). In a similar vein, Hargreaves (1997, pg.3) states that “reflecting upon the research basis of much teaching, specific lessons and acts of individual attention to students are nothing more than face saving disguises for pedagogic incompetence”. He goes on to say that the “dominant models for creating, disseminating and applying professional knowledge for teachers are now: (i) almost entirely inappropriate and ineffective (ii) a serious waste of material and human resources, and (iii) add to the low morale and the serious shortage of teachers” (Hargreaves, 1998, pg.17; also see OECD, 2002).
Furthermore, Holbrook et al. (2000) maintain that educational research has had little impact upon Australian teachers and their teaching practices. Holbrook et al. (2000, pg.6) discovered that “university research in schools was largely indirect, unstructured and often mediated through individuals”. To this extent, it appears that ‘the state-of-the-art’ instructional knowledge Good (1990), Reynolds (1989) and McMeniman et al. (2000) referred to is yet to be fully defined and developed and therefore have an impact on Australian teachers and their teaching practices. Thus, it is this form of instructional knowledge, which Shulman (1986b) refers to as ‘pedagogical content knowledge’, that is the “missing paradigm” in the discussions surrounding teaching and learning. In order to position my work in this framework I now discuss ‘pedagogical content knowledge’.

Throughout history different approaches to teaching and learning have focussed on either knowledge of content or knowledge of pedagogy. Shulman introduced the concept of pedagogical content knowledge in 1986. Pedagogical content knowledge is the interplay between pedagogy and content. At the centre of pedagogical content knowledge is the method in which subject matter (content) is transformed for teaching purposes. Shulman (1986a; 1986b, 1987) maintains that teachers must ‘know’ first, and then transform this knowing into effective instruction. As identified earlier, education has tended to focus on general pedagogical classroom practices, often at the expense of subject matter (content). Grossman, Wilson and Shulman (1989, pg.23) argue that teacher education has “been satisfied to leave this crucial piece of teachers’ knowledge [subject matter] behind”. They further claim that teachers’ subject matter knowledge affects “both the content and processes of instruction, influencing both what teachers teach and how they teach it” (Grossman et al., 1989, pg.26). Grossman, Wilson and Shulman (1989) outline four dimensions of subject matter which are fundamental to pedagogical content knowledge. These are: content knowledge; substantive
Content knowledge is the “stuff of a discipline: factual information, organizing principles, central concepts” (Grossman et al., 1989, pg.27). Grossman (1995, pg.21) claims that “teachers’ knowledge of the content affects both what teachers teach and how they teach it”. In this way, “teachers are likely to emphasize those areas in which they are more knowledgeable and to avoid or de-emphasize the areas in which they have relatively less content knowledge” (Grossman, 1995, pg.21). To this extent, it could be contended, based upon the arguments presented in Chapter One, that primary school teachers may avoid or de-emphasise environmental education if they have relatively less content knowledge about environmental education. Such propositions can be situated in the wider debates surrounding teacher knowledge preparation.

Substantive knowledge represents “the substantive structures of a discipline [and] include explanatory frameworks or paradigms that are used to guide inquiry in the field to make sense of data” (Grossman et al., 1989, pg.29). Teachers’ knowledge of substantive structures is tacit or explicit and significantly influence what teachers select to teach. For example, primary school teachers are more likely to present environmental issues “that are relevant to the questions [perspectives] they find most interesting, be they social, cultural, political, or intellectual” (Grossman et al., 1989, pg.29).

Syntactic knowledge is created in the discipline. It is the process “by which new knowledge is introduced and accepted into that community” (Grossman et al., 1989, pg.29). Essentially, it is the canons of evidence. According to Grossman, Wilson and Shulman (1989, pg.30), “a lack of syntactic knowledge may seriously limit prospective [and practicing] teachers’ abilities to learn new information in their fields”. For example,
without a firm knowledge in environmental education, teachers are unlikely to be able to
distinguish between legitimate or illegitimate claims in the field.

*Teachers’ beliefs* also have a powerful influence on what teachers select to teach and in
turn how such subject matter is interpreted. Teachers’ belief about content and their
orientation to subject matter directly influences the teaching and learning process.
Grossman, Wilson and Shulman (1989) point out that beliefs have not been thoroughly
researched and are less understood than the other identified areas of knowledge.\(^{26}\)

This ‘pedagogical content knowledge’ framework is grounded in the academic rationalist
tradition which assumes that the teacher is an expert of the discipline/s and is able to
disseminate this knowledge to students in a capturing and exciting manner. Whelan
(1992) argues that Shulman’s academic rationalist model of ‘pedagogical content
knowledge’ is rarely implemented nor achieved in classrooms. Whelan (1992, pg.83)
further explains: “it is acknowledged... even among its supporters (Shulman, 1987)... that there is inadequate support for the claim that this model is achieved often”.

Furthermore, Wilson (1998) maintains that ‘knowledge’ as a focus in education has
been more or less abandoned for over thirty years now. In Wilson's (1998, pg.3)
view, ‘knowledge’ lost its salience for teachers and education systems during the 1960s
and 70s. More specifically, Wilson (1998, pg.3) argues that the education profession
“came to believe that education was no longer about filling up people’s minds with a lot
of stuff”. Wilson (1998) further asserts that the latter model, of “filling up people’s
minds with a lot of stuff”, by the 1990s was considered to be a ‘substandard’ model of

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\(^{26}\) Grossman, Wilson and Shulman’s (1989) interpretation of belief as a specific type of ‘pedagogical
content knowledge (subject matter)’ are dealt with in this Section. However, Section Two explicitly
focuses upon beliefs.
education. Wilson's (1998, pg.3) key argument is that this dramatic shift in thinking was entirely about knowledge, which he describes as:

That was what filled the bucket wielded by teachers. That was what the author had, and has to be disposed of. That was what God was the source of. And it would have been what professors possessed if they had been in their offices. Knowledge.

In this way, the knowledge which Wilson (1998) is explicitly referring to is content knowledge or what Grossman et al. (1989) called subject matter. As such, he claims that "... while we weren't watching, knowledge became a bad thing. It was erased from educational offer, or at least reduced substantially in importance" (Wilson, 1998, pg.3). Wilson's (1998, pg.5) explanation of this shift is that educators who anticipated the post-modern age were antagonistic to knowledge and reason, especially empirical knowledge and scientific rationality. Such educators sought self-realisation in personal experience, creativity and imagination as a means for understanding the world, as a reaction to the perception that teaching in the 1960s was too fact oriented and susceptible to rapid changes in knowledge content.

The 'Queensland School Reform Longitudinal Study' further supports Wilson's (1998) contentions, with recent findings revealing that "teachers themselves actually rate basic skills as the highest of their priorities, and intellectual engagement and demand as the lowest" (Education Queensland, 2001, pg.15). Furthermore, Education Queensland (2001, pg.9) reported that teachers "viewed behaviour management as a policy issue that required improvement prior to any considerations of classroom practices". As identified earlier, Bernstein's (1996) analysis of the acquisition-competence model
covers the same ground such that the internal workings of the learner rather than measurable learning outcomes have dominated teaching and teacher education. For example, as indicated in Chapter One, the current ‘Studies of Society and Environment’ (SOSE) syllabus (Queensland School Curriculum Council, 2000a) adopts a ‘learner centred approach’ within an outcomes framework. The outcomes are presented in such a way that they are open to a teacher’s own interpretation, thus leaving the content knowledge (or subject matter) dependent on a teacher’s knowledge and judgement about how to deal with it. This situation is liable to Grossman’s (1995, pg.21) criticism that such practices encourage teachers to emphasise only those areas in which they are knowledgeable and/or maintain fervent interests.

Notwithstanding, Grossman, Wilson and Shulman (1989) maintain that teachers’ beliefs influence what teachers select to teach and in turn how such ‘knowledge’ is interpreted. They point out that “beliefs are less researched and understood than content, substantive, and syntactic knowledge” (Grossman et al., 1989, pg.31). Following a summation of Section One, I take up the issue of ‘beliefs’ and in so doing position it in the framework of teachers’ knowledge.

**Summary**

In Section One, two types of knowledge were identified, namely propositional knowledge and procedural knowledge. It was identified that propositional knowledge maintains both substantive and syntactic structures. Procedural knowledge, or what some coin *process learning and/or process knowledge*, has dominated teaching and learning for the past thirty years. During that period discipline-based or content knowledge became less significant in the education system. With the onset of the information/knowledge...
society and economy, the educational push to ‘procedural knowledge’ (process knowledge) has accelerated, seemingly blind to the importance of the creation of a stock of knowledge as well as the need to learn and relearn in this environment.

It has only been in recent times that some key international commentators, such as the OECD, have stressed the significance of ‘propositional knowledge’, now referred to as complex knowledge, and the management of knowledge for educational and corporate ends. It is the stock of knowledge, the capacity to apply and transfer ‘complex knowledge’ on the part of primary school teachers that is the focus of this study. In the most generic sense, stock of knowledge refers to ‘complex pedagogical content knowledge’. I now turn to Section Two.

Section Two

In Section Two I initially review the concept of ‘belief’ in order to identify an appropriate definition for dealing with it in this study. Thereafter, I review the research about teachers’ beliefs. I then utilise the theoretical concept of environmental philosophy and the sociological concept of generations to situate teachers’ beliefs in wider social contexts. This discussion together with Section One, provides the foundation for the theoretical model for this study, which constitutes the final section of this Chapter.
Beliefs

Belief is the acceptance of something as true, or thinking that something could be true. There are two distinct notions of belief: belief in x, and belief that x. Regarding belief in, we can believe in the existence, truth, or value of something, or believe in something that we think ought to be. The notion of believe in is usually used to designate believe in good things. For example, we believe in Jones's cheery attitude but not his selfishness. Philosophers are principally concerned with belief that, and describe this as doxastic belief. This kind of belief is one of several types of propositional attitudes; others are thinking that x, wishing that x, and feeling that x (Fieser, 2001a, pg.1).

According to Fieser (2001a), the theological use of the concept belief is the closest to its common usage:

A theologian distinguishes between two different meanings. The first is more like an opinion, which is belief in the probability of something. The second is the belief in the certainty of something (Fieser, 2001a, pg.1).

The concept of belief is inextricably embedded within the concept of truth, a proposition that begs the question of truth itself. To illustrate with an example: is it true that God exists? According to Fieser (2001b), the problem for philosophers is not: is it true that God exists? The problem is: What does it mean to say that it is true that God exists?

To study belief is to study its “connections with long-term dispositions, actions, and inner experiences, not just the short-term idea that a person claims to accept” (Fieser,
It is this understanding of belief that I adopt in this thesis; the connections between the long-term dispositions, actions, and inner experiences of primary school teachers toward environmental education. Such beliefs influence what teachers select to teach and in turn how such subject matter is interpreted. These beliefs are grounded in the pedagogical content knowledge framework, now rephrased complex pedagogical content knowledge. Grossman, Wilson and Shulman (1989) identified that the concept of belief is less understood than the other key dimensions of pedagogical content knowledge. I now further explore the concept of belief in the context of education and teachers' beliefs.

Teachers' Beliefs

Beijaard and De Vries (1997, pg.245) consider that beliefs have two functions in the learning process, namely "making sense out of new information" and "changing beliefs". The first function, accordingly to Beijaard and De Vries (1997, pg.246), "influence what teachers learn and the way they process information". The second function can be grouped into two categories: "(1) teachers' beliefs about education are difficult if not impossible to change, and (2) teachers' beliefs about education can change depending on the content and nature of influences that one undergoes" (Beijaard & De Vries, 1997, pg.246). According to Renzaglia et al. (1997, pg.361), the latter is of significant importance as "there is evidence that teachers' beliefs and attitudes drive important decisions and classroom practice". The works of Shulman (1986a; 1986b; 1987) and Grossman, Wilson and Shulman (1989) also reiterate this view, such that beliefs significantly influence teachers' beliefs about knowledge and the implementation and emphasis of such knowledge in their teaching.
Teachers, taken as an occupational group, tend to have a set of cultural assumptions and beliefs about their work and students that clearly distinguish them from lawyers, medical practitioners, engineers and so on. These assumptions constitute a professional culture. The culture of teachers is hardly internally homogeneous because there are significant sub-cultures such as early childhood, primary, secondary and discipline or subject-based interests around which teachers' interests coalesce. The overarching culture, including such sub-cultures, have sufficient common features to distinguish them from each other and from other professional cultures. In this sense then, teachers are likely to share occupation-based beliefs when they work in similar situations such as primary school teaching and when they are trained in and teach subjects such as 'Studies of Society and Environment' (SOSE). To this end, environmental education is currently considered to be an inclusive curriculum area in Queensland primary school education (Queensland Department of Education, 1993). Furthermore, as identified in Chapter One, environmental education also constitutes a significant proportion of the Queensland 'Studies of Society and Environment' (SOSE) key learning area (Queensland School Curriculum Council, 2000a). To this extent, it can be argued that a broad or common view of environmental education probably exists among Queensland primary school teachers. In order to explore this proposition further, I now discuss the underlying environmental philosophies of primary school teachers.

Environmental (Eco) Philosophy

As indicated in Chapter One, the anthropocentric, or technocentric view is grounded upon the belief that the environment is a resource to be 'used', whereas the ecocentric perspective projects the belief that the environment is valued for 'its own sake'.

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27 By culture I mean, a set of standards for perceiving, acting, judging, valuing and predicting (Goodenough, 1964). It therefore emphasises what I have already described as complex knowledge.
It is often stated in the literature that the technocentric perspective is the overarching environmental (eco) philosophy in Western capitalist culture (see Bowers, 1997; O'Riordan, 1977, 1981, 1989, 1990; Orr, 1992; Weston, 1994; Weston, 1996; Weston, 1999; White, 1967).

Disinger (1992, pg.5) argues that "educators generally favour the dominant social paradigm, placing greater emphasis on ‘wise-use’ than non-use perspectives". To this extent, environmental education is often perceived as a "practical process for equipping" people with the "skills to improve the environment" (Withrington, 1977, pg.33). Weston (1996, pg.39) propounds that this technocentric view that environmental education adopts assumes that "relevant knowledge [is] already well-established, and as if it were the most obvious thing in the world what constitutes an improvement". Orr (1992) also highlights this problem and calls it the ‘tacit curriculum’.

Relating this to the framework of teachers’ beliefs, it is difficult to assign an environmental philosophy to teachers as a collectivity because there is a dearth of research about teachers’ environmental (eco) philosophies. One could assume that teachers adopt technocentric perspectives in about the same ration as the Australian population at large, although this mode of operation reflects the existing assumptions of technocentrists (see Bowers, 1997; Orr, 1992; Weston, 1994; Weston, 1996; Weston, 1999; White, 1967). An important driving force of this thesis is the investigation of teachers’ complex pedagogical content knowledge of the environment, or in other terms their environmental philosophies.

So far, I have emphasised the ‘enunciation’ of teachers’ knowledge and beliefs. It is necessary to balance this by positioning the teacher in a network of social obligations that
are a formative context for the individual. If primary school teachers’ knowledge and beliefs of environmental education are to be understood, then the resources individuals use to make the material authentic must be understood as well. This brings me to the sociological concept of ‘generations’.

**Generations**

Mackay (1997) stratifies current Australian society into three generations, namely: “baby boomers” (born 1945 – 1960); their parents; and their children, (born 1961 – 1981), known as the options generation and or generation X (X-ers). Mackay (1997) goes on to identify significant cultural differences between these generations. This is significant because at the time of writing the average age of a Queensland primary school teacher was forty, which locates the bulk of Queensland teachers in the ‘baby-boomer’ generation. Novice teachers are predominantly drawn from the ‘options’ generation. According to Mackay (1997), these two generations have distinct differences and similarities. Furthermore, the works of Green and Bigum (1993), Smith and Curtin (1997) and Brown (1998) have shown that there are connections between life experiences and life performance across occupational and cultural indicators. If this also applies to beliefs about the environment, then teachers of different generations may have very diverse beliefs about the environment and indeed environmental education. I now review the various arguments.

**The Options Generation**

Mackay (1997, pg.138) proposes that the options generation have been born into one of the “most dramatic periods of social, cultural, economic and technological development
in Australia's history: the age of discontinuity, the age of redefinition, the age of uncertainty”. The life experiences of the options generation are described as ‘radically different’ to that of preceding generations. The options generation keep their options open by making “it up as they go along” because there are few blueprints for making sense of their own existence (Mackay, 1997, pg.140). It is not surprising then that the central theme for the options generation is individuality. Flores and Gray (2001) distinguish two emerging forms of working life, the wired and the entrepreneurial. Both require forms of individuality and networking that confirm the individuality of post-boomer generations. Indeed, the ‘wired’ life is the playing out of the post-networking society for those with informational technology (IT) resources and skills.

This is the generation which has lived in a multicultural society, which accepts that Australia may become a republic, who are aware of AIDS, who live in a pervasive drug culture, who are accustom to family breakdown and who face a discouraging labour market. Quite critical for this thesis, Mackay (1997, pg.139) argues that the options generation members maintain optimistic environmental beliefs, such that they:

... have always known that the global environment is a precious resource which earlier generations have abused, and which must now be protected if the species is to survive.

Several other authors have drawn conclusions similar to those of Mackay (1997). Caudron (1997 March, pg.22) suggests that the options generation “want to know why they must learn something before taking time to learn how”. Brown (1998, pg.2) further
notes that the options generation desire meaningful school work and "tend to be independent problem solvers and self-starters".

In short, the options generations are summarised as 'individualistic, flexible, open-minded, realists, insecure, uncertain, non-conformist, alienated, materialistic, radically diverse, pessimistic, risk takers, spiritual seekers, overly-organised, technologically cultured, incredibly stressed and discontented' (see Codrington, 1998; Mackay, 1997).

**Baby Boomers Generation**

The baby boom following World War II was a response to postwar optimism. Thus, this generation "stands as a symbol of that optimism" with the 'family' becoming the focal point of Australian society (Mackay, 1997, pg.59). In Mackay's (1997, pg.134) view, the greatest source of tension for the baby-boomers:

... is that they are stressed by the present, while still wanting to resist the future. As the generation raised on the high-octane fuel of one of Australia's most optimistic periods, they still aspire to live in the moment with as much intensity as possible.

Furthermore, the 'baby-boomers' are 'hooked on materialism' and 'consumerism'. Mackay (1997) claims that baby-boomers 'want it now' and as such will deal with the consequences later. Baby-boomers have been labelled the consumer generation, with the 'options generation' coined the repair generation (Thompson, 2002). Economists (see Thompson, 2002) maintain that the options generation (or generation X) will be
impaired most by the fallout from the debt crisis, disintegrating families, growing racial disharmony and a poisoned environment. While the options generation are ennobled by a sense that they are the ones who must and will make the world a better place, they are embittered by the belief that they are fixing the problems not for themselves but for the generations following them.

While the characteristics of the options generation appear to counter the baby-boomer fixation on consumerism, they are probably no different in their effects on the environment because they are central to and constitutive of capitalist culture and lifestyle. It is an empirical question about the differential effects of the shift from the Boomers to the Options Generation (X-ers) in respect to those ecocentric and technocentric beliefs that sustain deleterious effects on the natural environment.

Summary

In this Section I have discussed the concept of belief which is a key element of complex pedagogical content knowledge. In further elucidating the concept of belief, it was discussed in the context of teachers’ beliefs, environmental philosophies and generations. It was shown that teachers’ beliefs influence important decisions about classroom practices. In addition, teachers have a set of cultural assumptions and beliefs about their work and students. Such beliefs and assumptions are in turn significantly influenced by teachers’ sub-cultures, namely early childhood education, primary, secondary and discipline and/or subject-based interests. These assumptions and beliefs clearly constitute a professional culture. It follows then that one might expect that a broad or common view of environmental education probably exists within the professional culture of Queensland primary school teachers.
Notwithstanding, such beliefs are grounded in an overarching culture, specifically western capitalist culture, which includes a set of beliefs or assumptions about the environment. Indeed, it is often stated in the literature that the technocentric perspective is the overarching environmental philosophy of western capitalist culture. One could assume that teachers adopt technocentric perspectives in about the same proportion as the Australian population at large, although such assumptions are unsubstantiated given the paucity of literature about teachers' environmental beliefs. This thesis is concerned with the investigation of such matters.

The sociological concept of 'generations' is also important in understanding teachers' beliefs as there are substantial cultural differences between the various defined generation groups. Such generational differences also extend to beliefs about the environment. In particular, the options generation are defined by their individualism, diversity and pessimism, coupled with their mastery of technology and adaptability towards change. The baby boomers, on the other hand, are defined as optimistic, family-centered and materialistic. To date, no literature exists which explains teachers' generation-related beliefs and the impact of such beliefs upon the environment and environmental education. This thesis investigates the proposition that generational differences mean differences in teachers' support and practices of environmental education. I now turn to Section Three of this Chapter.

**Section Three**

In Section Three, I set out a model for gauging primary school teachers' complex pedagogical content knowledge about the environment and environmental education.
doing so, I utilise the theoretical concepts of eco-literacy (environmental / ecological literacy) and adaptive management.

Theory Construction

I begin with the concept of knowledge as discussed earlier in this Chapter. I propose that to teach environmental education knowledge and skills, teachers require a relevant stock of knowledge. To establish a framework for a stock of knowledge, I draw upon Orr’s (1992) concept of ‘ecological literacy’, formerly known as environmental literacy.

This is an appropriate concept for use in this thesis for three reasons. First, it emphasises the ‘content knowledge’ referred to earlier as teachers’ complex pedagogical content knowledge. Second, environmental literacy evokes those ideas and approaches that environmentalists consider fundamental in environmental education. Third, the concept provides a yardstick or set of criteria against which I gauge teachers’ environmental literacy in the empirical work described elsewhere in this thesis.

Eco-Literacy as Complex Pedagogical Content Knowledge

In 1989 UNESCO-UNEP positioned environmental literacy as the most fundamental goal of environmental education. In syllabus and curriculum terminology, this means that environmental literacy has content, skills and processes that learners ought to know and be able to do to demonstrate ‘literacy’. According to Orr (1992, pg.92), environmental literacy is the “knowledge necessary to comprehend relatedness, and an

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28 The concept of environmental literacy is the predecessor to the concept ecological literacy. The change in terminology does have relevance, such that I initially utilise the concept environmental literacy in the introductory discussions of this Section before turning to the concept of ecological literacy where I explain the reasons for such changes in phraseology.
attitude of care or stewardship. *An environmentally literate* person would also have the practical competence required to act on the basis of knowledge and feeling”. Orr (1992) and Sturadavant (1993) consider environmental literacy, which they refer to as ecological literacy, to be environmental education, the term Roth coined in 1968.

In 1976 Harvey (pg.67) defined an environmentally literate person as “one who possesses basic skills, understandings, and feelings for the man-environment (sic) relationship”. Buethe and Smallwood (1987) defined it as one’s understanding of environmental facts. As these definitions are fairly limited, environmental literacy was later redefined by a series of authors (see Hurry, 1982; Roth, 1992; UNESCO-UNEP, 1989). In particular, Hurry (1982, pg.44) developed five sub-categories for defining an environmentally literate person. He alleged that a person who is environmentally literate:

- is aware of the natural and man-made (sic) environment of which he (sic) is part, and ... sees his (sic) places of work, residence and recreation as part of the fabric of his (sic) ecosystem. He (sic) sees himself (sic) as a living part of, and interacting with, his ecosystem;
- is aware of the natural resources upon which he (sic) is directly or indirectly dependent, and that he (sic) has some understanding of finite and renewable resources;
- has a conviction of his (sic) individual responsibility for the health of the land, where health is the capacity of the land for self-renewal;
- has been stimulated into positive environmental action in his (sic) daily life. He (sic) is committed to caring for his (sic) environment and its resources, in no matter how small a manner; and
- is concerned with developing or maintaining a quality of life which is not only
acceptable to the majority, but which is also in harmony with the capabilities of the environment.

The above definition expands the conceptualisation of environmental literacy. In particular, it contains the crucial idea of re-establishing the human and environment relationship. Roth (1992) further classified the characteristics of individuals’ environmental literacy into four categories. Table 2.1 illustrates a summary of such characteristics.

Table 2.1. Environmental Literacy Levels and Characteristics (Todt, 1995, pg.17)

<table>
<thead>
<tr>
<th>ENVIRONMENTAL LITERACY LEVEL</th>
<th>CHARACTERISTICS</th>
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<tbody>
<tr>
<td>Nominal Environmental Literacy</td>
<td>Can recognize some basic terms used in communicating about the environment.</td>
</tr>
<tr>
<td></td>
<td>Is developing awareness and sensitivity towards the importance of natural systems and the human impacts on them.</td>
</tr>
<tr>
<td></td>
<td>May possess misconceptions about and provide naïve explanations of environmental systems.</td>
</tr>
<tr>
<td></td>
<td>Is beginning to identify environmental problems and the issues surrounding proposed solutions.</td>
</tr>
<tr>
<td>Functional Environmental Literacy</td>
<td>Regularly uses environmental vocabulary with the correct definitions and in the appropriate context.</td>
</tr>
<tr>
<td></td>
<td>Is personally committed to environmental quality on selected issues that concern them.</td>
</tr>
<tr>
<td></td>
<td>Is motivated to personally invest time and energy towards the solution of environmental concerns at other levels.</td>
</tr>
<tr>
<td>Structural/Operational Environmental Literacy</td>
<td>Understands the organization and functioning of environmental systems and their interaction with human systems.</td>
</tr>
<tr>
<td></td>
<td>Can explain environmental concepts and problems to others using their own words.</td>
</tr>
<tr>
<td></td>
<td>Possesses the knowledge and skills to act on local problems and be involved with environmental concerns at other levels.</td>
</tr>
<tr>
<td>Multidimensional Environmental Literacy</td>
<td>Understands the connection of environmental issues with the world at large.</td>
</tr>
<tr>
<td></td>
<td>Is routinely involved in self study and seeking out new information about environmental issues.</td>
</tr>
<tr>
<td></td>
<td>Is able to synthesize environmental information and act upon that synthesis in ways that lead to environmental sustainability.</td>
</tr>
</tbody>
</table>
Although Hurry’s (1982) and Roth’s (1992) categorisations are useful (as seen in Table 2.1), Clacherty (1993, pg.114) alleges that such categorisations are inadequate for what is required to address the “dominant technocentric worldview which most of us, unwittingly, support”. As highlighted earlier, environmental education approaches, such as education for the environment, have been criticised in a similar vein (see Jickling, 1992, 1994; Jickling & Spork, 1998). For that reason, the term ‘environmental literacy’ was reconceptualised to include a transformatory reconstruction of industrial culture.

It was this reconceptualisation which later saw the phrase ‘environmental literacy’ transform to Orr’s (1992) refined term ‘ecological literacy’. I now explain how ‘ecological literacy’ is one of the core components of complex pedagogical content knowledge for a transformed environmental education.

Weston (1996, pg.40-41) criticises Orr’s (1992) use of the word ‘literacy’. He claims that literacy is a “mandatable, testable and technical skill” which does not necessarily encompass “the willingness to have one’s life changed and enriched by it” (Weston, 1996, pg.41). However, Freire (1972) transformed the concept of literacy beyond the techniques of reading and writing, to a higher order of comprehension and transformation. Freire (1972) argues that the process of conscientisation is how a person achieves literacy. This consciousness is not only awareness, it is a critical understanding and commitment to one’s world (see Clacherty, 1993; Stables & Bishop, 2001). This is an important element in the reconceptualisation of ecological literacy because the process of conscientisation enables individuals to “acquire a deeper awareness of the cultural order which shapes their lives and also perceive their own capacity to transform it” (Clacherty, 1993, pg.83). In short, ecological literacy constitutes complex pedagogical content knowledge.
To this extent, the concept of ecological literacy is:

... not merely an ability to ‘read the environment’, but is an ability to perceive, understand and work towards things which are not yet with us, towards a vision grounded in a fully conscious... grasp of what is and what could be (Clacherty, 1993, pg.117).

According to Orr (1992), ecological literacy encompasses six elements. They are:

1. holistic learning;
2. earth-centred, ecocentric (transdisciplinary) learning;
3. relationship with the natural and social worlds;
4. participatory learning;
5. experimental learning; and
6. practical competence in education for environmental sustainability.

These six prerequisites primarily comprise ‘knowing, caring and practical competence’ about “how people and societies relate to each other and to natural systems, and how they might do so sustainability” (Orr, 1992, pg.92). In this way, knowing how the world works and therein knowing how to preserve and maintain ecological systems forms a primary part of an ecologically literate culture. The ecologically literate person then understands the dynamics of the environmental crisis which includes a thorough understanding of how people (and societies) have become so destructive. Orr (1992) identifies three crises, namely: a food crisis; an energy crisis; and a biodiversity crisis. In Orr’s (1992) view, these problems together constitute a planetary crisis which requires fundamental changes in the way human beings relate to each other and to the
environment. It is this interpretation of the environmental crisis which separates this theory from other environmental education approaches, namely education for the environment, which continue to maintain technocentric characteristics.

Orr (1990; 1992; 1994) argues that education is the most powerful mechanism to address the world's environmental challenges. He propounds that no student should graduate from any educational facility without knowing seventeen key subject areas. Orr (1992, pg.109) refers to this complex knowledge base as a “syllabus for ecological literacy”. Echoing Allan Bloom's approach, he nominates over one hundred articles and books as essential readings for all students and teachers. Orr (1992) draws works from distinguished philosophers such as Ehrlich, Bacon, Kahn, Berry, Merchant, Emerson, Lovelock, Eiseley, Leopold and Thoreau. Table 2.2 illustrates these subject areas.

Table 2.2. – A syllabus for Ecological Literacy (see Orr, 1992, pg.109-124)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>How does the world work?</td>
<td>2.</td>
</tr>
</tbody>
</table>

It is this knowledge that Orr (1992) claims will enable educators, teachers and citizens to
ask what then? Sturdavant (1993, pg.209) postulates that asking 'what then' requires:

Interrogating the interconnected layers of practices, trends, and assumptions upon which we construct our present life style will render those interconnections and their ramifications more explicit, thereby making their sustainability available to assessment.

Orr (1992) and Sturdavant (1993) both argue that asking 'what then' will enable key stakeholders, such as educators, to construct a very different agenda for educational reform. In order to begin the process of reform in education and environmental education, identifying primary school teachers' ecological literacy levels is a necessary step. Table 2.3 identifies various indicators which can be utilised to gauge teachers' ecological literacy levels about the environment and environmental education. Of course, each level is not mutually exclusive and teachers may be located within and between levels. As indicated earlier, knowledge and beliefs are inextricably related. As such, I rephrase the concept ecological literacy to eco-literacy in order to appropriately encapsulate both ecological literacy (knowledge) and environmental (eco) philosophy (belief) indicators. Of course, this model is positioned in the wider context of education, specifically teaching and learning.

Table 2.3 is based upon the works of O’Riordan (1981), Fien (1992), Roth (1992) and Orr (1990; 1992; 1994). As identified earlier, it is clear that eco-literacy is ideally about developing a rich knowledge base and multifaceted beliefs and/or philosophies about the environment. The object of Orr’s (1992) theory of ecological literacy is not to develop one particular view of the environment, but rather a complex understanding of the various philosophies which lead to ecological sustainability.
Table 2.3. Eco-Literacy Levels (Adapted from the works of Fien, 1992; O'Riordan, 1981; Orr, 1990, 1992, 1994; Roth, 1992)

<table>
<thead>
<tr>
<th>ECO-LITERACY</th>
<th>COMPLEX KNOWLEDGE</th>
<th>BELIEFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecological Literacy</td>
<td>Little understanding of environmental issues and/or the idea of an environmental crisis. Many misconceptions about environmental issues.</td>
<td>Believes that environment is a resource to be used by human beings. Science and technology will solve/manage any problems. All economic growth is good. Suspicion that environmental education and social change are necessary.</td>
</tr>
<tr>
<td>Ecological illiteracy</td>
<td>Can recognise some basic terms used in communicating about the environment. May possess misconceptions about and provide naïve explanations of environmental systems. Is beginning to identify environmental problems and the issues surrounding proposed solutions.</td>
<td>Is developing awareness and sensitivity towards the importance of natural systems and the human impacts on them. Reformist belief that economic growth and resource exploitation can continue. Provision of effective environmental management agencies at national and local levels. Raising environmental awareness and concern is necessary within society/education.</td>
</tr>
<tr>
<td>Nominal Ecological Literacy</td>
<td>Regularly uses environmental vocabulary with the correct definitions and in the appropriate context. Understands the organization and functioning of environmental systems and their interaction with human systems. Possesses the knowledge and skills to act on local problems and be involved with environmental concerns at the education level.</td>
<td>Is personally committed to environmental quality. Belief in the intrinsic importance of nature for defining and sustaining humanity. Rejection of materialism. Lack of faith in large-scale technology and continued economic growth. Personally committed to environmental education and the production of an environmentally literate and committed citizenry.</td>
</tr>
<tr>
<td>Functional / Operational Ecological Literacy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Possesses a thorough understanding of how people and societies relate to each other and to natural systems, and how they might do so sustainably.

Possesses a thorough understanding of the dynamics of the environmental crisis which includes a thorough understanding of how people (and societies) have become so destructive.

Possesses an understanding of models of sustainability and associated environmental perspectives.

Is able to synthesise environmental information and act upon that synthesis in ways that lead to environmental sustainability through environmental education.

Faith in cooperative capabilities of societies to establish self-reliant communities based on sustainable resource use.

Belief in the intrinsic importance and preservation for defining nature and sustaining humanity.

A belief that humanity should live simply, so that others can live.

A passionate and committed belief in the production of an ecologically literate, committed and active citizenry.

Figure 2.2 illustrates Table 2.3 as a model which identifies Novins and Armstrong’s (1997) categories of knowledge in conjunction with the key environmental education concepts of this thesis. Ideally, teachers’ eco-literacy would be located in the bottom right-hand quadrant, with their eco philosophy located along (exclusively) the horizontal axis.

Figure 2.2. Eco-Literacy Model
Although Orr's (1990; 1992; 1994) works are useful in reconceptualising environmental education and teachers' eco-literacy, Orr does not clarify how 'ecological literacy', now rephrased eco-literacy, transits into educational practice. I now show how this apparent gap in Orr's (1990; 1992; 1994) work can be filled.

Adaptive Management

Ecological sustainability is the definitive goal of eco-literacy (including ecological literacy) in my theoretical approach. Environmental education then is as much about managing learning outcomes as it is about the content of the core concepts. In this respect, the teacher of environmental concepts is at once an environmentalist with an effective stock of complex pedagogical content knowledge and resources to enrich it, a designer of teacher programs, an instructional designer sensitive to the learning needs of students and a skilful evaluator committed to achieving the outcomes of the educative process. The environmental educator then is concerned with both “learning to manage by managing to learn” (Nyberg, 2001, pg.12).

This is a departure from the more usual concept of teaching that relies on nurturance, empathy with the young, and concern about seeking evidence that learning theory is confirmed. In contrast, this approach focuses on systematic instructional methods with stated outcomes so that environmental education policies and practices are translated into learning outcomes, as well as maintaining an overarching professional responsibility for the welfare of the learner (Nyberg, 2001, pg.12). Figure 2.3 illustrates a six step process for achieving such a learning management procedure that is anchored in intended environmental education outcomes.
It is apparent that a teacher of whatever eco-literacy level has to draw on learning strategies to implement a pedagogical cycle. The first step is that of assessing the opportunity for students to learn eco-literacy and then designing a strategy. At this stage, a teacher either has the requisite knowledge, can discover that knowledge or does not have the requisite knowledge to develop an effective cycle. In the environmental education context, this stage is critical because a teacher is subject to two constraints: there is a need to have access to the latest knowledge about the environment; and human activities like teaching must adapt to constantly changing contexts in the same way as ecosystems are always changing (Guay, 2001, pg.20). The other elements of the cycle, shown seriatim for the purposes of diagramming, draw on the accumulated wisdom and pedagogical skill of a teacher.
This model shows what happens with individual learners and the capacities of teachers with the practical interest of conceptualising how an ecologically literate population might be developed through participation in an education system. Before turning to Chapter Three, Methodological Approach, I now conclude Section Three and Chapter Two.

Conclusion

This Chapter has presented six concepts, namely complex pedagogical content knowledge, environmental (eco) philosophy, generations, ecological literacy, eco-literacy and adaptive management.

I have identified complex pedagogical content knowledge as the conceptual framework of this thesis. The major theory of this thesis is eco-literacy. Eco-literacy comprises complex pedagogical knowledge centred on ecological concepts. In turn, eco-literacy is a gloss of culture such that it is identified with the existence (or lack) of eco-literacy amongst teachers. In this context, the overall research question for this thesis is:

What is the scope and range of primary school teachers’ knowledge and beliefs about environmental education?

This question can now be rephrased as:

What stock of complex pedagogical content knowledge is available for the development of eco-literacy outcomes?
In the next Chapter I explain and justify the methodological approach adopted to undertake the investigation of such questions.
CHAPTER THREE
Methodological Approach

If you want to succeed you should strike out on new paths, rather than travel the worn paths of accepted success (Hayward, 1987, n.pg).

Introduction

In this Chapter I discuss and describe the combined-methods approach utilised to investigate primary school teachers’ knowledge and beliefs about environmental education. The Chapter is presented in two sections. In Section One, I argue a case for applying a combined-methods approach in this study. Section Two outlines the research design which includes a detailed description and account of the data collection and analysis techniques applied. I now turn to Section One.

Section One

A Combined-Methods Approach

Section One sets out a rationale for the combined qualitative ethnographic approach and the quantitative survey approach adopted in this thesis. As argued in the preceding Chapters, there is dearth of empirical research and theoretical basis in the field of environmental education about teachers’ knowledge, specifically complex pedagogical content knowledge (eco-literacy). Accordingly, I selected and designed a combined-approach to address this void in the field and consequently investigate the thesis
research problem. I now present a case for the application of a combined-methods approach.

*Justifying a Combined-Methods Approach*

For over a century there has been debate about the usefulness of the scientific approach in investigating human thought and behaviour (see Berg, 1995; Bogdan & Taylor, 1975; Brannen, 1992; Bryman, 1992; Creswell, 1994; Filstead, 1970; Hammersley, 1992a; Hammersley, 1992b; Hammersley & Atkinson, 1983; Judd, Smith, & Kidder, 1991; Potter, 1996; Sherman & Webb, 1988). Positivists, founded by the empiricist tradition fashioned by scholars such as Newton and Locke, support the use of the scientific method. Idealists, those who argue that social science is fundamentally different from physical science, oppose the use of the scientific method. More specifically, Potter (1996, pg.49) identifies that the "qualitative tradition grows out of the idealist argument that humans creatively and subjectively construct meaning for themselves, and this phenomenon cannot be captured using a scientific approach". The latter debate between the qualitative and quantitative paradigms is specifically concerned with ontology and epistemology. Such axioms require the researcher to select a position, which is grounded in ontological debates concerning 'what exists' and epistemological debates concerning 'how we come to know our world and how we make sense of it'. Naturally there are numerous positions and as Potter (1996, pg.49) reveals "scholars who hold extreme positions have a more and more difficult time defending their beliefs; scientists now recognize the importance of interpretation in their processes. And humanist scholars recognize the essential nature of empirical observation".  

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29 The concepts of 'interpretation' and 'humanist' are dealt with later in Section One of this Chapter.
Clearly, the divergence of qualitative and quantitative methodologies has promoted vigorous debate among a diversity of researchers (see Brannen, 1992; Bryman, 1992; Creswell, 1994; Greene, Caraceli, & Graham, 1989; Hammersley, 1992a; Macpherson, 1999; Potter, 1996; Silverman, 1993). In particular, social scientists have tended to identify themselves "on one side of this divide or the other (and even among some who wish to sit astride it)" (Hammersley, 1992a, pg.39). For instance, in 1964, Kaplan (pg.206) stated "if you can measure it, that ain't it", while Judd, Smith and Kidder (1991) claim that the use of statistics in the social sciences does not enable one to gauge the context in which people construct their worlds. Vidich (1970, pg.172) maintains:

Data collection does not take place in a vacuum. Perspectives and perceptions of social reality are shaped by the social position and interests of both the observed and the observer as they live through a passing event.

Filstead (1970) reiterates Vidich's (1970) view which Hammersley (1992b, pg.159) describes as an obscuration of "the breadth of issues and arguments involved in the methodology of social research". In the 1950s and 1960s quantitative methods were considered the preferable approach, and consequently dominated the fields of sociology and psychology. However, since the 1960s qualitative methods have become widespread wherein gaining legitimacy and acceptance (see Hammersley, 1992b). As such, in many fields this acceptance has further "led to a détente and to increased interest in the combination or even integration of quantitative and qualitative [methods]" (Hammersley, 1992b, pg.160).

To this extent, Bryman (1992, pg.75) maintains that quantitative and qualitative methodologies together "have distinctive characteristics that make the possibility of
combined them especially attractive”. In particular, Greene, Caracelli and Graham (1989, pg.260) argue that “quantitative methods can establish the degree to which perceptions are shared, but uncovering the perceptions themselves must be [first] done naturalistically”. Silverman (1993) furthers reiterates the latter view and argues that “[quantitative] research can claim to tell us about macro-structures, using the analysis of [qualitative] micro interaction as a first step”.

Following this position, Macpherson (1999, pg.1) cautions that “it is important to ask why you would want to use a mixed [combined] methods approach and to clarify exactly what the contributions of the various methods are going to be in your research”. Hammersley (1992b, pg.160) also further cautions “in learning to live and let live there is the danger that we will all quietly forget the [qualitative and quantitative] methodological disagreements that we should be tackling”. To this end, I now discuss the relative contributions of qualitative and quantitative approaches and argue a case for the chosen methodological approaches applied in this study. I now turn to this task and begin with the qualitative approach.

*The Qualitative Approach*

Many academics have offered various definitions and interpretations of qualitative inquiry, such that there is no ‘one’ universally accepted definition. In particular, Bogdan and Taylor (1975, pg.2) postulate that qualitative methods investigate “settings and the individuals within those settings holistically; that is, the subject of the study, be it an organization or an individual, is not reduced to an isolated variable or to a hypothesis, but is viewed instead as part of a whole”. Pauly (1991) describes qualitative research as a five-step procedure: (1) locating a topic; (2) developing research
questions; (3) collecting the evidence; (4) analysing the evidence (data); and (5) writing up the data. According to Potter (1996, pg.67), “qualitative research focuses on meaning making by humans and this meaning is seen best through examining the symbols and language”. Jankowski and Wester (1991, pg.44-45) claim that the qualitative paradigm relies on verstehen, which refers to an understanding of the meaning that people ascribe to their social situation and activities. Because people act on the basis of the meanings they attribute to themselves and others, the focus of qualitative social science is on everyday life and its significance as perceived by the participants.

This variety of definitions and interpretations has provoked debate among scholars, although Evans (1990, pg.155) insists that “in routine academic discourse, this terminological conflation is not too problematic, because like-trained scholars usually have a tacit but mutual understanding of the invoked terms”. Following this position, Potter (1996, pg.42) claims that there are five “assumptions prevalent in the writings of qualitative theoreticians”. These include phenomenology, interpretive, hermeneutics, naturalism and humanistic studies. More specifically, Table 3.1 contours Potter’s (1996) summary of the key assumptions underlying qualitative approaches.

In this study, a naturalist approach is adopted in that I as the researcher am investigating the phenomenon of environmental education knowledge and beliefs among practicing primary school teachers. In order to justify this approach, I now discuss the qualitative methodology applied and in doing so reveal its origins and foundations in the qualitative axioms. I now turn to this task drawing on Potter’s (1996) work as representative of the field.
Table 3.1. Axiomatic Assumptions (Potter, 1996, pg.48)

**Key Question:** What are the key assumptions underlying the qualitative approach?

1. Phenomenology: Researchers should not have preconceived notions about the phenomenon, but keep themselves open to the experience fully.

2. Interpretive: Researchers should strive to see the situation from the perspective of the other.

3. Hermeneutics: Research is a never-ending process of observing an instance and interpreting it in terms of a context that is itself a construction of instances.

4. Naturalism: Researchers need to go to the phenomenon and experience it in its natural, undisturbed state.

5. Humanistic studies: The focus is on language as a demonstration of meaning, and this language must be interpreted in cultural and historical contexts.

**Qualitative Methodology**

As Potter (1996, pg.50) states “methodologies are perspectives on research; they set out a vision for what research is and how it should be conducted. They are the connection between axioms and methods”. Qualitative inquiry consists of a variety of methodologies, including ethnography, ethnomethodology, reception studies, ecological psychology, symbolic interactionism, cultural studies and textual analysis. These methodologies are similar in that they each share axioms and methods, although “each has a different vision for what qualitative research should contribute to scholarship” (Potter, 1996, pg.66). Table 3.2 presents a summation of the seven methodologies identified by Potter (1996).

An ethnographic approach is adopted in this study as the most appropriate to my purposes. The ethnographer seeks to document the ‘knowledge and belief systems’ of a given group, just as I, the ethnographer, seek to document the ‘knowledge and beliefs systems’ of primary school teachers about environmental education. I now turn to a discussion of ethnography.
<table>
<thead>
<tr>
<th>Methodology</th>
<th>Definition</th>
<th>Foundation</th>
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<tr>
<td>Ethnography</td>
<td>“... is a methodology focused on exploring how communities are created and held together with human interactions. Ethnographers seek to document cosmology, that is the knowledge and belief systems that contribute to the coherence of the group” (Potter, 1996, pg.51)</td>
<td>“Its strongest foundational concept is naturalism... The social researcher respects the social world being examined; the allegiance is to the natural world where the information exists, not to any one particular set of methodological principles” (Potter, 1996, pg.52).</td>
</tr>
<tr>
<td>Ethnomethodology</td>
<td>“... is a methodology focused on the study of how people make sense out of everyday life” (Potter, 1996, pg.53).</td>
<td>“Ethnomethodology rests most strongly on a belief in hermeneutics, humanism and phenomenology” (Potter, 1996, pg.53).</td>
</tr>
<tr>
<td>Reception Study</td>
<td>“... is a methodology that focuses on how readers of texts construct meaning from that activity” (Potter, 1996, pg.54).</td>
<td>“... reflects a strong hermeneutic perspective. Also, the caution to focus on the meaning in the interpretations, rather than the texts themselves, shows a foundation of phenomenology” (Potter, 1996, pg.55).</td>
</tr>
<tr>
<td>Ecological Psychology</td>
<td>“... is a methodology that focuses on culturally patterned behavior and uses biological constructs as metaphors to explain how environments affect different species-specific behaviors” (Potter, 1996, pg.56).</td>
<td>“The foundational ideas of naturalism, phenomenology, and especially hermeneutics are important to ecological psychology” (Potter, 1996, pg.57). shrink</td>
</tr>
<tr>
<td>Symbolic Interactionism</td>
<td>“... is a methodology that focuses on meaning in social settings, that is, how individuals are able to assume other people’s perspectives to learn about the meaning behind the use of symbols in human interactions” (Potter, 1996, pg.57).</td>
<td>“Symbolic interactionism uses all five axioms as a foundation” (Potter, 1996, pg.59).</td>
</tr>
<tr>
<td>Cultural Studies</td>
<td>“Cultural studies examines how people interpret their culture and how they interact with it through the creation and use of symbols” (Potter, 1996, pg.60).</td>
<td>“The key axiom is interpretation” (Potter, 1996, pg.62).</td>
</tr>
<tr>
<td>Textual Analysis</td>
<td>“... is a methodology that focuses on texts and seeks to understand them from a literary point of view and to understand how they define culture” (Potter, 1996, pg.62).</td>
<td>“The primary axioms of textual analysis are hermeneutics and interpretation” (Potter, 1996, pg.63).</td>
</tr>
</tbody>
</table>
In Potter’s (1996, pg. 27) view “each human is unique in how he or she creates meaning, because each person is operating from a different set of experiences”. Accordingly, the ethnographic approach assumes that people with similar histories have similar experiences so that individuality is realised in social ways. Ethnographic research attempts to draw on both the individual and social meaning that individuals understand. Rosen (1991, pg. 12) contends that the goal of ethnography is to:

Decode, translate, and interpret the behaviours and attached meaning systems of those occupying and creating the social system being studied. Ethnography, therefore, is largely an act of sense-making, the translation from one context to another of action in relationship to meaning, and meaning in relationship to action.

Ethnographers seldom initiate predictive studies replete with hypotheses. The ethnographic researcher attempts to understand meanings in context. Prior prediction is inappropriate at least until an advanced stage of understanding is achieved. Thus, the ethnographer is more concerned with what happens in natural settings than with a priori schemes that shape the investigation. Such an approach is based upon several theoretical assumptions.

The first is that ethnographers attempt to capture and understand meanings and experiences of the participants within a social system from an “insider’s” or “emic” view (Kellehear, 1993). Data gathered in such a context provide the raw material for
what Wolcott (1990) depicts as the science of cultural description and Van Maanen (1988) defines as ‘culture’\(^{30}\).

Second, according to Hammersley and Atkinson (1983), ethnography has four core features; it is inductive, open to interpretation, rigorous and intensive and analysed explicitly, attempting to expose deep interpretation of meanings within a cultural framework. In this way, ethnographic data are the building blocks for what Glasser and Strauss (1967) refer to as ‘grounded theory’ – “using induction for building theory from qualitative data” (Potter, 1996, pg.152).

Third, ethnography draws on the traditions of naturalistic-phenomenological philosophy in multiple realities in all definitions of the situation (Schumacher & McMillan, 1989). In this tradition, it is assumed that human actions are influenced by the setting or the social or cultural reality in which they occur.

Fourth, the combination of an emic approach and a focus on naturally occurring behaviours enables the ethnographer the opportunity to provide cultural description that become vicarious experiences for readers (Sherman & Webb, 1988). Furthermore, as Schumacher and McMillan (1989) emphasise, understanding the social phenomenon from the native’s perspective requires the researcher to partake in the life of that culture as a participant. As Kellehear (1993, pg.27) suggests:

> Worlds are 'live-in' places and the ethnographer must socially or at least

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\(^{30}\) Grenfell and James (1998, pg.153) describe ethnography as “culture studying culture... concerned with describing group cultures and activities” which “may include issues of organisation, habit, practice, belief, behaviour, and outcomes”. Accordingly, education can also be conceptualised in similar terms (Grenfell & Janes, 1998). Indeed, education constitutes culture which includes cultural and sub-cultural groups. Thus, primary school teachers form a cultural group and environmental education (as a curriculum and teaching area) forms a sub-cultural group.
psychologically try to enter that world. The world is not objective but subjective.

Fifth, the ethnographer formulates ‘stories’ about the cultural worlds of informants built on their language. In this way, Werner and Schoepfle (1987) define culture as a system of knowledge (including knowledge about knowledge) that identifies social interrelationships and physical universes that form an integrated whole. In doing so, there is a juxtaposition between the knowledge of the researcher and that of informants so that as Van Maanen (1988, pg.4) proposes ethnographies “pose questions at the margins between two cultures. They necessarily decode one culture while recoding it for another”. In this situation, it is crucial that the ethnographer ‘speaks’ the native language. In the case of this study, the language is that of the primary school teacher on the subject of environmental education.

Bernstein (1996, pg.137) explains this point in the classic ethnographic position such that “the researcher has first to learn the language of the group or society and know the rules of its contextual use” and:

From here on, the researcher is developing reading rules (of recognition and realization) to grasp how members construct their various texts or manage their contexts. The researcher here is modeling the members’ recognition and realization rules, or the strategies of practice those rules constrain… The problem is to construct the tacit model. If the researcher fails to construct the model s/he is marooned in the specific contexts and their enactments, is in no position to appreciate the potential of the meaning of that particular culture, and
thus its possible enactments. Without a model, the researcher only knows what his/her informants have enacted (Bernstein, 1996, pg.138).

In accordance with Bernstein’s (1996) position, in Chapter Two I presented a tacit model which allows me to ‘grasp how members [teachers] construct their contexts [environmental education in primary school]’. Further, this model also enables me to develop the analytical codes (reading rules) for interpreting data. In these ways, the application of ethnography, in conjunction with the theoretical model, provides a means for understanding what teachers know and believe about environmental education.

Having identified the core categories of primary school teachers’ environmental education complex pedagogical content knowledge (eco-literacy), the distribution of these categories requires exploration. In order to determine the extent and distribution of the informants’ meaning and understanding of environmental education among the wider population of primary school teachers, a quantitative survey was applied to confirm and elucidate the theoretical model and the views discovered using ethnography. I now discuss quantitative methodology and the survey approach.

The Quantitative Survey Approach

Quantitative research is often described as “the process of enumerative induction” (Brannen, 1992, pg. 5). Brannen (1992, pg.5) further states:

One of its main purposes is to discover how many and what kinds of people in the general or parent population have a particular characteristic which has been found to exist in the sample population.
Combining this purpose with the already established culturally valid categories generated by the ethnographic interviews, the survey is a method of identifying "a quantitative or numeric description of some of the population - the sample – through the data collection process of asking questions of people" (Creswell, 1994, pg.117). In turn, the data collection process allowed me to generalise the contextualised ethnographic findings to a sample population.

Similar to qualitative inquiry, quantitative methods are not without criticism. de Vaus (1995) classifies the criticisms reported into three categories, namely philosophical, technique based and political. As highlighted earlier, the philosophical criticisms relate to the limitations of the survey method in establishing meaningful data about social phenomena. As recommended by Green et al. (1989) and Silverman (1997), this problem is overcome in this study through the application of the ethnographic approach prior to the implementation of the survey method. The ethnographic approach allowed me to collect rich and meaningful data about social phenomena, specifically teachers' knowledge and beliefs about environmental education, before administrating the survey to determine the magnitude of such phenomena. As Friedenberg, Mulvihill and Caraballo (1993, pg.152) recommend, the ethnographic approach was also utilised as a means of incorporating "socio-cultural insights into the design of the survey instrument".

Secondly, the technical criticisms assume that "surveys are too statistical and reduce interesting questions to totally incomprehensible numbers" (de Vaus, 1995, pg.9). While this criticism follows the general critique of qualitative methods discussed earlier,
this study has taken steps to ensure that the content of the survey has tangible meaning for the participants and for the field of environmental education\textsuperscript{31}.

Thirdly, the political criticisms relate to the manipulative nature of surveys. de Vaus (1995, pg.9) states that surveys are considered this way for two reasons:

First, the knowledge it [survey] provides about the social world gives power to those in control and this can lead to an abuse of power. Second, survey research leads to ideological manipulation. It does not produce knowledge about reality but is an ideological reflection whose acceptance by ‘the public’ furthers particular interests.

Again, these criticisms are substantially countered by the content of the survey and its contribution to the betterment of environmental education. I deal with these criticisms further in Section Two of this Chapter, specifically in the discussion about the survey’s validity and reliability. I now turn to a brief summary of Section One, before turning to Section Two.

\textit{Summary}

This Section sets out a rationale for the methods selected for the empirical work of this thesis, namely the qualitative ethnographic approach and the quantitative survey approach. As recommended by Bernstein (1996), the methods selected are grounded on a tacit theoretical model, as presented in Chapter Two, in turn allowing me to ‘grasp how members [teachers] construct their contexts [environmental education]’. This

\textsuperscript{31} This is further discussed in Section Two of this Chapter.
model also reveals the analytical codes (reading rules) for interpreting data. To this end, the application of ethnography, in conjunction with the theoretical model, provides a means for understanding what teachers know and believe about environmental education. Further, the quantitative survey approach provides a means for confirming and elucidating the theoretical model and the views discovered using ethnography. I now turn to Section Two, the Data Collection and Data Analysis Techniques.

Section Two

Data Collection and Analysis Techniques

In Section Two, I discuss, describe and reflect upon what I did in-and-out of the field; in others words, the methods utilised to collect and analyse data. As indicated earlier, the data collection and data analysis phases were carried out in two stages. Stage one consisted of a series of ethnographic interviews followed by intensive analysis, whereas a mail survey and subsequent analysis constituted stage two. I now describe the data collection and analysis techniques utilised in stage one and stage two consecutively.

Stage One - Data Collection & Analysis Techniques

The Informants / Participants

Primary school teachers were selected as the informants for this study. For stage one, primary school teachers were recruited from two Queensland 'education districts'.

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32 In Queensland, ‘districts’ are geographical administrative units for overseeing government schools. Districts tend to oversee fifty to seventy schools (approximately). There are thirty-three such units (districts) in Queensland.
Primary school principals in the identified districts were approached (via letter and then email) to seek their support for the study. All principals were mailed a package (July 2001) which included a letter about the study and an appropriate number of information sheets and consent forms to distribute to their teaching staff (see Appendix One). A total of sixty-eight packages were sent to sixty-eight different school principals, a total of six hundred and ninety information sheets and consent forms sent altogether. Five days later, a follow-up email was sent to all sixty-eight principals to confirm that they had received the package and distributed its content (see Appendix Two). Sixteen principals replied to acknowledge that they had received the packages, with thirteen principals indicating that all information sheets and consent forms had been distributed. Three school principals expressed no interest in the study. The remaining forty-nine primary school principals were contacted again via email and/or telephone. However, most principals either did not return my telephone message and/or did not respond to my email messages. In instances where principals did respond, it was indicated that all information sheets and consent forms were distributed.

A total of five teachers responded to the above-mentioned method. Another fourteen primary school teachers were accessed, in the same two districts, through organised (state education) department professional development workshops wherein I was given a brief amount of time to speak about my study and seek volunteers. Two principals also invited me to their schools to recruit volunteers, which in turn resulted in seven more participants. All participants were also sent packages (including a ‘thank you’ card) to distribute information sheets and consent forms to their fellow teaching colleagues (see Appendix Three), however this method proved to be unsuccessful. I also advertised my research project through professional education internet sites, email

33 In the state of Queensland, all teachers must be initially contacted via the school principal.
lists and teacher networks, however once again, this method proved to be unsuccessful in accessing primary school teachers for my study. Notwithstanding, as Table 3.3 illustrates a total of twenty-six primary school teachers volunteered and participated in stage one of this study.

Table 3.3. Total Number of Stage One Participants

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>female</td>
<td>22</td>
<td>84.6</td>
</tr>
<tr>
<td>male</td>
<td>4</td>
<td>15.4</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>100.0</td>
</tr>
</tbody>
</table>

These figures are consistent with the most current Education Queensland data that seventy-eight percent of primary school teaching staff are female and twenty-two percent are male (Cheong, 2002).

As illustrated in Figure 3.1, the age range of the participants was from twenty-two to fifty-seven (see Appendix Four). The average age of the participants was forty-one. Once again, this is consistent with Education Queensland data which indicates that the average age of primary school teachers is forty (Cheong, 2002).

Further, the number of years taught by the participants ranged from one year to twenty-six years. The 'mean' (average) number of years taught from years one to three was 8.3 years and 10.8 years for years taught from four to seven (see Appendix Five). Nine informants also indicated that they had experience in other education fields such as education departments (education / curriculum advisor), secondary schools (teaching), environmental education centres (teaching), special education (teaching), reading
recovery, vocational education (teaching), land care (government), intervention, learning support and education management (deputy principal and teaching principal).

Figure 3.1. Stage One Participants' Age Range, Standard Deviation and Mean

All twenty-six participants obtained various different teaching qualifications. Three informants obtained a Certificate in Teaching / Education qualification. Twenty participants ascertained a Diploma of Teaching / Education qualification (two who also obtained a certificate), and sixteen participants (three who also obtained a diploma) attained a Bachelor of Education / Teaching qualification. Six informants also obtained degrees in other disciplines such as 'The Arts' (four) and 'Science' (two). A further three informants have Masters of Education / Administration degrees. And eight of the twenty-six informants indicated that they had done extensive professional development in various different curriculum areas.

All twenty-six informants were interviewed once. The average duration of an interview was ninety minutes. The shortest interview was sixty minutes in length and the longest interview was one hundred and seventy minutes in length. There were no time restrictions placed on the interviews and all interviews progressed for as long as
necessary. Before discussing my experiences and techniques applied in the field, I now describe the interviewing techniques utilised.

**Intensive and Structured Interviewing**

Intensive ethnographic interviewing techniques were utilised in this study. Lofland and Lofland (1971, pg.76) describe intensive interviewing as “a guided conversation whose goal is to elicit from the interviewee (usually referred to as the informant) rich, detailed materials that can be used in qualitative analysis”\(^{34}\). According to Lofland and Lofland (1995) intensive interviewing serves as a tool to discover the perceptions and experiences the informant has had of a particular situation or topic. While the chosen interview technique can be labelled intensive, it was also ethnographic in nature. Thus, each interview was “not as balanced as most conversations are”, but rather I took control “by asking questions and probing the person’s responses” (Potter, 1996, pg.96). Moreover, I structured the interviews like survey interviewing, while remaining responsive to the situation rather than having a standardised proforma. Interviews were also open-ended and designed to get the interviewee talking about broad topics (see Potter, 1996, pg.96-97).

In addition, I sought to understand teachers’ meaning, or as Marshall (1995, pg.82) describes “rich narrative descriptions”, by applying one-to-one interviewing. Each interview was approached with an unstructured ethnographic interview guide (see

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\(^{34}\) Participant observation is also a technique commonly applied in ethnographic research. Ethnographic interviewing techniques were not used as the main method to collect data for this study because an interpretative approach was adopted for the research design on the whole. The central premise of interpretative research is understanding human experiences. According to Berry (1999), in-depth or intensive ethnographic interviewing as a stand-alone method is a legitimate means of understanding human experiences about any given subject or issue. Adding to this, participant observation was also not utilised in this study for reasons to do with teacher access and teacher confidence. Such issues are discussed further in Chapter Five, Limitations of the Study.
Appendix Six). The interview guide could be described as “a list of things to be sure to ask about when talking to the person being interviewed” (Lofland, 1995, pg.76), rather than a rigid set of questions. The content of the interview guide was derived mainly from the ‘Literature Review’ (Chapter One). The ‘Theoretical Framework’ (Chapter Two) also constituted content of the interview guide as recommended by Lofland and Lofland (1995).

I also followed Lofland and Lofland’s (1995) advice on the use of well thought out probes. Each interview began with a ‘grand tour’ question such as “tell me, what does environmental education mean to you?” This technique is designed to open up broad issues, thus allowing the interview to proceed according to the informant’s responses. Face sheets (see Appendix Seven) and post-interview comment sheets (see Appendix Eight) were also utilised for the purposes of data identification (filing), bookkeeping and keeping a record of the interviews (Lofland, 1995).

A micro-cassette recorder was used to record each interview. Lofland and Lofland (1995, pg.86) acknowledge the importance of using a tape-recorder:

In our view, it is imperative that you tape-record the interview itself. Since there is no strict order of questioning and since probing is an important part in the process, you must be alert to what the informant is saying.

Further, during the course of each interview handwritten notes were taken. Once the interview process was completed the interviews were transcribed verbatim. This process impels the researcher to listen to the interview, piece by piece, thus stimulating analysis. The interviews were written up as analytical notes which were recorded in a somewhat
similar fashion to a diary. This experience is similar to that suggested by Lofland and Lofland (1995, pg.88) as it takes “twice as long writing up the interview in this fashion as you spent in conducting it”. Whilst writing-up the interview, new questions and puzzlements were raised and were then incorporated into future interviews.

Following the transcribing and writing-up process, the transcript was forwarded to the informant with a ‘certificate of appreciation’ and ‘letter’ expressing gratitude and requesting the informant to make modifications if necessary (see Appendix Nine). This technique is designed to increase the accurateness of the transcripts, in addition to giving the informants a sense of contribution and engendering confidence and trust in the researcher (see Berg, 1995; Marshall & Rossman, 1995; Rosen, 1991). As such, all informants returned their transcripts with no modifications. I now describe my entry into the field.

Entry into the field

From the outset of my entry into each setting the informants were made aware of the purpose of the study and their associated role in the study. Prior to all interviews informants were given some detail as to why I was investigating primary school teachers’ knowledge and beliefs about environmental education. Such details were also provided on the information sheet which all informants received prior to the interview.

As Lofland and Lofland (1995, pg.40) recommend, throughout the course of the interviews I adopted a naïve “learner role” which assisted in “getting along” with the informants. However, I was mindful of Lofland and Lofland’s (1995, pg.40) advice about demeanour during interview sessions:
If you are to avoid being perceived as either frivolous or stupid and dismissed as such, you should have enough knowledge about the setting and or people you wish to study to appear competent to do so.

Courtesy was extended to all informants at all times throughout the study. Interviews were arranged at the informant’s convenience. Interviews were also conducted at the informant’s chosen location. In most cases the informants were interviewed at their place of work (school), and in some cases the informants were interviewed at their residence.

The ‘assurance of confidentiality’ was also guaranteed to all of those involved in the study (Lofland, 1995; Lofland & Lofland, 1984). Berg (1995, pg.213) insists that “it is important to provide subjects with a high degree of confidentiality”. Ensuring confidentiality enabled me to engender trust with the informants, in addition to assisting in my ‘getting in’. Furthermore, in an effort to ensure confidentiality, informants have been identified by a coded numbering system in lieu of the use of real names in the data presentation and data analysis Chapter. I now describe the stage one data analysis.

Data Analysis Techniques – Stage One

I utilised the computer software program NVIVO (Version 2.0) to analyse all stage one data. NVIVO allows researchers to store, categorise, code and analyse data. More specifically, “NVIVO provides a range of tools for handling rich data records and information about them for browsing and enriching text, coding it visually or at
categories, annotating and gaining accessed data records accurately and swiftly” (Richards, 2000, pg.4).

NVIVO requires the researcher to organise, link and code data. To do this, NVIVO has two fundamental processes, namely ‘documents’ and ‘nodes’. Documents are the interview transcripts, and the nodes represent “ideas, things, people, concepts, categories for thinking about data” (Richards, 2000, pg.16). Free nodes were utilised to store unorganised ideas and tree nodes were utilised to organise all nodes into a “hierarchical thesaurus-like system”. Ultimately, nodes represent the emerging themes and patterns in the data. Such themes and patterns (nodes) were directly influenced by issues raised in the Literature Review (Chapter One), and grounded in the theoretical model presented in Chapter Two. As Richards (2000, pg.59) notes, “qualitative researchers usually create categories [nodes] in two different ways ‘up’ from the data, as meanings of the data are noted and stored, and ‘down’ from prior ideas, project designs and theories”. I created nodes utilising both methods.

As such, pre-existing nodes (categories) were created via Richard’s (2000) techniques of ‘down from the data’ which were based upon the ideas and theoretical models contained in the Literature Review (Chapter One) and Theoretical Framework (Chapter Two). The remaining nodes (categories) were created via Richard’s technique of ‘up from the data’. The latter technique involved reading and analysing all transcripts, piece by piece, and individually coding the data into pre-existing nodes and/or new nodes as themes and topics arise.

Altogether, eight tree nodes were created, namely: knowledge in and about the environment and environmental education; beliefs in and about the environment and
environmental education; ‘SOSE’ & outcomes approach – practices and concerns; the environmental crisis – concerns and viewpoints; environmental education teaching - practices and barriers; environmental education training; the future of environmental education – teachers’ Ideas; and teachers’ role/s in environmental education. Each tree node consisted of ten to twenty individual nodes which included some tree nodes. In total, one hundred and thirty-eight nodes were formed.

Furthermore, as Richards (2000, pg.19) notes, the techniques of organising, linking and coding data “are brought together in integrated search procedures”. In particular, there are seven search strategies altogether, including: integrated searches (text and coding pattern searches, including Boolean and relational searches); text searching (string and pattern searches); specific passage and document scope searches; assay searches; node (results) searching; qualitative matrices (patterns of coding or attributes in tabular format); and building on search results to create models and visual representations (drawing, managing, layering, styling and grouping items and links in models) of the data. As such, all seven search strategies were applied to the stage one data.

To this extent, NVIVO enabled me to generate nodes (categories) from the data. These nodes (categories) developed into stories which were then refined into the themes formulating the qualitative data presentation and analysis (Chapter Four) of this thesis. Further, the analysis of the stage one data allowed me to structure and design the survey questionnaire. Prior to describing this process, I now discuss the data collection problems experienced during stage one.
Data Collection Problems – Stage One

I, as the ethnographer, collected and analysed data as impartially as possible, however the informants' culture and my own culture would have certainly influenced my interpretations (Werner & Schoepfle, 1987). This difficulty is highlighted by the Manheim's paradox in that no researcher is a *tabula rasa* regardless of how familiar one is with local culture and native language (Werner & Schoepfle, 1987). This highlights the elusive nature of knowledge. Like all human knowledge, cultural knowledge is uncertain as the only meanings which pass between two people are interpretations. This is problematic as no two human beings have the same life experiences, thus meanings can be entirely individual or "presumptive" (Werner & Schoepfle, 1987). Werner and Schoepfle (1987, pg.60) point out, "we presume that what we know is true and operate on the basis of this knowledge as if it were true, but we can never be certain". All researchers then, are faced with issues of reflexivity or "willingness to probe beyond the level of straightforward interpretation" (Woolgar, 1988, pg.16). The problems lie both in the informants' responses and the interpretation of them by the ethnographer. In turn, there is the difficulty of the ethnographer writing the 'story' at a distance from the informants and the story then being interpreted by readers who are positioned differently again.

In an attempt to deal with such issues, I drew on Hammersley and Atkinson's (1983) position of 'triangulation'. Thus, I gathered data from different primary school teachers to determine anomalies. Furthermore, I followed the advice of Werner and Schoepfle (1987) to deal with the influence of my own cultural perspectives. I embedded myself in ethnographic theory, the local language(s) of the informants and the literature concerning environmental education while endeavouring also to 'bracket' my own
beliefs. I am aware, of course, that this is always a partial solution to ethnocentrism on the part of the researcher.

In voicing the informants’ perspectives, I as the researcher have the power to misconstrue or otherwise distort their experiences. This presents a deeper and more intractable difficulty. In my view, it is the understanding that my ethnographic report can never possess the status of fundamental truth that ‘really’ represents the informants. Rather, I take the view that in attempting to deal with these issues, I am, at least partially, fulfilling obligations which accrue to the position that the ethnographer’s report is always flawed and always partial. The ethnographer, like all other researchers, can never claim to know the truth in a final, essentialist sense.

Thus, the quantitative survey approach adopted is also a part solution to such problems as it provides a means for confirming and/or elucidating the views discovered using ethnography. As Greene, Caracelli and Graham (1989, pg.260) argue “quantitative methods can establish the degree to which perceptions are shared, but uncovering the perceptions themselves must be [first] done naturalistically”. Thus, in an attempt to bracket my own beliefs (ethnocentrism) and deal with issues to do with reflexivity, I have followed such advice. As such, I now turn to a discussion about the data collection and data analysis techniques utilised in stage two.

Stage Two - Data Collection & Analysis Techniques

So as to elucidate the findings discovered in the stage one phase of data collection, a quantitative survey was administered in Queensland primary schools. To assist with the
development of the survey, a pilot study was undertaken. I now discuss the strategies utilised for designing, conducting and analysing the pilot survey and the mail survey.

The Sample – ‘Pilot Survey’

In the pilot survey, I pretested the survey instrument and procedures for the study, in addition to testing data collection and analysis techniques and identifying variance in the targeted sample population to do with age, gender, experience and training backgrounds.

For the pilot survey, primary school teachers from the Central Queensland region were sampled using convenience sampling methods. More specifically, ninety-five teachers from five different primary schools, in addition to the twenty-six informants interviewed in the stage one phase of this study, were surveyed. The stage one participants were mailed and emailed a questionnaire (see Appendix Nine). The five different schools volunteered to participate in the pilot study upon my request (email) to two Queensland education districts. I personally administered the questionnaires from all participating schools. A total of seventy-eight teachers completed and returned their questionnaires, equaling a response rate of eighty-two percent. According to de Vaus (1995, pg.103) "somewhere between 75 and 100 respondents provides a useful pilot test".

Notwithstanding, seventy-one percent of the sample were female and the remaining twenty-nine percent were male. As illustrated in Figure 3.2, the age range of participants was from twenty-two years of age through to sixty-one years of age. The average age of participants was forty-two and half years of age. Once again, such
gender and age break-ups are consistent with current Education Queensland demographic data as discussed previously (Cheong, 15 February 2002).

Figure 3.2. Stage Two (Pilot) Participants' Age Range, Standard Deviation and Mean

Further, the number of years taught by the participants ranged from less than one year to thirty-eight years. Figure 3.3 illustrates the percentage break-ups of the respondents' current (at the time of data collection) teaching year level.

Figure 3.3. Pilot Respondents’ Current (2002) Teaching Level
The participants all obtained various different teaching and teaching-related qualifications. Table 3.4 illustrates that sixty-eight percent of the sample obtained a Bachelor of Education and sixty-six percent a Diploma of Teaching. Only four percent of the sample had done further postgraduate study (at the university level).

**Table 3.4. Pilot Respondents’ Teaching Qualifications (Percentages)**

<table>
<thead>
<tr>
<th>Qualification</th>
<th>Percentage with Qualification</th>
<th>Percentage without Qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certificate of Teaching</td>
<td>17%</td>
<td>83%</td>
</tr>
<tr>
<td>Diploma of Teaching</td>
<td>66%</td>
<td>34%</td>
</tr>
<tr>
<td>Other Diploma</td>
<td>15%</td>
<td>85%</td>
</tr>
<tr>
<td>Bachelor of Education</td>
<td>68%</td>
<td>32%</td>
</tr>
<tr>
<td>Bachelor of Arts</td>
<td>9%</td>
<td>91%</td>
</tr>
<tr>
<td>Bachelor in Other Discipline Area</td>
<td>13%</td>
<td>87%</td>
</tr>
<tr>
<td>Masters (and/or Further Higher Education)</td>
<td>4%</td>
<td>96%</td>
</tr>
<tr>
<td>Doctor of Philosophy / Education</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>

_The Sample – ‘Mail Survey’_ 

One thousand nine hundred and thirty questionnaires were distributed to five different Queensland education districts. Sufficient questionnaires for all primary school teachers were mailed to all schools (one hundred percent sample) within each district. Across all five districts there were one hundred and seventy eight schools which employed a total of one thousand nine hundred and thirty primary school teachers.
The five different education districts were randomly selected from all of Queensland's thirty-three education districts. Prior to administrating the survey, all five district directors (from the different districts) were approached to seek their support for the study (see Appendix Ten). All five district directors endorsed the survey and agreed to support the study through personally contacting all principals in their district to seek and gain their support.

In accordance with the above-mentioned process, the survey was administered to all five districts. A total of three hundred and forty-nine primary school teachers completed and returned questionnaires, equalling a nineteen percent response rate. Seventy-six percent of the sample were female and the remaining twenty-four percent were male. As illustrated in Figure 3.4, the age range of participants was from twenty-one years of age through to sixty-two years of age. The average age of participants was forty and a half years of age. Once again, such gender and age break-ups are consistent with current Education Queensland demographic data as discussed previously (Cheong, 15 February 2002).

Figure 3.4. Stage Two Participants' Age Range, Standard Deviation and Mean
Further, the number of years taught by the participants ranged from less than one year to thirty-seven years. Figure 3.5 illustrates the percentage break-ups of the respondents’ current (at the time of data collection) teaching year level.

Figure 3.5. Mail Survey Respondents’ Current (2002) Teaching Level

The participants all obtained various different teaching and teaching-related qualifications. Table 3.5 illustrates that seventy-one percent of the sample obtained a Bachelor of Education and fifty-eight percent a diploma of teaching. Only six percent of the sample had done further postgraduate study (at the university level).

Table 3.5. Mail Survey Respondents’ Teaching Qualifications (Percentages)

<table>
<thead>
<tr>
<th>Qualification</th>
<th>Percentage with Qualification</th>
<th>Percentage without Qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certificate of Teaching</td>
<td>13%</td>
<td>87%</td>
</tr>
<tr>
<td>Diploma of Teaching</td>
<td>58%</td>
<td>42%</td>
</tr>
<tr>
<td>Other Diploma</td>
<td>16%</td>
<td>84%</td>
</tr>
<tr>
<td>Bachelor of Education</td>
<td>71%</td>
<td>29%</td>
</tr>
<tr>
<td>Bachelor of Arts</td>
<td>6%</td>
<td>94%</td>
</tr>
</tbody>
</table>
In essence, the findings of the stage one data analysis provided the content for the survey instrument. The pilot questionnaire format and structure replicated the (proposed) mail survey (see Appendix Eleven). The pilot instrument contained demographic questions referring to gender, age, current teaching year level, total years of experience, teaching and/or relevant qualifications and in-service and pre-service environmental education training. It included a mixture of nine close-ended questions (items), including multiple choice, likert and ranking style questions. Such questions (items) were developed in accordance with the eco-literacy model presented in Chapter Two.

So as to increase the success of the pilot survey, all elements of Dillman’s (2000; 1978) total design method for mail surveys were utilised in the pilot study as follows:

1. Ninety-five teachers, including the twenty-six informants who participated in stage one, received a questionnaire (with an attached return envelope where necessary).

2. Seventy-five questionnaires were distributed across five state primary schools who had agreed to participate in the pilot survey.
3. The twenty-six informants (from Stage One) received their questionnaire with their original interview transcript.

4. The questionnaire was five pages in length and printed on off-white, cream paper in a professional layout (See Appendix Eleven).

5. The questionnaire required little time and effort of the respondent.

6. All chances of embarrassment, subordination and direct monetary cost were eliminated.

7. The questionnaire was identified with a known organisation that has legitimacy (Central Queensland University).

8. The respondent was personally rewarded by showing positive regard to the respondent's contribution.

9. The respondent was further rewarded by being entered into a competition to win an extensive selection of environmental education (& SOSE) resource kits, activities, games, posters, stickers and books.

10. Questionnaires were personally delivered and collected so as to increase the response rate of the pilot survey.

Following the administration and analysis of the pilot survey, the mail survey questionnaire underwent some changes. Such changes were mainly in the form of reworking and enhancing questions to improve the readability and analytical capability of the instrument. Three content style questions were also included in the mail survey instrument which do not appear in the pilot survey instrument35.

35 In the actual mail survey questionnaire, participants were requested to answer three multiple-choice questions about environmental concepts. These were the only items not included in the pilot questionnaire due to restricted time constraints stipulated by the individual schools. With the permission of the Wisconsin Environmental Literacy Center, the three content-style items were adapted from the Wisconsin Teacher Environmental Literacy Survey (Wisconsin Center for Environmental Education, 1997).
The Survey Instrument and Administration – ‘Mail Survey’

The mail survey contained demographic questions referring to gender, age, current teaching year level, total years of experience, teaching and/or relevant qualifications and in-service and pre-service environmental education training. It included a mixture of twelve closed ended questions (items), including multiple choice, likert and ranking style questions (see Appendix Twelve). All elements of Dillman’s (2000; 1978) total design method for mail surveys were also applied with regards to the administration of the mail survey:

1. Emailed (message and postcard) all primary schools in the selected districts (sample) one week prior to the administration of the survey so as to alert the sample to the mail survey and thus obtain their support (see Appendix Thirteen).
2. All district directors were provided with two electronic messages and postcards to email to all schools within their district at different stages throughout the administration of the survey (see Appendix Fourteen).
3. Administered the questionnaire (with an attached reply-paid envelope) and covering letter (see Appendix Fifteen) to one thousand nine hundred and thirty primary school teachers from the five selected districts, a total of one hundred and seventy eight primary schools.
4. The questionnaire was six pages in length and printed on cream paper in a professional, easy-to-follow layout (A4 booklet) (see Appendix Twelve).
5. The questionnaire requires little time and effort of the respondent (maximum 10 – 15 minutes).
6. All chances of embarrassment, subordination and direct monetary cost were eliminated.
7. The questionnaire was identified with a known organisation that has legitimacy (Central Queensland University & Education Queensland).

8. The respondent was personally rewarded by showing positive regard to the respondent’s contribution.

9. The respondent was further rewarded by being entered into a competition to win two nights for two adults at Club Crocodile Resort.

10. Administered a reminder email message to all schools (in the selected districts) one week after the questionnaires had been delivered (see Appendix Sixteen).

11. Administered a second reminder email message (with questionnaire attached) (see Appendix Seventeen).

12. Three weeks after the administration of the survey, administered (mailed) a reminder / thank you letter (on CQU letterhead) and individual thank you notes (with Club Crocodile pamphlet attached) to all teachers (see Appendix Eighteen).

13. Administered a final email message, thanking all participants, four weeks after the administration of the survey (see Appendix Nineteen).

14. Drew the winner of the Club Crocodile Prize and announced the winner to the entire sample with the permission of the winner (see Appendix Twenty).

So as to increase the survey’s reliability and validity specific techniques were also applied. I now describe such procedures.

Reliability and Validity Techniques

The following reliability and validity tests were utilised for the mail survey. Such tests were initially trialled in the pilot survey instrument.
Litwin (1995) maintains that all data sets contain varying degrees of 'reliability' error. The two most common forms of error are random error and measurement error. According to Litwin (1995, pg.5), “random error is the unpredictable error that occurs in all research”. He (1995) further claims that random error is usually caused by the sampling techniques applied. As such, a large sample was drawn upon so as to reduce the severity of random error.

Measurement error “refers to how well or poorly a particular instrument performs in a given population” (Litwin, 1995, pg.6). In this way, measurement error reflects “the precision (or lack of precision) of the survey instrument itself” (Litwin, 1995, pg.6). To gauge the ‘measurement error’ of my survey instrument, particular questions were worded differently to measure the same attribute (de Vaus, 1995). This is what de Vaus (1995, pg.55) describes as the “test-retest method”. Thus, this technique allowed me to measure the reliability of the subjects’ responses.

de Vaus (1995, pg.55) further recommends careful question wording. de Vaus (1995) cautions that “it is wise to avoid questions about which people are unlikely to have an opinion or knowledge, or at least provide ‘do not know’ or ‘cannot decide’ responses”. As such, de Vaus’s (1995) suggestions were applied.

de Vaus (1995) further recommends that all coding methods should be determined in conjunction with the development of the questionnaire. Once again, such suggestions were applied, such that a code book was developed prior to the administration of the survey.
In addition to reliability techniques, there are also several types of validity techniques which can be adopted to determine the performance of a survey instrument, including face, content, criterion and construct methods (Litwin, 1995). To measure the validity of the survey, content validity techniques were applied. The content validity technique is a subjective measure by reviewers who ascertain some knowledge in the subject matter (Litwin, 1995). With my particular study, key environmental education authorities were employed to measure the content validity of the survey. Litwin (1995, pg.35) maintains that "the assessment of content validity typically involves an organized review of the survey contents" which usually "provides a good foundation on which to build a methodologically rigorous assessment of a survey instrument's validity". Following the analysis of the pilot study these techniques were revised and then reapplied in the mail survey instrument. I now briefly describe the data analysis techniques utilised in stage two.

Data Analysis Strategies — ‘Pilot Survey’ and ‘Mail Survey’

The quantitative data collected was analysed using the statistical software package for the social sciences (SPSS Version 11.5). SPSS provides "a range of features which enable the user to manage, analyse, manipulate and display data" (Myatt, 1998, pg.2).

Numerical scales were applied for collating demographic data, such as gender, current year level, qualifications and training, age and total years of teaching experience. Ordinal and ranking techniques were utilised in the construction of the closed ended questions, such as likert, multiple choice and ranking questions.
As this study was exploratory, each item was analysed individually. In doing so, a predictive analytical model was developed for each individual question (see Appendix Twenty-One). These models directed the statistical analysis of all data. Each model was connected to all other questions in the questionnaire, by measuring the relationships between and the significance of question responses.

Univariate analysis techniques (specifically descriptive statistics) were applied to measure frequencies and cross-tabulations of and between data. Factor analysis techniques were also applied to specific ‘knowledge’ questions (namely questions five, six, seven, ten, eleven & twelve) and ‘belief’ questions (namely questions one, two, three, four, eight and nine). Significance testing (Chi-Square) was applied to the data categories (questions) and demographic data. From such analysis a predictive regression (path analysis) model was developed which can be seen in Chapter Four.

Prior to summarising Section Two, I now discuss the stage two data collection problems encountered.

_Data Collection Problems – Stage Two_

Data collection problems were minimised in the stage two phase of data collection as all possible sources of error were accounted for and, as discussed earlier, specific procedures were applied. For instance, all elements of Dillman’s (2000; 1978) ‘total design method’ for surveys were applied, in addition to the discussed reliability and validity procedures.
Notwithstanding, to avoid data collection problems, as recommended by de Vaus (1995, pg.107), five factors were considered prior to, during and following the administration of the both the pilot survey and mail survey. These include: response rate; ability to produce a representative sample; limitation on the questionnaire design; quality of responses; and implementation problems. I now address each factor successively.

Response rates

de Vaus (1995) claims that face-to-face and telephone surveys often receive better response rates than mail surveys. As such, Dillman (2000; 1978) shows that face-to-face and telephone surveys receive response rates of approximately eighty-five percent (using his total design method for surveys)\(^{36}\), whereas mail surveys receive response rates of sixty to seventy-five percent (using his total design method for surveys). However, as Dillman (2000; 1978) notes, response rates are also influenced by personal interest in the topic *per se*, which cannot be controlled by the researcher.

In attempting to achieve high response rates, several methods were applied in this study, as recommended by Dillman (2000; 1978) and de Vaus (1995). In particular, all elements of Dillman’s (2000; 1978) total design method for surveys were applied. Such techniques have been widely reported as significantly increasing the response rate of surveys (de Vaus, 1995). However, despite utilising such methods, a relatively low response rate of nineteen percent was achieved in the mail survey. The low response rate achieved can be attributed to principals’, teachers’ and schools’ lack of interest in research, including survey research, as reported by Holbrook (2000).

\(^{36}\) A face-to-face (personal) survey was neither practical nor possible for this study. Further, a telephone survey was not possible as the telephone numbers of Queensland primary school teachers are considered confidential information which is not made available to researchers or the general population. Moreover, it is considered unethical to contact primary school teachers personally, as all initial contact must be done through school principals. Thus, a telephone survey of this nature would also be considered unfeasible.
Further, the low response rate can also be attributed to the delivery method of the mail survey. The personal approach utilised in the pilot survey yielded a much higher response rate. Unfortunately, time and financial constraints prevented me from administering the state-wide mail survey using the same method applied for the pilot survey.

*Obtaining a representative sample*

A representative sample is one where all members in a given population have an equal chance of being surveyed. As there are approximately nineteen thousand primary school teachers in Queensland alone, assuring this was impossible. However, through undertaking a one hundred percent sampling method in five different education districts, this allowed all teachers in those districts an equal opportunity of completing the questionnaire. According to de Vaus (1995, pg.108), “to obtain a representative sample it is necessary to have some control who completes the questionnaire”. As de Vaus (1995) notes, this is extremely difficult to control in the administration of mail surveys. Once again, this is an unavoidable limitation of this study.

*Questionnaire design, Quality of answers and Implementing the survey*

According to Dillman (2000; 1978), overly short questionnaires will be perceived as trivial by potential respondents, and therein decrease response rates. Dillman (2000; 1978) recommends that a questionnaire should be no longer than twelve pages, however current educational research indicates that teachers are participating significantly less in survey research (see Holbrook et al., 2000). Thus, it was considered that six pages would cover all the necessary topics and issues.
Once again, Dillman’s (2000; 1978) recommendations for questionnaire design were applied. In particular, off white cream paper, a professional and easy-to-follow format and interesting and simply worded questions were utilised in the design of the questionnaire. Further, according to de Vaus (1995), mail surveys have the most successful performance rate of all other survey methods inasmuch as obtaining accurate answers as the respondents are less likely to be affected by controversial or sensitive issues.

Furthermore, the actual implementation of the survey is also considered to be less troublesome than other survey methods as it does not require staff or a costly budget. According to de Vaus (1995), the implementation of a mail survey requires a well organised researcher. To this end, the mail survey was conducted, through applying Dillman’s (2000; 1978) ‘total design method’ for surveys, in an organised and reasonably uncomplicated manner as previously discussed.

Prior to turning to the data presentation and analysis, Chapter Four, I now summarise Section Two, before concluding Chapter Three.

**Summary**

In Section Two, I discussed, described and reflected upon what I did in-and-out of the field; in others words, the methods utilised to collect and analyse data. It will be recalled that the data collection phase of this study consisted of two stages. For stage one, a total of twenty-six primary school teachers volunteered and participated in one intensive ethnographic interview. Unstructured ethnographic interview guides were
prepared for the interviews. Accordingly, probes, face-sheets, post-interview sheets, a micro-cassette recorder and specific note-taking techniques were employed for all interviews. Furthermore, I utilised the computer software program NVIVO (Version 2.0) to store, categorise and analyse all stage one data.

So as to elucidate the findings discovered in the stage one phase of data collection, a quantitative survey (stage two) was administered in five Education Queensland state primary school districts. To assist with the development of the survey, a pilot study was trialled. All elements of Dillman’s (2000; 1978) total design method for mail surveys were utilised in the pilot survey and actual mail survey. Furthermore, reliability and validity procedures were also applied. The quantitative data collected was analysed using the ‘Statistical Software Package for the Social Sciences’, (SPSS Version 11.5). To avoid data collection problems, five factors were considered prior to and during the administration of the survey, namely: response rate; ability to produce a representative sample; limitation on the questionnaire design; quality of responses; and implementation problems.

Before turning to Chapter Four, Data Presentation and analysis, I now briefly conclude Chapter Three.

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**Conclusion**

The combined-methods approach and design provided the means for testing the research problem and theoretical model presented in Chapter Two. These techniques allowed data to be collected from selected informants. The Chapter has also described the ways in which data were collected, codified and analysed. I now proceed to Chapter Four.
CHAPTER FOUR
Data Presentation & Analysis

I don't think I need to know specific content to be able to teach (26).\(^7\)

Introduction

In this Chapter I present, discuss and analyse the data collected in 'Stage One' and 'Stage Two' of this study. The data presentation and analysis are organised under four headings. These include: Teachers' Preparedness; Teachers' Knowledge; Teachers' Beliefs; and Correlating Teachers' Preparedness, Knowledge & Beliefs – A Path Analysis. I now turn to this task.

Teachers' Preparedness

In order to gauge primary school teachers' knowledge and beliefs (eco-literacy) about environmental education, it was considered necessary to determine the level of environmental education training undertaken by the stage one and stage two participants.

The majority of teachers (in stage one), both male and female, indicated that they had not undertaken pre-service training in environmental education, as outlined by one participant:

\(^7\) All 'Stage One' comments indicate a number (code) which allows me as the researcher to check and identify data sources, in addition to assuring the anonymity of all informants.
I didn't get to learn that sort of thing [environmental education] at uni (6).

Furthermore, several of the recently graduated stage one informants indicated that they had received very little environmental education during their undergraduate pre-service teacher training, as typified in the following exchange:

**ACM:** What about at Uni, did you have the opportunity to learn about environmental education?

**3:** We didn’t, no. We had a social environmental unit where we had to basically go to a school and plan an area that would promote learning outside in the outdoors. And we developed a senses garden. That's the only thing I had to do with it through uni.

**ACM:** So you haven’t had any [environmental education] in-servicing or pre-servicing?

**3:** No.

Consistent with the stage one findings and as shown in Figure 4.1, 85.5% of the mail survey sample indicated that they had never undertaken pre-service training in environmental education, whereas 14.5% of participants had undertaken training. This represents 13.8% of the female sample and 16.5% of the male sample having undertaken pre-service environmental education training. Of the 13.8% of female participants who had undertaken pre-service training, 62.85% were aged twenty-one to thirty years of age. In contrast, of the 16.5% of male participants who had undertaken pre-service training 46.15% were aged thirty-one to forty-one years of age. Such variances in training among female and male participants of different age groups were statistically significant at $P < 0.000$. 


Further, the majority of teachers (in stage one), both male and female, indicated that they had not undertaken in-service training in environmental education, as outlined by the following participants:

*When you do professional development and inservicing, that’s not what we are inservicing on. We’re inservicing on keeping them literate and other sorts of things (11).*

*Because we haven’t done enough of it and we haven’t had enough professional development on it, I don’t really completely understand it. They’re not providing the professional development (26).*

*There is a general lack of professional development in the area of environmental education and SOSE (17).*
As Figure 4.2 illustrates, 89.1\% of the mail survey sample also indicated that they had never undertaken in-service training in environmental education, with 10.9\% of participants having undertaken in-service training. This represents 7.8\% of the female sample and 20.7\% of the male sample having undertaken in-service environmental education training. Of the 7.8\% of female participants who had undertaken in-service training 35\% were aged forty-one to fifty and 30\% were aged twenty-one to thirty. In contrast, of the 20.7\% of male participants who had undertaken in-service training 47.05\% were aged thirty-one to forty and 41.17\% were aged fifty-one(+). Such variances in in-service training among female and male participants of different age groups were statistically significant at $P < 0.003$.

Figure 4.2. Stage Two Participants’ In-Service Training in Environmental Education

The majority of the stage one participants indicated that they would undertake (or encourage) in-service training in environmental education, as outlined by the following participant:
To promote that enthusiasm, you do that [environmental education] through professional development [in-service training]. As a Principal then... I would be looking for those people that have that keenness or interest in something and I would be grabbing them and thrusting that professional development at them. You can then build up a little group of interested people and they get the professional development and they get the enthusiasm going (16).

Despite such enthusiasm, one participant, who was identified as a committed environmental educator, saw it differently:

I think it is more personal. We give them every opportunity at our place [school]. If they want to go to a workshop, everything is paid for. No commitment to follow up or report. It couldn’t be easier. Like the upcoming workshop organised, there is only one person who has expressed an interest (2).

Several of the stage one teachers, who were identified as recent graduates and/or relatively in-experienced teachers, indicated that they did not feel ‘prepared’ to teach environmental education due to lack of pre-service and/or in-service training\(^\text{38}\), as outlined in the following comment:

Not now, I would need more experience, more something, in-service training, I don’t know. I wouldn’t feel prepared right now, that’s being honest (3).

\(^{38}\) The stage one participants indicated other contributing factors limiting and/or preventing the implementation of environmental education. These factors are discussed later in this Chapter.
In order to situate such findings in the overall framework of the thesis, I present the data pertaining to the participants’ knowledge of environmental education.

**Teachers’ Knowledge**

In this section, I discuss the participants’ (stage one and stage two) concept of environmental education, knowledge of environmental education approaches, environmental content knowledge and beliefs about knowledge in and about the area of environmental education. I now proceed to such tasks.

I sought to determine the stock of ‘environmental education’ knowledge among the participants. In this regard, the following comments are typical perceptions of environmental education offered by the participants in stage one:

*In my classroom it means educating the children about the environment and their impact upon the environment (4).*

*It is making sure that the people we are teaching understand what has to happen to keep where we live the way it should be and to improve it from what has been done to degrade it or to keep the status quo (20).*

Such comments display simple understandings of environmental education. However, another participant displayed a more complex understanding of environmental education through conveying a ‘futures perspective’ as can be seen in the following comment:
That the future generations that we teach understand that the environment, local and global, has to be conserved so that it is there for future generations (12).

So as to understand teachers' knowledge (and awareness) of common environmental education approaches teachers were asked if they were aware of and implemented the approaches ‘education about the environment, education in the environment and education for the environment’. Only several participants (2, 12, 16) in stage one were familiar with the terminology of ‘education about the environment, education in the environment and education for the environment’.

As illustrated in Figure 4.3, 51.9% of the stage two mail survey participants had ‘never heard of’ the identified approaches. This represents 56.1% of the female sample and 40.5% of the male sample. Of the female sample who had ‘never heard of’ or implemented these approaches, 32.2% were in the forty-one to fifty age group.

Figure 4.3. Stage Two Participants’ Knowledge (Awareness) and Implementation of Environmental Education Approaches
In contrast, 16.3% of the participants knew and implemented the approaches which represent 12.5% of the female sample and 26.2% of the male sample. Of the 26.2% of male participants who ‘knew of and implemented the approaches’, 38.4% were in the twenty-one to thirty age group and 28.6% were in the fifty-one (+) age group. Such patterns in the data were statistically significant at $P < 0.01$.

Most participants (in stage one) were not familiar with key environmental education documents, such as the Queensland P-12 Environmental Education Curriculum Guide (Queensland Department of Education, 1993), as typified in the following comment:

> Never read the document. So we’re all just stumbling along doing what we can (20).

I also sought to understand the participants’ understanding of environmental concepts. Most of the stage one participants openly admitted that they could not explain environmental concepts in any detail. Even so, some stage one participants attempted to define a concept and in doing so often revealed little understanding, as typified in the following comment about the greenhouse effect:

> The greenhouse effect is to do with the ozone layer around the earth and gases emitted by various industries and cars. It rises into the ozone layer and concentrates over the poles. I read up on the greenhouse effect when I taught it and it was slightly different to this, but it has made holes over the artic and Antarctic and the suns rays penetrate through the holes in the ozone and the heat comes under the ozone layer and is not able to escape because of the gases (15).
Clearly this particular participant confused elements of ozone depletion with the greenhouse effect. In fact, I queried the participant about possible confusion with the two terms:

*I probably do [confuse them] and in the past I may have mixed them up but as I go on I am learning. The information is always changing* (15).

Two participants (2, 16) revealed a better understanding of the greenhouse effect, as typified in the following comment:

*The greenhouse effect is where a number of gases are given off from industry, and the environment itself. And [the gases] are caught in the earth's atmosphere and they can't escape and this causes a build-up of heat in the atmosphere* (16).

The stage one participants were also unfamiliar with the key concept 'ecological sustainability', as exemplified in the following comment:

*I haven't a clue... I am fairly intelligent and literate. It's all verbal claptrap... biodiversity, ecological sustainability* (12).

This particular informant (12) believed that the language (jargon) associated with the environment and environmental education deters teachers, as explained:

*The language should let us all know what we are talking about not flash environmental catchwords. If you are not into the environment, it puts people off.*
Notwithstanding, so as to determine the stage two participants’ understanding of environmental concepts I selected three prominent issues, namely carrying capacity, ground water pollution and the greenhouse effect. The participants displayed varying levels of understanding about these concepts.

The participants revealed a particularly low level of understanding of ‘carrying capacity’. As illustrated in Figure 4.4, 28.8% of the sample identified “carrying capacity” (the correct response) when asked to identify the term referring to ‘the potential ability of a system to support population growth without harming the environment’.

Figure 4.4. Stage Two Participants’ Understanding of Carrying Capacity

The 28.8% who identified ‘carrying capacity’ represents 26.5% of the female sample and 30.9% of the male sample. Of the 30.9% of male participants who identified ‘carrying capacity’, 42.1% were in the fifty-one(+) age group and 40% were in the thirty-one to forty age group. On the contrary, of the 26.5% of female participants who identified ‘carrying capacity’, 28.7% were in the twenty-one to thirty age group and 23.9% were in the forty-one to fifty age group.
Although the stage two participants revealed a low understanding of the concept 'carrying capacity', the participants revealed a higher understanding of 'groundwater pollution' and the 'greenhouse effect'. As illustrated in Figure 4.5, 65% of the sample identified 'adding too much fertiliser to fields' (the correct response) when asked 'What would be most likely to cause groundwater pollution'.

Figure 4.5. Stage Two Participants' Understanding of Groundwater Pollution

There were no significant differences in responses between male and female participants. However, there were significant differences between the various age groups. As shown in Table 4.1, the age group forty-one to fifty demonstrated the highest (43.5%) level of knowledge and the age group twenty-one to thirty demonstrated the lowest level (16.4%) of knowledge. Such differences in responses (between age groups) were statistically significant at $P < 0.013$. 
Table 4.1. Stage Two Participants’ Understanding of Groundwater Pollution (Age Groups)

Which of the following would be most likely to cause groundwater pollution?

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>Organic farming practices</th>
<th>Municipal composting of yard waste</th>
<th>Adding too much fertilizer to fields</th>
<th>Wastewater treatment plants</th>
<th>All of the above</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-30</td>
<td>100.0%</td>
<td>12.5%</td>
<td>16.4%</td>
<td>42.9%</td>
<td>31.6%</td>
<td>22.0%</td>
</tr>
<tr>
<td>31-40</td>
<td>0.0%</td>
<td>25.0%</td>
<td>20.1%</td>
<td>21.4%</td>
<td>23.2%</td>
<td>21.1%</td>
</tr>
<tr>
<td>41-50</td>
<td>0.0%</td>
<td>12.5%</td>
<td>43.4%</td>
<td>28.6%</td>
<td>27.4%</td>
<td>37.4%</td>
</tr>
<tr>
<td>51(+)</td>
<td>0.0%</td>
<td>50.0%</td>
<td>20.1%</td>
<td>7.1%</td>
<td>17.9%</td>
<td>19.6%</td>
</tr>
</tbody>
</table>

Furthermore, as shown in Figure 4.6 57% of the stage two participants identified ‘Increased used of hydroelectric power’ (correct response) when asked ‘Which of the following do scientists not consider to be a significant contributor to the greenhouse effect?’

Figure 4.6. Stage Two Participants’ Understanding of the Greenhouse Effect

There were marginal differences in responses between male and female participants, such that 54.8% of the female participants and 61.7% of the male participants selected the correct response. Once again, the age group forty-one to fifty (39.1%)
demonstrated the highest level of understanding of the greenhouse effect and the age group twenty-one to thirty demonstrated the lowest (17.2%) level of understanding. Although there were clear differences, such trends were not statistically significant.

In accordance with such trends, the majority of the stage one and stage two participants expressed their lack of knowledge about environmental education. More specifically, approximately half of the stage one participants said "I don't know a lot about it [environmental education]". More specifically, when asked "do you feel you know a lot about environmental education?" one participant said:

*No I don't. I think I know a little bit about it and I have an interest in it, so I can maybe start an interest in the children, and perhaps that will lead me to finding more information. I don't have a good awareness.*

Consistent with these trends, as illustrated in Figure 4.7, 77.3% of the participants rated their knowledge of environmental education concepts, theories and approaches as 'average to low'.

Figure 4.7. Stage Two Participants’ Rating of Their Environmental Education Knowledge
As shown in Table 4.2, significantly more male participants than female participants rated their knowledge as 'very high to high' while significantly more female than male participants rated their knowledge as 'low to very low'. Such variances between female and male participants were statistically significant at $P < 0.002$.

Table 4.2. Stage Two (Female & Male) Participants’ Rating of their Environmental Education Knowledge

<table>
<thead>
<tr>
<th>Gender</th>
<th>% within Gender</th>
<th>very high</th>
<th>High</th>
<th>average</th>
<th>low</th>
<th>very low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>% within Gender</td>
<td>1.9%</td>
<td>11.2%</td>
<td>53.7%</td>
<td>26.3%</td>
<td>6.9%</td>
</tr>
<tr>
<td>Male</td>
<td>% within Gender</td>
<td>8.3%</td>
<td>17.9%</td>
<td>58.3%</td>
<td>11.9%</td>
<td>3.6%</td>
</tr>
<tr>
<td>Total</td>
<td>% within Gender</td>
<td>3.5%</td>
<td>12.8%</td>
<td>54.8%</td>
<td>22.7%</td>
<td>6.1%</td>
</tr>
</tbody>
</table>

As shown in Table 4.3, 38.1% of male participants in the age group fifty-one(+) rated their knowledge as 'high' which was a significantly greater proportion than any other age group. In all age groups, more female participants rated their knowledge 'low' as compared with their male counterparts. Such findings were statistically significant at $P < 0.001$.

Table 4.3. Stage Two (Gender & Age Groups) Participants’ Rating of their Environmental Education Knowledge

<table>
<thead>
<tr>
<th>Gender &amp; Age Groups</th>
<th>Percentages</th>
<th>very high</th>
<th>high</th>
<th>average</th>
<th>low</th>
<th>very low</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-30 (Female)</td>
<td>% within Age Groups Ordered by Gender</td>
<td>4.5%</td>
<td>12.1%</td>
<td>57.6%</td>
<td>21.2%</td>
<td>4.5%</td>
</tr>
<tr>
<td>21-30 (Male)</td>
<td>% within Age Groups Ordered by Gender</td>
<td>18.2%</td>
<td>.0%</td>
<td>72.7%</td>
<td>9.1%</td>
<td>.0%</td>
</tr>
<tr>
<td>31-40 (Female)</td>
<td>% within Age Groups Ordered by Gender</td>
<td>.0%</td>
<td>3.8%</td>
<td>48.1%</td>
<td>32.7%</td>
<td>15.4%</td>
</tr>
</tbody>
</table>
The participants were also asked to consider whether or not 'teachers need advanced knowledge of environmental education concepts, theories and approaches at the primary school level'. As shown in Table 4.4, 41.1% of the sample agreed with this statement. Male participants tended to agree with the statement more than female participants, and significantly more female participants were neutral about the statement than their male counterparts.

Table 4.4. Stage Two Participants' Need for advanced knowledge of environmental education concepts, theories and teaching approaches at the primary school level

<table>
<thead>
<tr>
<th>Gender</th>
<th>Strong Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>3.1%</td>
<td>21.5%</td>
<td>25.7%</td>
<td>41.0%</td>
<td>8.8%</td>
</tr>
<tr>
<td>Male</td>
<td>4.9%</td>
<td>23.5%</td>
<td>14.8%</td>
<td>45.7%</td>
<td>11.1%</td>
</tr>
<tr>
<td>Total</td>
<td>3.5%</td>
<td>21.9%</td>
<td>23.1%</td>
<td>42.1%</td>
<td>9.4%</td>
</tr>
</tbody>
</table>

Moreover, the majority of stage one teachers' felt that content knowledge was not overly important, as displayed in the following comments:
I don’t think the content knowledge is vital. It would be really difficult to fill their heads with all this information and figures. You need hands on stuff rather than filling their heads with all the information (11).

No, I don’t think so. But again it’s attitude. Whereas some teachers will only teach about the things that they know about. The priority is learning and that includes me... I want to learn with the kids, so I don’t need to know in advance... I don’t plan to have any sort of environmental issues and knowledge and content pushed with young children (26).

Content is not important... I don’t think it is a be all and end all... I don’t think that content in itself, but you will always feel good if someone has learnt something (8).

We can’t teach kids content so much anymore, we need to teach them skills and how to stay on this earth (6).

Not a huge content, I think they need to make sure they are not misinformed. I can walk my children along the beach and pick up things and use descriptive words to describe the shapes of things, without having to tell them... I am not into names of shells or trees and names of habitats, but I would rather say, this is interesting and I wonder why the shell is this shape? (5)

There is an implicit assumption here that ‘knowledge’ means transmission, the ‘empty-vessel’ notion of ‘teaching’. This is perhaps a reflection of the teacher education
theories learned by these participants during pre-service teacher education (Wilson, 1998).

Only one informant was critical of the lack of ‘content’ in primary school education, including environmental education, as outlined:

_They are learning nothing... They are learning nothing now because it is not content based anymore; it is airy-fairy... It's not content-based. I believe it should be core content and all this other airy-fairy stuff as a side-line, but there should be a core content. The outcomes approach is not content-based_ (1).

On the contrary, many participants (in stage one) indicated that “knowledge would come much later and was not needed at the primary school level”. The majority of participants (in stage one) indicated that knowledge is more about knowing how to access information, as one participant explains:

_As I said before, I believe knowledge is knowing how to access information. Information comes from all sources all the time and we don't just teach access on the internet. We teach accessing other sources, material Resources, human resources. How to access different sources of information and to use those sources of information_ (16).

Furthermore, the majority of participants (in stage one) revealed that “a positive attitude” towards the environment is “definitely” the most important characteristic to develop in environmental education, as one informant explains:
Definitely attitude. *If the world is going to be made better it will be made better by good people not clever; the attitude that the world is important* (18).

Such a view suggests that these primary school teachers were primarily concerned with feelings and attitudes. Consistent with such trends, as illustrated in Figure 4.8, the majority of the stage two mail survey participants considered that the essential aim of environmental education should be to develop either *‘attitudes and values’* (38%) or *‘action’* (34.8%). Only 17.7% of the sample considered that environmental education should essentially aim to develop knowledge, and only 7.5% of the sample considered that environmental education should (essentially) aim to develop ‘attitudes/values, action and knowledge’.

**Figure 4.8.** Stage Two Participants’ Conceptions of the Essential Aim of Environmental Education

As indicated in Table 4.5, both female and male participants of various age groups generally tended to select ‘attitudes and values’ or ‘actions’ as the *essential aim* of environmental education. However, male participants in the thirty-one to forty age

---

39 The terms attitudes, feelings, values and beliefs are used interchangeably here.
group (25%) and the fifty-one(+) age group (35.5%) tended to select 'knowledge' as the 'essential aim' of environmental education.

Table 4.5. Stage Two (Gender & Age Groups) Participants' Conceptions about the Essential Aim of Environmental Education

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>At the primary school level, environmental education should essentially aim to?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>attitudes &amp; values</td>
<td>knowledge</td>
</tr>
<tr>
<td>21-30 (Female)</td>
<td>42.4%</td>
<td>18.2%</td>
</tr>
<tr>
<td>21-30 (Male)</td>
<td>18.2%</td>
<td>9.1%</td>
</tr>
<tr>
<td>31-40 (Female)</td>
<td>33.3%</td>
<td>19.6%</td>
</tr>
<tr>
<td>31-40 (Male)</td>
<td>30.0%</td>
<td>25.0%</td>
</tr>
<tr>
<td>41-50 (Female)</td>
<td>38.7%</td>
<td>12.9%</td>
</tr>
<tr>
<td>41-50 (Male)</td>
<td>39.4%</td>
<td>18.2%</td>
</tr>
<tr>
<td>51(+) (Female)</td>
<td>43.8%</td>
<td>14.6%</td>
</tr>
<tr>
<td>51(+) (Male)</td>
<td>35.0%</td>
<td>35.0%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>38.0%</td>
<td>17.5%</td>
</tr>
</tbody>
</table>

Many of the stage one informants also felt that teachers did not need to have a significant content knowledge base, as typified in the following comments:

*I don’t think as a teacher you need a huge content base, as such. Possibly a little bit more than what our teachers are graduating with. There are opportunities for teachers to catch up on that content-base knowledge as time goes on (5).*

*I don’t think I need to know specific content to be able to teach (26).*

*I don’t think content is important (12).*

*Maybe we need to teach the kids how to learn, more than just worrying about content... I have always firmly believed that the teacher is in many ways, or*
the content of what the teacher is teaching, is quite irrelevant to what the children learn (14).

This apparent abandonment of knowledge (see Cutter, 1998; 2002) among a significant proportion of these participants is consistent with the findings of ‘The Queensland School Reform Longitudinal Study’ which maintains that “teachers themselves actually rate basic skills as the highest of their priorities, and intellectual engagement and demand as the lowest” (Education Queensland, 2001, pg.15). Bernstein’s (1996) analysis of the acquisition-competence model covers the same ground such that the internal workings of the learner rather than measurable learning outcomes dominate teaching and teacher education.

As discussed in Chapter Two, knowledge and beliefs are inextricably related, such that Grossman et al. (1989) argue that ‘beliefs’ are a form of knowledge, specifically pedagogical content knowledge (subject matter). In order to situate teachers’ knowledge about environmental education, I now turn to the presentation and analysis of the stage one and stage two data about teachers’ beliefs of environmental education.

**Teachers’ Beliefs**

In this section, I present the data in two sub-headings, namely a) Teachers’ Pedagogical Beliefs and b) Teachers’ Environmental Beliefs.

*a) Teachers’ Pedagogical Beliefs:*

Most participants *(in stage one)* displayed some level of interest in environmental
education, although clearly admitted that it was not a priority in schooling generally, as indicated in the following comments:

"I don't think it is a priority anymore because there is so much else you are dealing with. You have kids that have emotional and social problems. Kids that have shocking upbringings... I know from my point of view, just covering literacy and numeracy every single day is a struggle."

"I wouldn't say I treat it as a priority. It is just one of those things that if it can be done, it might be."

"It is not my priority. I am more inclined to make sure the children have the basics under their belt."

Such findings are consistent with the 'The Queensland School Reform Longitudinal Study'. More specifically, Education Queensland (2001, pg.9) reported that teachers "viewed behaviour management as a policy issue that required improvement prior to any considerations of classroom practices".

Notwithstanding, as illustrated in Figure 4.9 the stage two mail survey results revealed that the majority of participants considered environmental education to either 'definitely' (22.4%), 'usually' (32.9%) or 'occasionally' (38.1%) be a priority in their teaching.
As shown in Table 4.6, there were significant differences between both male and female participants within the various age groups. In particular, male participants aged forty to

Table 4.6. Stage Two (Gender & Age Groups) Participants’ Priority for Environmental Education

<table>
<thead>
<tr>
<th>Age Groups (by Gender)</th>
<th>Definitely</th>
<th>Usually</th>
<th>Occasionally</th>
<th>Not Usually</th>
<th>Definitely Not</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-30 (Female)</td>
<td>9.4%</td>
<td>34.4%</td>
<td>50.0%</td>
<td>6.3%</td>
<td>.0%</td>
</tr>
<tr>
<td>21-30 (Male)</td>
<td>10.0%</td>
<td>70.0%</td>
<td>10.0%</td>
<td>10.0%</td>
<td>.0%</td>
</tr>
<tr>
<td>31-40 (Female)</td>
<td>22.4%</td>
<td>20.4%</td>
<td>53.1%</td>
<td>4.1%</td>
<td>.0%</td>
</tr>
<tr>
<td>31-40 (Male)</td>
<td>21.1%</td>
<td>42.1%</td>
<td>26.3%</td>
<td>10.5%</td>
<td>.0%</td>
</tr>
<tr>
<td>41-50 (Female)</td>
<td>22.0%</td>
<td>28.6%</td>
<td>35.2%</td>
<td>13.2%</td>
<td>1.1%</td>
</tr>
<tr>
<td>41-50 (Male)</td>
<td>35.3%</td>
<td>29.4%</td>
<td>35.3%</td>
<td>.0%</td>
<td>.0%</td>
</tr>
<tr>
<td>51(+) (Female)</td>
<td>34.1%</td>
<td>40.9%</td>
<td>25.0%</td>
<td>.0%</td>
<td>.0%</td>
</tr>
<tr>
<td>51(+) (Male)</td>
<td>25.0%</td>
<td>40.0%</td>
<td>35.0%</td>
<td>.0%</td>
<td>.0%</td>
</tr>
<tr>
<td>Total</td>
<td>22.4%</td>
<td>32.9%</td>
<td>38.1%</td>
<td>6.3%</td>
<td>.3%</td>
</tr>
</tbody>
</table>
fifty (35.3%) and female participants in the fifty(+)age group (34.1%) indicated that environmental education is a ‘definite’ priority in their teaching. In contrast, female participants aged forty-one to fifty (13.2%) and male participants aged thirty-one to forty (10.5%) indicated that environmental education is ‘not usually’ a priority in their teaching. Such differences were statistically significant at $P < 0.015$.

According to the majority of the stage one participants, reasons as to why environmental education is not a “definite” priority in schooling is because, as one informant explains:

> It is not pushed as a priority. Literacy and numeracy are pushes... But teachers will also go down the road that principals’ push and very few are focused on the environment because they are just as overworked. If a principal has a passion the whole school follows it. So it is not just the teachers (12).

However, the participants (in stage one) also proclaimed that ‘personal choice’ dictates what is taught, as two participants clearly state:

> I can do that [environmental education] if I wanted to. That’s if I wanted to personally. No-one is making me do anything. They leave it very open for us to interpret so it depends on how keen I am to teach it (1).

> I don’t see too much of anything being pushed at me to teach. I see things put in front of me and say this is what you have to teach but really you go away and you teach what you teach. There’s still not a lot of checks and balances (20).
In this regard, the participants expressed varying levels of practice with some teachers saying “no I don’t teach it” (1, 18, 13, 20), others saying “no I haven’t this year at all” (11, 7, 17), with many saying “I build it [environmental education] into other units... it’s incidental” (3, 4, 5, 6, 8, 10, 12, 14, 15, 16, 19) and only one staying “a lot” (2).

The majority of stage one participants indicated that they integrate environmental education with Studies of Society and Environment (SOSE), also known as Social Studies, and Science Education. There were ‘mixed feelings’ about the SOSE curriculum area and new SaSE syllabus. The following exchange exemplifies a particularly positive view about the syllabus:

**ACM:** Some people think that environmental education is over emphasised in the SOSE syllabus. What are your thoughts about that?

**24:** I don’t think so.

**ACM:** Some have described it as “left winged” and “radical”. What are your thoughts?

**24:** Well I’m not into the politics that much so I don’t really know. But I personally am quite happy with it. So if that makes me “left winged” then probably yes, it probably is radical. I think it’s fine, but it is balanced with the other things that are in the SOSE.

On the other hand, many other participants found the SOSE curriculum area and syllabus to be overwhelming and felt unsupported by the school and department, as typified in the following comment:
I started at the beginning of the year having a go at implementing the new SOSE curriculum and ended up letting it ride and not worrying too much about it simply because there wasn’t enough information, not enough support behind it (26).

Notwithstanding, several teachers (in stage one) indicated that they were aware of teachers with a commitment or interest in environmental education:

Those few who are interested in it keep doing it, and the rest of us just go with the flow. Until something happens that impacts us directly, we just keep going the way we are (4).

There is this one teacher who is so committed to finding out everything she can, what she does with it I don’t know, but at least she’s committed to finding out what’s available in environmental education (9).

Robottom et al. (2000, pg.157) have also raised this issue and concluded that “behind every successful environmental education program is a committed teacher”. Such findings indicate that individual commitment to environmental education, while not apparent among the majority of the stage one participants, is a vital component with respect to the implementation of environmental education.

One stage one informant emphasised the importance of modeling in environmental education:
... schools have to start modeling good practice, they actually have to think about what they do in school and how they do it and model it so they have got something for the kids to follow (2).

Nonetheless, many stage one participants indicated that they had not witnessed 'effective' or 'good' environmental education practice, as typified in the following comment:

_Not really. I haven't seen a lot of teachers doing it. The general feeling I get at the school I'm at is that the focus should be more on maths and English and perhaps science, and SOSE, but not so much on the environment part of SOSE_ (3).

Several informants expressed that environmental education is a community issue and not necessarily a school issue, as one participant explains:

_It's definitely more a community issue than only a school issue. It can come up in schools and can be done in schools but I don't think the schools are the only place where environmental education should occur. There are Councils and community groups and things like that where there should be a lot of environmental education occurring_ (26).

Once again, this finding is consistent with the findings of Robottom et al. (2000, pg.146) that, in some cases, “environmental education curriculum has moved out of the school and into the community”.
The stage two participants were also asked to indicate the different ways in which they teach environmental education. As Table 4.7 illustrates, 76.4% of the participants indicated that they most often taught environmental education incidentally ('when it comes up'). 73.6% of the participants indicated that they integrate environmental education through social studies, and 69.5% also indicated that they integrate environmental education across the curriculum. There were no significant differences in methods between female and male participants of different age groups.

Table 4.7. Stage Two Participants' Environmental Education Teaching Methods

<table>
<thead>
<tr>
<th>Teaching Method</th>
<th>Percentage (Who Used this Method)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidental (when it comes up)</td>
<td>76.4%</td>
</tr>
<tr>
<td>Integrate with Social Studies</td>
<td>73.6%</td>
</tr>
<tr>
<td>Integrate across the Curriculum</td>
<td>69.5%</td>
</tr>
<tr>
<td>Integrate with Science Education</td>
<td>67.8%</td>
</tr>
<tr>
<td>Other</td>
<td>8.9%</td>
</tr>
<tr>
<td>Teach Separately (Stand Alone)</td>
<td>7.2%</td>
</tr>
<tr>
<td>Main Focus of Curriculum</td>
<td>3.4%</td>
</tr>
<tr>
<td>Do Not Teach Environmental Education</td>
<td>.3%</td>
</tr>
</tbody>
</table>

In order to gauge the limitations which prevent or impede the implementation of environmental education, the stage two participants were asked to rank (1–5) particular factors. As shown in Table 4.8, the four most limiting factors (very limiting to limiting) were overcrowded curriculum, time constraints, other professional demands and constant and ongoing changes.

There were differences between female and male participants with respect to these limiting factors. In terms of the most limiting factor, overcrowded curriculum, more female participants (48.0%) indicated this factor as limiting than their male counterparts (38.9%). Such differences were statistically significant at $P < 0.044$. 

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Table 4.8. Stage Two Participants’ Barriers (Factors) Preventing the Implementation of Environmental Education (Ranked)

<table>
<thead>
<tr>
<th>Limitation/Barrier</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overcrowded Curriculum</td>
<td>45.3%</td>
</tr>
<tr>
<td>Time Constraints</td>
<td>35.1%</td>
</tr>
<tr>
<td>Other Professional Demands</td>
<td>25.7%</td>
</tr>
<tr>
<td>Constant and Ongoing Changes</td>
<td>24.2%</td>
</tr>
<tr>
<td>Resource Constraints</td>
<td>15.3%</td>
</tr>
<tr>
<td>Not Considered a Priority by the School/Department</td>
<td>10.0%</td>
</tr>
<tr>
<td>Lack of Knowledge of Environmental Education</td>
<td>6.6%</td>
</tr>
<tr>
<td>Not Considered a Priority as a Teacher</td>
<td>2.6%</td>
</tr>
</tbody>
</table>

There were also significant differences between female and male participants in terms of whether or not the school/department prioritises environmental education. As such, more female participants (30.3%) identified this factor to be limiting than did their male counterparts (15.5%). Such differences were statistically significant at $P < 0.048$.

Significant differences also existed between age groups. The fifty-one(+) age group identified time constraints as less limiting than the other age groups. Such differences were statistically significant at $P < 0.05$.

As shown in Table 4.9, participants aged twenty-one to thirty also rated ‘resource constraints’ as significantly more limiting than any other age group. Furthermore, the age group fifty-one (+) rated ‘resource constraints’ as significantly less limiting than any other age group. Such differences were statistically significant at $P < 0.005$.

Table 4.9. Resource Constraints (Age Groups)

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>Very Limiting</th>
<th>Limiting</th>
<th>Neutral</th>
<th>Not Limiting</th>
<th>Not very Limiting</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-30</td>
<td>13.3%</td>
<td>48.3%</td>
<td>21.7%</td>
<td>6.7%</td>
<td>10.0%</td>
</tr>
<tr>
<td>31-40</td>
<td>24.1%</td>
<td>19.0%</td>
<td>31.0%</td>
<td>19.0%</td>
<td>6.9%</td>
</tr>
<tr>
<td>41-50</td>
<td>12.1%</td>
<td>31.3%</td>
<td>28.3%</td>
<td>13.1%</td>
<td>15.2%</td>
</tr>
<tr>
<td>51(+)</td>
<td>13.8%</td>
<td>19.0%</td>
<td>36.2%</td>
<td>24.1%</td>
<td>6.9%</td>
</tr>
<tr>
<td>Total</td>
<td>15.3%</td>
<td>29.8%</td>
<td>29.1%</td>
<td>15.3%</td>
<td>10.5%</td>
</tr>
</tbody>
</table>
Moreover, one stage one participant (2), earlier identified as a committed teacher of environmental education, saw 'lack of knowledge' on the part of primary school teachers as a significant barrier impeding the implementation of environmental education:

*First and foremost there is not enough knowledge... Understanding of concepts such as sustainability. They wouldn't have the background we would like them to have... I don't see the issues being addressed (2).*

When asked about personal background the above-mentioned participant (2) indicated a former occupation as a wildlife carer. The participant also noted that environmental education requires 'a personal interest', and noted:

*My parents had a concern for wildlife and I have been brought up in an environment where we cared for it (2).*

Further, the stage one participants also identified similar concerns to the stage two participants, although the stage one participants were particularly concerned with the issues of 'constant change' and 'on-going professional demands' as one participant explains:

*Teachers are not reading and discovering and discussing professionally. There are too many changes and demands. I can't think of a week where something hasn't impinged dramatically on me trying to teach. We lose days and days. Our knowledge and skill base is dropping, but it is not necessarily our fault (12).*
These pressures and their effect in Queensland were also reported by Andrews (1997). To this extent, many teachers (in stage one) indicated that "there is no motivation and no reward" to implement environmental education. Indeed, environmental education appears to be caught in a larger set of historical circumstances exemplified by the comment that there is a lack of "self-motivation" and "professionalism" in teaching itself. This same participant explained that the only way in which environmental education could be improved is through teacher education and recognised professional status:

Nobody should get out of teacher training unless they are bloody good. No flick and tick stuff. It is whether they can teach. In environmental education, we need a foundation to start building on. A mentor in the school. There needs to be some level of professionalism (12).

While I am sympathetic with this view, it collapses teachers' content knowledge into teachers' pedagogical knowledge in a way that prioritises teaching processes over what is taught. At the same time, these primary school teachers generally expressed concern for the environment and varying levels of interest in the environment. So that these issues can be properly understood, I now present data about the participants' environmental beliefs.

b) Teachers' Environmental Beliefs:

Many of the participants (in stage one) revealed a concern for the environment, although it was clearly stated that such concerns do not amount to a belief that there is a 'crisis' (at this time), as one participant indicates:
I don’t know about a crisis. I try to be optimistic. But I am personally fearful of what we have done to the environment. But I don’t know about crisis, as there is a lot of awareness out there (4).

On the other hand, some participants were quite pessimistic and openly said that they “did not maintain much hope for a better future”, such that one participant said:

... it’s all about the big bucks, they don’t care about the environment. Everyone is saying their hands are tied. Well, if everyone’s hands are tied, Australia is going to be destroyed and so is the world. If everybody is of that attitude and doing their own thing, well the place is going to fall apart (1).

The majority of the participants (in stage one) said that they did not know much about the idea of an environmental crisis as typified in the following two comments:

I don’t have enough in depth knowledge. I don’t know enough to give an opinion (16).

I wouldn’t have a clue to be totally honest. I wouldn’t know how bad it is. I don’t know how serious the logging situation has become. I don’t know about the destruction of the Amazon rainforest. I know it happens and I know where it is, but I don’t know the impact it’s having (11).

In order to ascertain an understanding of the stage two participants’ environmental beliefs, the participants were asked whether or not they believed the environment is presently in a state of crisis. Quite the contrary to the stage one findings, as illustrated
in Figure 4.10 the majority of the participants either indicated that the environmental is 'definitely in a state of crisis' or 'probably in a state of crisis'. Such findings reveal that these participants consider that the environment is in a current state of crisis and one could assume a level of concern as reported in Spork (1990; 1992).

Figure 4.10. Stage Two Participants' Beliefs about the Environmental Crisis

As shown in Table 4.10, 18.2% of male participants aged twenty-one to thirty indicated 'other' when asked do you believe that the environment is in a state of crisis. Furthermore, male participants aged thirty-one to forty-one rated the environment to 'probably' be in a state of crisis at a higher level of incidence than all other participants. Such participants also rated the environment to 'definitely' be in a state of crisis at the lowest level of incidence than all other participants. Such trends were statistically significant at $P < 0.002$.

So as to gauge an understanding of the stage two participants' eco-philosophies, participants were asked to 'rate' particular environmental statements (see Appendix Six) which represented certain environmental (eco) philosophies/perspectives (as reported in Chapter Two), namely 'Technocentric Cornucopian', 'Technocentric Accommodation', 'Ecocentric Eco-socialist (Communalism)' and Ecocentric Gaia'.

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Table 4.1. Stage Two (Age Group & Gender) Participants’ Beliefs about the Environmental Crisis

<table>
<thead>
<tr>
<th>Age Groups (by Gender)</th>
<th>Definitely</th>
<th>Probably</th>
<th>Not really</th>
<th>Unsure</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-30 (Female)</td>
<td>45.3%</td>
<td>53.1%</td>
<td>1.6%</td>
<td></td>
<td>18.2%</td>
</tr>
<tr>
<td>21-30 (Male)</td>
<td>45.5%</td>
<td>36.4%</td>
<td></td>
<td></td>
<td>18.2%</td>
</tr>
<tr>
<td>31-40 (Female)</td>
<td>50.0%</td>
<td>48.1%</td>
<td></td>
<td>5.0%</td>
<td>1.9%</td>
</tr>
<tr>
<td>31-40 (Male)</td>
<td>40.0%</td>
<td>55.0%</td>
<td></td>
<td>5.0%</td>
<td>1.9%</td>
</tr>
<tr>
<td>41-50 (Female)</td>
<td>53.8%</td>
<td>43.0%</td>
<td>2.2%</td>
<td>1.1%</td>
<td></td>
</tr>
<tr>
<td>41-50 (Male)</td>
<td>50.0%</td>
<td>47.1%</td>
<td></td>
<td>2.9%</td>
<td></td>
</tr>
<tr>
<td>51(+) (Female)</td>
<td>47.9%</td>
<td>47.9%</td>
<td>4.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51(+) (Male)</td>
<td>47.6%</td>
<td>47.6%</td>
<td>4.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>49.0%</td>
<td>47.5%</td>
<td>1.5%</td>
<td>1.2%</td>
<td>.9%</td>
</tr>
</tbody>
</table>

Contrary to assumptions made in existing research (Disinger, 1992), the stage two participants agreed most with the ‘Ecocentric Eco-socialist’ perspective (61%) and ‘Ecocentric Gaia’ perspective (52.9%). Such trends were also apparent in stage one, as typified in the following comment:

*I would agree with that [Ecocentric Eco-socialist perspective]. Because I think that the areas that should be protected. Sure, we could drill oil on the barrier reef, but I don't feel that is necessary. It might be economically viable, but I think that the value of the reef as a natural beauty is far greater than the economic value (14).*

The stage two participants disagreed most with the ‘Technocentric Accommodation’ perspective (62%). The stage one participants also disagreed most with this perspective, as shown in the following comments:
I don't think that the environment is there to be used as such. We live in the environment, we work with the environment and should be looking after the environment. I don't know that we should actually be using it as such. That term "used" sort of indicates to me, OK, the environment is out there, I can use it, I can go and do whatever I like (26).

I don't think we have a right to use it as a resource without doing something to give back to the environment. We can't just keep taking because it is not going to be there forever. We need to start giving back (4).

As shown in Table 4.11, the 'Technocentric Accommodation' perspective was agreed with most by the male twenty-one to thirty age group (20.0%) and the male fifty-one(+) age group (25.0%). On the contrary, the 'Technocentric Accommodation' perspective was disagreed with most by the male thirty-one to forty age group (60.0%) and the female fifty-one(+) age group (53.7%). These trends (Technocentric Accommodation Perspective) were statistically significant at $P < .011$.

Table 4.11. Stage Two Participants' Technocentric Accommodation Perspective

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-30 (Female)</td>
<td>28.8%</td>
<td>39.0%</td>
<td>15.3%</td>
<td>15.3%</td>
<td>1.7%</td>
</tr>
<tr>
<td>21-30 (Male)</td>
<td>30.0%</td>
<td>20.0%</td>
<td>30.0%</td>
<td>.0%</td>
<td>20.0%</td>
</tr>
<tr>
<td>31-40 (Female)</td>
<td>42.9%</td>
<td>32.7%</td>
<td>14.3%</td>
<td>6.1%</td>
<td>4.1%</td>
</tr>
<tr>
<td>31-40 (Male)</td>
<td>60.0%</td>
<td>10.0%</td>
<td>25.0%</td>
<td>5.0%</td>
<td>.0%</td>
</tr>
<tr>
<td>41-50 (Female)</td>
<td>39.5%</td>
<td>35.8%</td>
<td>13.6%</td>
<td>3.7%</td>
<td>7.4%</td>
</tr>
<tr>
<td>41-50 (Male)</td>
<td>32.3%</td>
<td>41.9%</td>
<td>19.4%</td>
<td>.0%</td>
<td>6.5%</td>
</tr>
<tr>
<td>51(+) (Female)</td>
<td>53.7%</td>
<td>26.8%</td>
<td>12.2%</td>
<td>2.4%</td>
<td>4.9%</td>
</tr>
<tr>
<td>51(+) (Male)</td>
<td>25.0%</td>
<td>35.0%</td>
<td>10.0%</td>
<td>5.0%</td>
<td>25.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>39.2%</strong></td>
<td><strong>33.1%</strong></td>
<td><strong>15.4%</strong></td>
<td><strong>5.8%</strong></td>
<td><strong>6.4%</strong></td>
</tr>
</tbody>
</table>
In order to conceptualise the above-mentioned data, I now present a path analysis of the stage two data.

**Correlating Teachers’ Preparedness, Knowledge & Beliefs –**

*A Path Analysis*

The data presented suggests that teachers’ knowledge about environmental education and environmental concepts is quite low. However, significant differences have been reported between female and male participants of different age groups. Differences were also reported in terms of the participants’ beliefs about the environment and environmental education. So as to elucidate these differences, the stage two data were analysed utilising path analysis (regression) techniques. Prior to performing such an analysis, factor analysis was carried out on the data. As such, the variables were grouped and four factors (relationships between variables) were revealed, namely ‘Knowledge about Environmental Education’, ‘Knowledge about the Environment’, ‘Beliefs about Environmental Education’ and ‘Beliefs about the Environment’ (see Appendix Twenty-Two).

The path analysis revealed that the participants’ priority for environmental education *(Question 2 in Mail Survey)* was the dependent variable in terms of ‘predicting’ and ‘explaining’ participants’ environmental education practices. The independent variables, which correlated with the dependent variable, were ‘Knowledge about Environmental Education’, ‘Beliefs about Environmental Education’ and ‘Beliefs about the Environment’.
As shown in Figure 4.11, teachers' age has the most direct effect (-0.083) on teachers' priority for environmental education in their teaching. Teachers' age also indirectly affects teachers' beliefs of the environment (0.145), perceived limitations on the implementation of environmental education (-0.273) and in-service training in environmental education (-0.029). The latter factors then directly affect teachers' priority for environmental education in their teaching. It is also important to note that gender (-0.121) has an indirect effect on in-servicing. Furthermore, teachers' age (-0.029) and gender (-0.390) also indirectly affect teachers' knowledge of environmental education which directly affects their priority for environmental education in their teaching.

Figure 4.11. Path Analysis Model

As such, the path analysis (see Appendix Twenty-Three) of the data reveals that teachers are more likely to consider environmental education to be a priority in their teaching if they:

1. maintain a high knowledge of environmental education approaches;
2. rate their own environmental education knowledge highly;
3. believe that teachers require knowledge (of environmental education) at the primary school level;
4. consider pedagogical constraints not to be very limiting;
5. believe that the environment is definitely or probably is in a state of crisis;
6. consider environmental protection to be important (eco-socialist perspective); and
7. are older teachers, in the forty-one to fifty age group and even more so in the fifty-one(+) age group.

Further trends which can be reported from the path analysis are:

1. older teachers are more likely to consider that there are a number of factors that impede the implementation of environmental education;
2. older teachers are more likely to believe that the environment should be protected;
3. pre-service training has had no impact upon teachers’ priority for environmental education. And more importantly, pre-service training has had no real impact on the level of teachers’ knowledge;
4. teachers are more likely to have a higher knowledge of environmental education approaches if they have undertaken in-service training; and
5. male teachers are more likely to have undertaken in-service training.

The data presented reveal that teachers’ knowledge, beliefs and in-service training significantly influence their priority of and level of intention to implement environmental education in the primary school classroom. The data also reveal that pre-
service teacher education is yet to have a direct influence upon teachers’ knowledge and beliefs about and of environmental education. Before turning to Chapter Five, I now conclude this chapter.

Conclusion

In Chapter Four I presented and analysed the data under four sub-sections, namely: Teachers’ Preparedness; Teachers’ Knowledge; Teachers’ Beliefs; and Correlating Teachers’ Preparedness, Knowledge & Beliefs – A Path Analysis. As such, eleven major findings were reported in the presentation and analysis of the data.

One, both the stage one and stage two participants indicated that they had received no or very little in-service and/or pre-service training in environmental education. Spork (1990; 1992) also reported in her study that primary school teachers received little professional preparation to teach environmental education. Spork (1990; 1992) indicated that 4.9% of her sample received pre-service training, however according to the findings of this study this figure has increased to 14.5%. Spork (1990; 1992) further reported that 6.6% of this same sample only received in-service training. Once again, it can be seen that this particular figure has also increased to 10.9%. Thus, it appears that more Queensland teachers are now receiving professional preparation in environmental education.

Notwithstanding, the mail survey data revealed that there was a significant difference between male and female participants of different age groups who had undertaken training in environmental education. The majority of stage two participants who had undertaken pre-service training were female participants aged twenty-one to thirty years.
of age and male participants aged thirty-one to forty-one. In contrast, significantly more male participants than female participants had undertaken in-service training. The majority of male teachers who had undertaken training were aged thirty-one to forty and/or fifty-one (+).

Adding to this, several of the stage one teachers, who were identified as recent graduates and/or relatively in-experienced teachers, indicated that they did not feel "prepared" to teach environmental education due to lack of pre-service and/or in-service training.

Two, the stage one participants, as a group, displayed simple understandings of environmental education. In fact, the majority of the participants openly expressed their lack of knowledge about environmental education. Moreover, the majority of participants in stage one were not familiar with (nor implemented) the environmental education approaches 'education about the environment, education in the environment and education for the environment'. They were also not aware of state environmental education curriculum and policy documents.

These trends were also confirmed in the stage two mail survey data. However, male participants tended to display a significantly higher level of knowledge with respect to environmental education approaches.

Three, the stage one participants held many misconceptions and simple understandings of various environmental concepts. Most of the participants openly admitted that they could not explain environmental concepts in any detail. The stage two data confirmed such trends. In particular, there were significant differences between the various age
groups, such that older age groups revealed a higher level of understanding of the ‘selected’ environmental concepts.

Four, in accordance with the above-mentioned trends the majority of participants (in stage one and stage two) rated their knowledge as average to low. The stage two data revealed that significantly more male participants than female participants rated their knowledge as ‘very high to high’ while significantly more female than male participants rated their knowledge as ‘low to very low’. In fact, the male age group 51(+) rated their knowledge as the highest.

Five, the stage two participants revealed various positions about knowledge. Male participants tended to agree that primary school teachers need substantial knowledge of environmental education more than female participants. Significantly more female participants were neutral about the statement (teachers’ need for knowledge) than their male counterparts. Furthermore, the majority of the stage one participants indicated that primary school teachers do not require substantive content knowledge. Such teachers were of the view that it is more important to know how to access information. There is an implicit assumption here that ‘knowledge’ means transmission, the ‘empty-vessel’ notion of ‘teaching’.

Additionally, the majority of participants (both stage one and stage two) revealed that “a positive attitude” towards the environment is “definitely” the most important characteristic to develop in environmental education. This is perhaps a reflection of the teacher education theories learned by these participants during pre-service teacher education. Even so, of the minority of stage two participants who considered
‘knowledge’ as the *essential aim* of environmental education, the majority were male participants in the thirty-one to forty and fifty-one(+) age groups.

Six, most stage one participants displayed some level of interest for environmental education, although such informants clearly admitted that it is not a priority in their teaching or in schooling generally. Once again, the stage two results confirmed such findings. The stage one participants attributed this lack of priority for environmental education to literacy and numeracy demands and teachers’ personal interests (in subject matter). Thus, similar to the apparent decline in concern for the environment in society generally, it appears that interest has declined in environmental education also when compared to previous stated interest levels (see Spork, 1990; 1992).

Seven, the majority of the stage one participants indicated that they did not practise environmental education. Most participants indicated that it was incidental and usually incorporated with the Studies of Society and Environment (SOSE) and Science Education learning areas. Such trends were further confirmed in stage two.

Eight, the stage two data revealed that the majority of teachers perceived *time constraints, over-crowded curriculum, constant change* and *ongoing professional demands* as the major barriers preventing and/or limiting the implementation of environmental education. The stage one teachers also identified such concerns, although these teachers were particularly concerned with the issues of ‘constant change’ and ‘on-going professional demands’.

Nine, many of the stage one participants revealed a concern for the environment, although it was clearly stated that such concerns do not constitute a ‘crisis’ (at this
time). Even so, the majority of the participants (in stage one) said that they did not know much about the idea of an environmental crisis. Quite the contrary to the stage one findings, the majority of the stage two participants either indicated that the environment is 'definitely in a state of crisis' or 'probably in a state of crisis'.

Ten, the participants revealed a range of environmental philosophies. In particular, the stage one and two participants agreed most with the 'Ecocentric Eco-socialist' perspective and 'Ecocentric Gaia' perspective.

Eleven, the path analysis confirmed that teachers' knowledge, beliefs and in-service training significantly influence the priority of and the level of intention to implement environmental education in the primary school classroom. The data also revealed that pre-service teacher education is yet to have a direct influence upon teachers' knowledge and beliefs of and about environmental education. I now synthesise such data in Chapter Five.
CHAPTE R Five
Synthesis & Conclusions

... 'the bucket is empty' for many teachers in the case of environmental education.

Introduction

As stated from the outset, this thesis aimed to assess the scope and range of Queensland primary school teachers’ knowledge and beliefs about environmental education. This thesis focused on the following three objectives:

1. to determine the current condition of environmental education in Queensland primary schools;

2. to determine Queensland primary school teachers’ knowledge and beliefs about environmental education; and

3. to determine the factors which impede the implementation of environmental education in Queensland primary schools.

In Chapter Two, I presented six independent concepts, including complex pedagogical content knowledge, environmental (eco) philosophy, generations, ecological literacy, eco-literacy and adaptive management. Complex pedagogical content knowledge underpinned the conceptual framework of this thesis, which was positioned within a theoretical model based up eco-literacy and adaptive management. In this context, the
overall research question for this thesis was:

What is the scope and range of primary school teachers’ knowledge and beliefs about environmental education?

And in theoretical terms, this question was:

What stock of complex pedagogical content knowledge is available for the development of eco-literacy outcomes?

The research problem, objectives and my allied theoretical framework provided the ‘frames’ or ‘lenses’ for my scrutiny of environmental education theory and practice. As such, Chapter Five specifically addresses the above-mentioned questions and objectives in light of the previous Chapters presented. The Chapter consists of five sections. Section One provides a summation of the entire thesis. Section Two synthesises the findings of the study in relation to the research problem, objectives and theoretical framework. Section Three outlines the limitations of the study and Section Four details the possible future directions for research in the area. In the final section of the thesis I conclude the study. I now turn to this task.

Summation

Chapter One

In the Background to the Study and Review of Literature, I presented an overview of the
various international environmental education policy developments and initiatives, and revealed that there are established goals, objectives and principles for environmental education. In Australia, environmental education policies have been developed, although state departments have been slow to incorporate environmental education into key curriculum documents. Environmental education is predominately incorporated into and practised through existing curriculum areas; principally the ‘Studies of Society and the Environment’ (SOSE) key learning area. The implications of concentrating environmental education into specific curriculum domains are yet to be fully explored.

It was identified that there are a variety of disparate views about the proper role of environmental education. The various approaches include: education about the environment, education in (or through) the environment and education for the environment. For the past two decades, particularly in Australia, education for the environment has been identified as the preferred approach for environmental education. Notwithstanding, a growing number of researchers argue that education for the environment is theoretically and conceptually flawed. Four issues were identified as the basis of these criticisms. These are: its indoctrination and anthropocentric tendencies; its definitive usage of the concept sustainable development; its inappropriate use of social-critical theory; and the lack of empirical research concerning the implementation of education for the environment in primary school systems. To this end, I argued that the field of environmental education is characterized by theoretical assumptions, flaws and contradictions and a dearth of empirical research.

To this end, little is known about the extent to which environmental education has been incorporated into school systems, particularly in primary schools. Despite the various policy advancements in environmental education, the evaluation studies that have been
conducted indicate that policy expectations are rarely met. There are many barriers which impede the implementation of environmental education, namely: time and resource constraints for teachers; lack of teacher knowledge and skills; lack of knowledge of departmental regulations regarding environmental education; and differences and gaps between the theories (with respect to environmental education) held by policy makers, curriculum developers and educational researchers and the theories held by practitioners. In this way, environmental education research has tended to conclude that the provision of further or restructured teacher education is the ‘priority of priorities’ for environmental education. However, such propositions tend to be based on both a lack of empirical evidence and a theoretical presumption that environmental education and the structure, politics and organisation of school systems are unproblematic. Thus, conclusions made about primary school teachers and what they might or might not know about environmental education required further and deeper investigation. The theoretical and empirical ‘gaps’ identified in Chapter One formulated the impetus and justification of this study.

Chapter Two

Chapter Two presented a theoretical framework for the thesis problem set out in Chapter One. In three sections, the theoretical framework established links between the major concepts of teachers’ knowledge, teachers’ beliefs and environmental education.

In Section One, two types of knowledge were identified, namely propositional knowledge and procedural knowledge. It was established that propositional knowledge maintains both substantive and syntactic structures. Procedural knowledge, or what some coin process learning and/or process knowledge, that has dominated teaching and learning for
the past thirty years (see Bernstein, 1971; 1990; 1996). It was revealed that during that period, discipline-based, or substantive content knowledge, became less significant in the education system. With the onset of the information/knowledge society and economy, the educational push to ‘procedural knowledge’ (process knowledge) has accelerated, seemingly blind to the importance of the creation of a stock of knowledge as well as the need to learn and relearn in this environment.

It has only been in recent times that some key international commentators, such as the OECD (2001), have stressed the significance of propositional knowledge (complex knowledge) and the management of knowledge for educational and corporate ends. It is the stock of knowledge, the capacity to apply and transfer ‘complex knowledge’ on the part of primary school teachers that is the focus of this study.

In this respect, Shulman (1986b) refers to instructional knowledge as ‘pedagogical content knowledge’. The important issue for this thesis is that Shulman (1987, pg.8) maintains that ‘pedagogical content knowledge’ lies at the heart of teaching because it represents the ways in which teachers “blend academic content with teaching methods, organize instruction, and unite all these elements with the interests and abilities of the students in their class”.

Furthermore, such factors are further heightened through teachers’ inclination to emphasise (prioritise) content areas for which they are more knowledgeable about and to avoid those content areas in which they have significantly less knowledge. Moreover, teachers’ beliefs influence what teachers select to teach and in turn how such knowledge is interpreted (see Grossman, Wilson and Shulman, 1989). As such, I made the contention in Chapter Two that primary school teachers would tend to avoid or
de-emphasise (de-prioritise) environmental education if they had relatively low content
knowledge of it.

In Section Two, I established that the concept of belief is a key element of complex pedagogical content knowledge. It was shown that teachers' beliefs influence important decisions about classroom practices. In addition, teachers have a set of cultural assumptions and beliefs about their work and students. Such beliefs and assumptions are in turn significantly influenced by teachers' sub-cultures, namely early childhood education, primary, secondary and discipline and/or subject-based interests. These assumptions and beliefs clearly constitute a professional culture. It follows then that one might expect that a broad or common view of environmental education probably exists within the professional culture of Queensland primary school teachers.

Such beliefs are grounded in an overarching culture, specifically western capitalist culture, which includes a set of beliefs or assumptions about the environment. Indeed, the literature places the technocentric perspective as the overarching environmental philosophy of western capitalist culture. Based upon such literature, one could assume that teachers adopt technocentric perspectives in about the same ratio as the Australian population at large, although such assumptions are unsubstantiated given the paucity of literature about teachers' environmental beliefs.

The sociological concept of 'generations' was also utilised as a means for understanding teachers' beliefs as there are substantial cultural differences between the various defined generation groups. Such generational differences also extend to beliefs about the environment. In particular, the options generation are defined by their individualism, diversity and pessimism, coupled with their mastery of technology and adaptability.
towards change. The baby boomers, on the other hand, are defined as optimistic, family-centered and materialistic. To date, no literature exists which explains teachers’ generation-related beliefs and the impact of such beliefs upon the environment and environmental education.

In Section Three, I set out a model for gauging primary school teachers’ complex pedagogical content knowledge about the environment and environmental education. In doing so, I utilised the theoretical concepts of environmental literacy, ecological literacy, eco-literacy and adaptive management.

I proposed that to teach environmental education knowledge and skills, teachers require a relevant stock of knowledge. To establish a framework for a stock of knowledge, I drew upon Orr’s (1992) concept of ‘ecological literacy’, formerly known as environmental literacy. I rephrased the concept ecological literacy to *eco-literacy* in order to appropriately encapsulate both ecological literacy and environmental (eco) philosophy (belief).

Eco-literacy is an appropriate concept for use in this thesis for three reasons. First, it emphasises the ‘content knowledge’ referred to earlier as teachers’ complex pedagogical content knowledge. Second, it evokes those ideas and approaches that environmentalists consider fundamental in environmental education. Third, the concept provides a yardstick or set of criteria to gauge teachers’ eco-literacy.

Although Orr’s (1990; 1992; 1994) works are useful in reconceptualising environmental education and teachers’ eco-literacy, Orr does not clarify how ‘ecological literacy’ (eco-literacy) transits into educational practice. I show how this apparent gap in Orr’s
(1990; 1992; 1994) work can be filled using the theory of Adaptive Management. I illustrate a six step process for achieving a learning management procedure that is anchored in intended environmental education outcomes.

Chapter Three

Chapter Three outlined the combined-methods approach utilised to investigate primary school teachers' knowledge and beliefs (eco-literacy) about environmental education. To this extent, the methodological approach consisted of two stages. For stage one, a total of twenty-six primary school teachers volunteered and participated in one intensive ethnographic interview. So as to elucidate the findings discovered in the stage one phase of data collection, a quantitative survey (stage two) was administered in five Education Queensland state primary school districts. A total of three hundred and forty-nine primary school teachers completed and returned questionnaires, equalling a nineteen percent response rate.

Chapter Four

In Chapter Four I presented and analysed the data collected in 'Stage One' and 'Stage Two' of this study. The data were presented in four sections, namely: Teachers' Preparedness; Teachers' Knowledge; Teachers' Beliefs; and Correlating Teachers' Preparedness, Knowledge & Beliefs - A Path Analysis. Eleven major findings were reported in the presentation and analysis of the data. The participants:

1. had received no or very little in-service and/or pre-service training in environmental education;
2. possessed misconceptions and simple understandings of environmental education and environmental concepts;
3. rated their knowledge of environmental education (including environmental concepts) as average to low;
4. believed that primary school teachers do not require substantive content knowledge;
5. believed that "a positive attitude" towards the environment is "definitely" the most important characteristic to develop in environmental education;
6. displayed some level of interest for environmental education, although did not consider it a priority in their teaching or in schooling generally;
7. did not generally practise environmental education. Most participants indicated that it was incidental and usually incorporated within the Studies of Society and Environment (SOSE) and Science Education learning areas;
8. perceived time constraints, over-crowded curriculum, constant change and ongoing professional demands as the major barriers preventing and/or limiting the implementation of environmental education;
9. revealed a concern for the environment, although various views about the environmental crisis were apparent (between stage one and stage two);
10. displayed a range of environmental philosophies. The stage one and two participants agreed most with the 'Ecocentric Eco-socialist' perspective and 'Ecocentric Gaia' perspective; and,
11. the participants' knowledge, beliefs and amount of in-service training significantly influenced their priority of and level of intention to implement environmental education in the primary school classroom.
Significant trends were also reported in terms of differences between male and female teachers of different age-groups. I now synthesize these trends in relation to the research problem and theoretical framework presented in Chapter Two.

**Synthesis**

In Chapter Two, Table 2.3 identified various indicators to gauge teachers' eco-literacy levels about the environment and environmental education. More specifically, the model allowed me to determine the stock of complex pedagogical content knowledge available for the development of eco-literacy outcomes. Of course, each level is not mutually exclusive and teachers may be located within and between levels.

Figure 5.1 illustrates Table 2.4 as a model which identifies Novins and Armstrong's (1997) categories of knowledge in conjunction with the key environmental education concepts of this thesis. As stated in Chapter Two, teachers' eco-literacy would be ideally located in the bottom right-hand quadrant, with their eco philosophy located along (exclusively) the horizontal axis.

Utilising Table 2.4, the majority of participants in this study demonstrated little or simple understandings of environmental education, such that their knowledge can be categorised as Ecological Illiteracy and/or Nominal Ecological Literacy. As shown in Figure 5.1, Chapter Four reveals that teachers' eco-literacy is located in the top left-hand quadrant (a). Such forms of knowledge are procedural knowledge, or what some call 'process learning and or process knowledge', which has dominated teaching and learning (see Bernstein, 1971; 1990; 1996). The data presented in Chapter Four confirms the contentions of the
OECD (2001), that there is very little evidence of the creation, dissemination and application of complex knowledge, or what Ryle (1949) coined propositional knowledge, in primary schools. Thus, it is this form of knowledge, which Shulman (1986b) refers to as 'pedagogical content knowledge', that is the “missing paradigm” in the discussions surrounding teaching and learning. Indeed it is this form of knowledge that is the “missing paradigm” in environmental education.

Notwithstanding, it was stated in Chapter Two that teachers' beliefs significantly influence their beliefs about knowledge and the implementation and emphasis (priority) of such knowledge in their teaching. Accordingly to the data presented in Chapter Four, the participants' eco philosophies were varied. Their beliefs about environmental education and its priority in education were closely aligned with the Technocentric Anthropocentric and Accommodation perspectives as identified in Table 2.4 (b). The Anthropocentric perspective does not accept that environmental education and social change are necessary, whereas the Accommodation perspective advocates that 'raising' environmental awareness and concern is necessary within society/education. Clearly such beliefs about environmental education can in turn be directly related to the participants' low eco-literacy levels. Such data also reinforces Grossman, Wilson and Shulman's (1989) contentions that teachers' beliefs influence what teachers select to teach and in turn how such 'knowledge' is interpreted.

On the other hand, the participants' beliefs about the environment were closely aligned with the Eco-Socialist perspective (c). As mentioned earlier, from existing research one could assume that teachers adopt Technocentric perspectives about the environment (see Bowers, 1997; Orr, 1992; Weston, 1994; Weston, 1996; Weston, 1999; White, 1967). Based upon the findings of this study, this is quite the contrary with teachers
supporting the Eco-Socialist perspective the most (towards the environment) and the Technocentric Accommodation perspective the least. Even so, the participants in this study certainly did not convey a deep understanding or appreciation of the various perspectives as outlined in Table 2.4.

Adding to this, there were clear differences between the various generations in terms of their knowledge about and philosophies of the environment. Thompson (2002) labelled the baby-boomer generation as the consumer generation, with the 'options generation' identified as the repair generation. Based upon the findings of this study, such contentions are quite inaccurate as the baby-boomer generation (41 and above) displayed more appreciation for and knowledge about the environment and environmental education than their options generation counterparts.

Figure 5.1. Teachers' Eco-Literacy
To this end, the findings of this thesis convey that environmental education in Queensland primary schools is limited and inadequate in terms of current teachers' ability and commitment to produce an 'environmentally informed, committed and active citizenry'. The findings of this thesis also show that teachers' knowledge about and beliefs of environmental education (eco-literacy) has a significant effect on their willingness to practise and prioritise environmental education in primary school education. In this way, teachers' eco-literacy levels are clearly a barrier preventing and limiting the implementation of effective environmental education. Even so, the path analysis of the stage two data reveals that in-service training has the capacity to equip teachers with the necessary knowledge and beliefs; hence eco-literacy.

As such, I propose that adaptive management is an appropriate theoretical and pedagogical approach for in-service training (professional development) in environmental education. Such an approach focuses on systematic instructional methods with stated outcomes so that environmental education policies and practices are translated into learning outcomes, as well as maintaining an overarching professional responsibility for the welfare of the learner (Nyberg, 2001, pg.12). In light of the findings presented, Figure 5.2 illustrates a six step process for achieving such a learning management procedure that is anchored in intended environmental education outcomes.

As indicated in Chapter Two, it is apparent that teachers of all eco-literacy levels have to draw on learning strategies to implement a pedagogical cycle. The first step is to assess the opportunity for students to learn eco-literacy and then design a strategy. At this stage, a teacher has the requisite knowledge, can discover that knowledge or does not have the requisite knowledge to develop an effective cycle. Based upon the findings presented, teachers do not have the requisite knowledge. This model shows what happens with
individual learners and the capacities of teachers with the practical interest of conceptualising how an ecologically literate population might be developed through participation in an education system.

**Figure 5.2. Environmental Education (Eco-Literacy) Learning Management Cycle**

- Assess the opportunity for teachers to learn environmental education (eco-literacy)
- Adapt and redesign future learning tasks
- Evaluate learning outcomes and learn from them
- Monitor the learning progress of teachers
- Design a learning management 'instructional method' with outcomes
- Implement the instructional method
- Adaptive Environmental Education (eco-literacy) Learning Management Cycle

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**Limitations Of The Study**

The major limitation of this study is the relatively low response rate (19%) received for the mail survey (stage two). It could be considered that such a response rate decreases the reliability of the overall findings. The low response rate can be attributed to primary school principals' and teachers' lack of interest in survey research (Holbrook et al., 2000)
and possibly environmental education. The latter contention is further confirmed by the significantly higher response rate achieved in the pilot survey. The only difference in administration of the two surveys was the sampling method. For the pilot survey I used convenience sampling methods and administered the survey at the various schools who agreed to participate and were clearly interested in the study. I personally delivered and collected the questionnaires from all participating schools. In contrast, for the mail survey I posted and emailed all questionnaires and correspondence to five randomly selected education districts which employed a total of one thousand nine hundred and thirty primary school teachers. Unfortunately time and financial constraints prevented me from administering the state-wide mail survey using the same method applied for the pilot survey.

**Future Directions**

A number of areas are suggested for further research. First, replications of this study using similar settings for a greater period of time could be undertaken. Second, a follow up study of the same participants could be implemented after an appropriate time period, to check the longevity of environmental education knowledge and beliefs as discussed in this thesis. Third, the implementation of the adaptive management approach using an action research model to assess its effectiveness and make ongoing improvements. Finally, a focused study of primary school teachers' environmental education knowledge development during in-service environmental education training could provide a better understanding of the existing research.
Concluding Comments

The majority of participants in this study neither possessed sufficient pedagogical content knowledge of environmental education (eco-literacy) nor were particularly concerned about that fact. As discussed earlier, such findings can be placed in wider theoretical arguments to do with knowledge and its apparent lack of focus (priority) in education over the past thirty years (Wilson, 1998). Wilson (1998, pg.3) states that “filling up people’s minds with a lot of stuff” is considered to be a ‘bad’ model of education. He further states that content knowledge is “what fills the bucket wielded by teachers” (Wilson, 1998, pg.3). Based upon the findings of this study, ‘the bucket is empty’ for many teachers in the case of environmental education.

I conclude that the introduction of eco-literacy in educational policy and the espousal of adaptive management strategies may advance the goals of environmental education, although such initiatives are unlikely to significantly change the current ‘condition’ of environmental education unless there is a system-wide commitment to environmental education and knowledge management on the part of governments, education departments, pre-service and in-service teacher education providers, schools and teachers themselves.
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Stage One package sent to all schools in two Queensland education districts requesting teachers to participate in ethnographic interviews
Dear Sir or Madam:

RE: RESEARCHERS SEEK TEACHERS TO PARTICIPATE IN 'ENVIRONMENTAL EDUCATION' PROJECT

This letter is to inform you that Professor Richard Smith and Amy Cutter of Central Queensland University are conducting a research project about the status of ‘Environmental Education’ in Queensland primary schools. The project forms a substantial component of Amy Cutter’s doctoral studies. Full ethical clearance for this project has been granted by Education Queensland and Central Queensland University.

To achieve the objectives of the project, the methodology consists of two stages. In ‘stage one’ we intend to interview primary school teachers in the Central Queensland Region. These interviews are informal and are aimed at finding out what teachers think about environmental education.

In ‘stage two’ a mail survey of primary school teachers in Queensland government primary schools will be administered.

We seek the participation of primary school teachers now for the interview round of the study. We anticipate that the interview can be completed in 40-60 minutes. However, the interview will proceed for as long (or short) as the participant feels necessary. The interviews will be conducted outside of school hours at a time and place convenient for each participant.

We would appreciate if you could encourage and seek the participation of your teaching staff. For those teachers who wish to participate or obtain further information, please distribute the enclosed information sheets and consent forms.

If you have any questions or queries relating to this project please contact Amy Cutter on (Ph) 4930 6873 or at a.cutter@cgu.edu.au. Should there be any further concerns about the nature and/or conduct of this research project, please contact Central Queensland University’s Research Services Office on (Ph) 4930 9828.

Yours sincerely,

Amy Cutter & Richard Smith.
Information Sheet

Environmental Education
in Queensland Primary Schools

Project Team

Professor Richard Smith (Supervisor)
Amy Cutter (PhD Candidate)

Faculty of Education and Creative Arts
Central Queensland University
Rockhampton Campus, Queensland, 4702.

Professor Richard Smith and Amy Cutter at Central Queensland University are conducting a research project about the status of ‘Environmental Education’ in Queensland primary schools. The project forms a substantial component to the investigator’s (Amy Cutter) doctoral studies.

To achieve this aim, the methodology consists of two stages. In ‘stage one’ we intend to interview primary school teachers in the Central Queensland Region. These interviews are informal and are aimed at finding out what teachers think about environmental education.

The ‘second stage’ of the empirical research includes the use of a mail survey of primary school teachers in Queensland government primary schools.

We seek your participation now for the interview round of the study. We anticipate that the interview can be completed in 30-40 minutes. However, the interview will proceed for as long (or short) as the participant feels necessary.

If you want to participate, please complete the attached ‘consent’ form and FAX (07 4930 9604) or send it (in the reply-paid envelope) to Amy Cutter.

If you have any questions or queries relating to this project please contact Amy Cutter on (Ph) 4930 6873. Should there be any further concerns about the nature and/or conduct of this research project, please contact Central Queensland University’s Research Services Office on (Ph) 4930 9828.
Consent Form

Environmental Education
in Queensland Primary Schools

Project Team

Professor Richard Smith (Supervisor)
Amy Cutter (PhD Candidate)

Faculty of Education and Creative Arts
Central Queensland University
Rockhampton Campus, Queensland, 4702.

Project Participation Consent Form
(Ethical Clearance Number: 01/06-41)

THIS IS TO CERTIFY THAT I (print name) HAVING READ THE INFORMATION SHEET ABOUT THIS PROJECT HEREBY AGREE TO PARTICIPATE AS A VOLUNTEER IN THE STUDY: ENVIRONMENTAL EDUCATION IN QUEENSLAND PRIMARY SCHOOLS.

• I have been provided with an information sheet concerning the nature and the purpose of the study.
• I understand that various activities throughout the project will be recorded (audio-taped); I understand that transcripts from these recordings will be analysed by the researchers.
• I understand that I can withdraw from the project at any time.
• I understand that my name will not used in any material associated with the project.
• I understand that I am free to refuse to answer any specific questions and may withdraw from any part of the project at any time.
• I understand that I can ask to have feedback about the project communicated to me in an accessible form.
• I have been given the opportunity to ask questions and receive satisfactory answers about the project.

Date: ___________________ Signature: ________________________

So that you can be contacted please supply:
Contact Telephone Number: ________________________________
Region: ________________________________

I would like a copy of the 'plain English' statement of results when available posted to (please print):

Name: ___________________ Mailing / Email Address: ________________________________
APPENDIX TWO

Email sent to targeted Stage One Queensland education districts confirming receipt of package
Dear Sir / Madam,

Last week we mailed a package to every state primary school in the Rockhampton district 'seeking teachers to participate in the first stage of an environmental education research project'.

As such, the project is about the status of 'Environmental Education' in Queensland primary schools. We seek the participation of primary school teachers **now** for the interview round of the study. We anticipate that the interview can be completed in 40-60 minutes. **However, the interview will proceed for as long (or short) as the participant feels necessary.** The interviews will be conducted outside of school hours at a time and place convenient for each participant.

We would appreciate if you could encourage and seek the participation of your teaching staff. For those teachers who wish to participate or obtain further information, could you please distribute the information sheets and consent forms enclosed in the package. Could you please confirm that the package was received and whether your teachers may be interested in participating in the project?

If you have any questions or queries relating to this project please contact Amy Cutter on (Ph) 4930 6873 or at a.cutter@cqu.edu.au. Should there be any further concerns about the nature and/or conduct of this research project, please contact Central Queensland University's Research Services Office on (Ph) 4930 9828.

We look forward to your response.

Best wishes,

Amy Cutter and Professor Richard Smith.

---

**AMY CUTTER**

Faculty of Education and Creative Arts
Central Queensland University
Rockhampton Campus, Queensland, 4702.
Telephone: (07) 4930 6873
Email: a.cutter@cqu.edu.au
APPENDIX THREE

Progress card and request for assistance sent to Stage One informants
Just a quick note to let you know that all interviews are currently being transcribed and analysed, and will be returned to you shortly.

To date I have conducted twenty interviews and am hoping to conduct a further ten interviews. As you may be aware, it has been extremely difficult to access primary school teachers for this study. I have found that the most effective method is simply through teacher-to-teacher networking. Without your individual participation this research project would not be possible. In this regard, it would greatly assist me if you would distribute the enclosed information sheets and consent forms to your (primary) teaching colleagues and encourage them to participate in this project.

Once again, thank you for your continued support.

With many sincere thanks,

Amy Cutter.
Stage One participants’ age range
### Stage One Participants’ Age Range

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Appendix Five

Number of years (range) taught by Stage One participants
Number of Years Taught By Stage One Participants

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Stage One interview guide
Stage One Interview Guide

1. Tell me what made you decide to become a teacher?

2. What issues do you feel are necessary to teach in primary schools?

3. What are your thoughts about the new ‘Studies of Society and Environment’ Syllabus?

4. What issues do you see as most important in the syllabus?

5. How do you feel about the inclusion of environmental education in the syllabus?

6. Do you feel that environmental education should be taught in primary schools? If so, how often? If not, tell me about that.

7. What do you think environmental education is? What is its purpose?

8. Do you or have you taught environmental education within your classroom? How often do you teach environmental education? Tell me about that?

9. Where have you sought resources for environmental education? Have you visited an environmental education centre?

10. Are there any factors limiting the implementation of environmental education in your classroom?

11. What environmental education / environmental concepts do you feel are important for students to know?

12. Here is a list of ‘words’ often heard in discussions concerning the environment and environmental education. What do you make of each one?
   - sustainable development
   - ecological sustainability
   - technological or economic sustainability
   - environmental crisis

13. What do you consider the environment to be?

14. How do you feel about the environment?

15. Do you have any concerns? What issues do you consider most important and why?

16. How do you feel about the following statements:
   - The environment is a resource to be used by human beings.
   - Economic growth should and must continue, even if it results in damage to the environment.
   - The environment should be protected, even if it results in a reduction in economic growth.
   - The environment should be preserved and protected, no matter what the cost.
17. Are you involved in any environmental conservation groups? Tell me about that.

18. Do you or have you previously participated in any environmental activities, such as recycling or the purchasing of environmentally-friendly products?

19. Have you taken any action regarding an environmental issue (e.g. lodged a complaint or letter, participated in a public meeting or march, lobby group, work campaign such as ‘Clean Up Australia Day’)?

20. Have you done any pre-service and in-service training in environmental education? Tell me about that.

21. Where have you gained information about the environment and environmental issues? Do you consider these sources to be reliable?

22. What is knowledge? Tell me about that.

23. How would you rate your knowledge about the environment and environmental education?

24. Do you feel that an advanced level of knowledge is needed to teach environmental education? Tell me about that.

25. Do you feel that a particular belief/s or commitment is needed to teach environmental education effectively?

26. What characteristics do you feel a primary school teacher requires to teach environmental education effectively?
Stage One interview facesheet
Interview Facesheet

Identification Number:

Date of Interview: ......................................................................................................................

Start Time: __________________________ Finish Time: __________________________

Place of Interview: ..................................................................................................................

Gender: Female ☐ Male ☐

Age: ........................................................................................................................................

Year levels taught from 2001-1999 (tick the appropriate boxes)

2001:

1 2 3 4 5 6 7

2000:

1 2 3 4 5 6 7

1999:

1 2 3 4 5 6 7

Teaching experience in the various year levels:

1 – 3: ........................................................................................................................................

4 – 7: ........................................................................................................................................

8 – 10: ......................................................................................................................................

Other: .......................................................................................................................................

Education qualifications:

Undergraduate: .........................................................................................................................

Postgraduate: .............................................................................................................................

Other: ........................................................................................................................................

266
Stage One post-interview comment sheet
Stage One Post-Interview Comment Sheet

Description of the setting:

Description of the informant:

Emotional tone of the interview:

Difficulties encountered (methodological or personal):
Personal feelings about the experience:

Insights and reflections:
APPENDIX NINE

Stage One thank you letter and certificate of appreciation (and Stage Two pilot questionnaire)
Dear [Insert Name],

I have now finalised all the transcribing of interviews. As such, your particular transcript is enclosed. Please check the transcript for accuracy. If you wish to modify any text please do so. However, please ensure that the changed text is highlighted and written clearly. If the transcript is accurate, it would be appreciated if you could let me know or if I do not receive a response I will assume that the transcript is accurate. Please return your modified transcript to Amy Cutter at the above-mentioned address (top left-hand corner).

Furthermore, I have now developed a pilot questionnaire based upon the preliminary data analysis of such interviews. For the purposes of cross-checking and confirming the preliminary analysis of stage one, I would very much appreciate it if you could complete the attached questionnaire and return it to me (in the reply-paid envelope) within the next two days (if possible). The questionnaire will only take five to ten minutes to complete. In addition, all teachers who participate will be entered into a competition to WIN a hamper of environmentally friendly products, an extensive range of environmental education and SOSE resources, posters and stickers.

I would also like to take this opportunity to thank you for participating in stage one of this study; without your support and cooperation such research would not be possible. I have enclosed a certificate of my appreciation. Please ‘keep in touch’ and ensure that you contact me should you ever want to ‘talk’ environmental education.

Many thanks and best wishes,

Amy Cutter.
Certificate of Appreciation

is hereby granted to:

(Informant’s Name)

for participating in and contributing to the research project:

Environmental Education in Queensland
Primary Schools

________________________________________

Amy Cutter
& Professor Richard Smith
Letter sent to sampled district offices requesting their support and participation in the 'Stage Two mail survey'
Dear [insert district directors name]:

RE: RESEARCHERS SEEK THE SUPPORT OF [INSERT DISTRICT OFFICE'S NAME] TO PARTICIPATE IN ‘ENVIRONMENTAL EDUCATION’ SURVEY

This letter is to inform you that Amy Cutter and Professor Richard Smith of Central Queensland University are conducting a research project about Environmental Education in Queensland primary schools. The project forms a substantial component to the investigator's (Amy Cutter) doctoral studies. Full ethical clearance for this project has been granted by Education Queensland and Central Queensland University.

This study is an investigation of primary school teachers' knowledge and beliefs about environmental education. Environmental education is yet to be fully implemented in primary schools and tends to occur only at the individual teacher level. To date, very few studies have been carried in Australia which investigate teachers’ knowledge and beliefs about environmental education.

So as to achieve the desired research objectives, we are using a two-step process. In 'stage one', we interviewed primary school teachers in the Central Queensland Region about environmental education.

In the ‘second stage’, we are using a mail survey. So to elucidate and confirm the findings generated from stage one, we now endeavour to administer a state-wide survey of primary school teachers' knowledge and beliefs about environmental education. A successful pilot study has already been administered in the Central Queensland region so as to test the mail survey data collection and data analysis instruments.

As such, we now seek the participation and support of the [insert district name] district office in the administration of the mail survey. We intend to administer the survey in five education districts, including the [insert district name] district. The questionnaire will only take FIFTEEN MINUTES to complete (please see questionnaire attached). All teachers and schools who participate in the survey will be entered into a competition to WIN two nights (for the whole family) at CLUB CROCODILE RESORT in Mackay, Airlie Beach or The Whitsundays.

As the survey will be administered via the mail this will necessarily require follow-up telephone and email reminder messages to all schools sampled. Thus, we hope that the [insert district office name] district office will support the survey through encouraging primary school principals and primary school teachers to participate in the survey. We intend to administer the survey between May 20 and May 31, 2002. Please contact me at the above-mentioned address to discuss the survey and how the [insert district office name] district office can support and encourage primary school teachers to participate in this important study. I look forward to your response.

Best wishes,

Amy Cutter & Richard Smith.
Stage Two pilot questionnaire
Pilot Questionnaire
Environmental Education in Queensland Primary Schools

Project Team:
Amy Cutter (PhD Candidate)
Professor Richard Smith (Supervisor)

Faculty of Education & Creative Arts
Central Queensland University
Rockhampton Campus, Queensland, 4702.
Telephone: (07) 4930 6873
Fax: (07) 4930 9604
Email: a.cutter@cqu.edu.au

Amy Cutter and Richard Smith at Central Queensland University are conducting a research project about Environmental Education in Queensland primary schools. The project forms a substantial component to the investigator’s (Amy Cutter) doctoral studies.

The study uses a two-step process. In ‘stage one’, we interviewed primary school teachers in the Central Queensland Region about the environment and environmental education.

In the ‘second stage’, we are using a mail survey. The purpose of this mail survey is to seek confirmation of what teachers told us in ‘stage one’. We will require a large number of teachers to complete questionnaires. Accordingly, we seek your participation in the survey. The questionnaire will take ten minutes to complete. Of course, all participants will remain anonymous and survey responses are treated as being strictly confidential. All completed surveys and data will be maintained in a locked filing cabinet at the University, accessible only to the researchers.

Participation in this research is completely voluntary and you are free to withdraw from the study at any time without comment or penalty. By completing this questionnaire you are taken to have agreed to participate in this project.

If you have any questions or queries relating to this project please contact Amy Cutter on 4930 6873 or at a.cutter@cqu.edu.au. Please contact Central Queensland University’s Research Services Office on 4930 9828 should you have further concerns about the nature and/or conduct of this research project.
Please complete the following demographic details in the spaces provided:

NAME (stage one participants – for checking purposes only): ..........................................

Gender: 
☐ Female  ☐ Male

Age (in years): ........................................................................................................

Current Teaching Year Level (tick the appropriate boxes):

2002: 
☐ 1  ☐ 2  ☐ 3  ☐ 4  ☐ 5  ☐ 6  ☐ 7  ☐ Other

Total Teaching Experience (in years) in the following year levels:

Years 1 – 3: ................................. Years 4 – 7: .................................

Years 8 – 10: ................................. Other: .................................

Qualifications (please list): ..................................................................................

In-Service Training in Environmental Education:  ☐ Yes  ☐ No

Pre-Service Training in Environmental Education:  ☐ Yes  ☐ No
Please complete the following questionnaire in the spaces provided:

**Question 1:** At the primary school level, environmental education should **essentially** aim to *(please tick one response)?*

- [ ] Develop children’s attitudes and values about and towards the environment
- [ ] Develop children’s knowledge about the environment and environmental concepts.
- [ ] Develop environmentally active children.
- [ ] Other *(please insert comment): ..........................................................*

**Question 2:** Is environmental education a **priority** in your teaching *(please circle one response)?*

- [ ] Definitely
- [ ] Usually
- [ ] Occasionally
- [ ] Not Usually
- [ ] Definitely Not

**Question 3:** Please indicate how you *teach* environmental education *(tick all appropriate responses).*

- [ ] Incidental – when it comes up
- [ ] Included with SOSE
- [ ] I do not teach environmental education
- [ ] Integrate throughout the curriculum
- [ ] Teach separately as a stand-alone subject
- [ ] Main focus of my entire curriculum
- [ ] Included with science
- [ ] Other: ..........................................................
    *(please indicate above)*

**Question 4:** Please *rank* the following factors which **limit** the implementation of environmental education in your classroom *(from 1-8, 1 being the most limiting factor and 8 being the least limiting factor)?

- [ ] Constant and on-going changes in curriculum and schools
- [ ] Time constraints
- [ ] Other professional demands
- [ ] Resource constraints
- [ ] Over-crowded curriculum
- [ ] Lack of knowledge of environmental education
- [ ] I do not consider it a priority as a teacher
- [ ] Not considered a priority by school/ department
**Question 5:** Do you know of the environmental education approaches, ‘education about the environment’, ‘education in the environment’ and ‘education for the environment’ *(please circle one response)*?

<table>
<thead>
<tr>
<th>Yes, I know and implement them</th>
<th>Yes, I know of them, but do not implement them</th>
<th>Yes, I have heard of them generally, but do not practice them</th>
<th>No, I have never heard of them</th>
</tr>
</thead>
</table>

**Question 6:** Please rate your knowledge about environmental education concepts, theories and teaching approaches *(circle one response)*?

<table>
<thead>
<tr>
<th>Very High</th>
<th>High</th>
<th>Average</th>
<th>Low</th>
<th>Very Low</th>
</tr>
</thead>
</table>

**Question 7:** Do you feel that teachers need advanced knowledge of environmental education concepts, theories and teaching approaches *(circle one response)*?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Unsure</th>
</tr>
</thead>
</table>

**Question 8:** As a teacher, do you believe that the environment is in a state of crisis? Please tick the most appropriate response:

- [ ] **Definitely**... immediate, fundamental changes are needed in the way we live and interact with the environment.
- [ ] **Probably**... if we do not make changes, environmental problems will reach crisis point in the future.
- [ ] **Not really**... existing environmental problems will be resolved by scientific and technological innovations.
- [ ] **Definitely Not**... environmental problems are overstated and nothing to worry about.
- [ ] **Unsure**... I do not have enough knowledge to comment.
- [ ] **Other** *(please insert response)*: ..........................................................
Question 9: Please indicate *(tick one)* which statement you *agree with most*:

- [ ] The environment is a resource to be used by human beings.
- [ ] Economic growth should and must continue, even if it results in damage to the environment.
- [ ] The environment should be protected, even if it results in a reduction in economic growth.
- [ ] The environment should be preserved and protected, no matter what the cost.

Thank you for your Participation in this Pilot Survey

Please place your completed questionnaire in the self-addressed reply-paid envelope and return to Amy Cutter at Central Queensland University, Faculty of Education & Creative Arts, Rockhampton, QLD, 4207.

Please fill in the tear-off slip if you wish to be entered in a competition to *WIN* a hamper of environmentally friendly products, an extensive range of environmental education and SOSE resources, posters and stickers *(also place in reply-paid envelope or send separately if you prefer)*.

×

Name: ............................................................................................................................
Contact Details: ...........................................................................................................

Central Queensland University
Where Students Come First.
Stage Two mail survey questionnaire
Amy Cutter and Richard Smith of Central Queensland University are conducting a research project about Environmental Education in Queensland primary schools. The project forms a substantial component to the investigator’s (Amy Cutter) doctoral studies.

So as to achieve the desired research objectives, we are using a two-step process. In ‘stage one’, we interviewed primary school teachers in the Central Queensland Region about the environment and environmental education.

In the ‘second stage’, we are using a mail survey. The purpose of this mail survey is to seek confirmation of what teachers told us in ‘stage one’. As such, we will require a large number of teachers to complete questionnaires.

Accordingly, we seek your participation in the survey. The questionnaire will take fifteen minutes to complete. Of course, all participants will remain anonymous and survey responses are treated as being strictly confidential. All completed questionnaires and data will be maintained in a locked filing cabinet at the University, accessible only to the researchers.

Participation in this research is completely voluntary and you are free to withdraw from the study at any time without comment. By completing this questionnaire you are taken to have agreed to participate in this project.

If you have any questions or queries relating to this project please contact Amy Cutter on 4930 6873 or at a.cutter@cqu.edu.au. Please contact Central Queensland University’s Research Services Office on 4930 9828 should you have further concerns about the nature and/or conduct of this research project.
Please complete the following demographic details in the spaces provided:

Gender:  
- [ ] Female  
- [ ] Male

Age (in years):

Current Teaching Year Level (please circle the appropriate boxes):

2002:  
- [ ] Pre-school  
- [ ] 1  
- [ ] 2  
- [ ] 3  
- [ ] 4  
- [ ] 5  
- [ ] 6  
- [ ] 7  
- [ ] Other

Total Teaching Experience (in years) in the following year levels:

Years P – 3:  

Years 4 – 7:  

Years 8 – 12:  

Other (please specify):

All Teaching or Relevant Qualifications (please list all): ...........................................

In-Service Training in Environmental Education:  
- [ ] Yes  
- [ ] No  

(please tick ONE response)

Pre-Service Training in Environmental Education:  
- [ ] Yes  
- [ ] No
Please complete the following questionnaire in the spaces provided:

**Question 1:** At the primary school level, environmental education should *essentially* aim to *(please tick ONE response)*?

- [ ] Develop children's attitudes and values about and towards the environment.
- [ ] Develop children's knowledge about the environment and environmental concepts.
- [ ] Develop environmentally active children.
- [ ] Other *(please insert comment)*: ............................................................

**Question 2:** Is environmental education a *priority* in your teaching *(please circle ONE response)*?

- [ ] Definitely
- [ ] Usually
- [ ] Occasionally
- [ ] Not Usually
- [ ] Definitely Not

**Question 3:** Please indicate how you *teach* environmental education *(tick ALL APPROPRIATE responses)*.

- [ ] Incidental – when it comes up
- [ ] Integrate throughout the curriculum
- [ ] Main focus of my entire curriculum
- [ ] Included with SOSE
- [ ] Teach separately as a stand-alone subject
- [ ] Included with science
- [ ] I do not teach environmental education
- [ ] Other: ............................................................... *(please specify above)*
Question 4: Please individually rate each of the following factors (from 1-5, with 1 being limiting and 5 being not limiting) which prevent or limit the implementation of environmental education in your classroom:

- [ ] Constant and on-going changes in curriculum and schools
- [ ] Time constraints
- [ ] Other professional demands
- [ ] Resource constraints
- [ ] Over-crowded curriculum
- [ ] Lack of knowledge of environmental education
- [ ] Not considered a priority as a teacher (personally)
- [ ] Not considered a priority by school/department

Question 5: Do you know of the environmental education approaches, 'education about the environment', 'education in the environment' and 'education for the environment' (please circle ONE response)?

- Yes, I know and implement them
- Yes, I know of them, but do not implement them
- Yes, I have heard of them generally, but do not practice them
- No, I have never heard of them

Question 6: Please rate your knowledge about environmental education concepts, theories and teaching approaches (please circle ONE response)?

- Very High
- High
- Average
- Low
- Very Low

Question 7: How do you feel about the following statement: 'Teachers need advanced knowledge of environmental education concepts, theories and teaching approaches at the primary school level' (please circle ONE response)?

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

(Unless Disagree or Agree)
Question 8: As a teacher, do you believe that the environment is in a state of crisis? Please tick the most appropriate response:

- [ ] Definitely... immediate, fundamental changes are needed in the way we live and interact with the environment.
- [ ] Probably... if we do not make changes, environmental problems will reach crisis point in the future.
- [ ] Not really... existing environmental problems will be resolved by scientific and technological innovations.
- [ ] Definitely Not... environmental problems are overstated and nothing to worry about.
- [ ] Unsure... I do not have enough knowledge to comment.
- [ ] Other (please insert response): .....................................................

Question 9: Please individually rate each of the following statements from 1 – 5, with one being strongly disagree and five being strongly agree:

- [ ] The environment is a resource to be used by human beings.
- [ ] Economic growth should and must continue, even if it results in damage to the environment.
- [ ] The environment should be protected, even if it results in a reduction in economic growth.
- [ ] The environment should be preserved and protected, no matter what the cost.

Question 10: Which of the following phrases refers to the potential ability of a system to support population growth without harming the environment (please circle ONE response)?

A: Carrying capacity  
B: Species loading  
C: Adaptive management  
D: Non-Sustainable Growth  
E: None of the above
Question 11: Which of the following would be most likely to cause groundwater pollution (please circle ONE response)?

A: Organic farming practices
B: Municipal composting of yard wastes
C: Adding too much fertiliser to fields
D: Wastewater treatment plants
E: All of the above

Question 12: Which of the following do scientists not consider to be a significant contributor to the greenhouse effect (please circle ONE response)?

A: Destruction of the earth’s rainforests
B: Burning of fossil fuels, such as gasoline and oil
C: Increased use of hydroelectric power
D: Production of methane gas by cattle and rice paddies
E: Answers C and D

Thank you for your Participation in this Survey

Please fill in the tear-off slip if you wish to be entered into a competition to WIN two free nights accommodation at Club Crocodile Airlie Beach, the Whitsundays or Mackay. Please include this slip in your reply-paid envelope. However, send separately if preferred.

X

Name: ..........................................................................................................................
Contact Details: .........................................................................................................
Email (post-card) sent to all Stage Two schools seeking their support and participation in the mail survey
This email is to inform you that Amy Cutter and Professor Richard Smith of Central Queensland University are conducting a research project about Environmental Education in Queensland primary schools. Accordingly, we seek the participation of primary school teachers to participate in the survey. The questionnaire will take FIFTEEN minutes to complete.

We would appreciate if you could encourage and seek the participation of your teaching staff. For those teachers who wish to participate the survey, please distribute the questionnaires with the attached reply-paid envelopes which will be delivered to your school shortly. We require all questionnaires to be RETURNED by June 7, 2002.

If you have any questions or queries relating to this project please contact Amy Cutter on (Ph) 4930 6873 or at a.cutter@cqu.edu.au. Should there be any further concerns about the nature and/or conduct of this research project, please contact Central Queensland University's Research Services Office on (Ph) 4930 9828.

Best wishes,

Amy Cutter & Richard Smith.
Stage Two email messages prepared for each district office to distribute
Dear Sir / Madam,

As mentioned in my previous email, I would very much appreciate if your District Office would support this environmental education survey by emailing two messages to all schools in your district. The first email has been inserted after this message. The actual survey will be administered Friday thereby arriving at schools by Monday or Tuesday. I have already emailed one email to all the various schools so as to alert them to the survey. I would appreciate if the email inserted below could be sent either Monday or Tuesday of next week. Thank you for your support.

Best wishes, Amy Cutter.

---

Please encourage all teachers to participate in the FIRST state-wide 'Environmental Education Survey'. Return all questionnaires by June 7, 2002.

Help improve the current status of environmental education by encouraging and supporting all primary school teachers at your school to participate in the FIRST state-wide 'Environmental Education Survey'. The questionnaire will only take 15 minutes to complete and all teachers are eligible to WIN two nights (for the whole family) at Club Crocodile Resort in Mackay, Airlie Beach or The Whitsundays. Please return all questionnaires in the supplied replied-paid envelopes by June 7, 2002.

Best wishes,

[insert district office name]
To: DISTRICT DIRECTORS  
From: Amy Cutter <a.cutter@cqu.edu.au>  
Subject: Second Email Message to be Sent to all Schools (EE Survey)

Dear Sir / Madam,

As mentioned in my previous email, I would very much appreciate it if your District Office would support the environmental education survey by emailing two messages to all schools in your district. I assume that the first email has been sent (or a similar message encouraging teachers to participate). The final email is merely a reminder message to complete and return all questionnaires by June 7, 2002 (or ASAP). As such, I have inserted the email message to be sent by your district office beneath this message. I would appreciate if this message could be sent as soon as possible as the response rate to date has been quite low. Once again, thank you for your support.

Best wishes, Amy Cutter.

---

Have your teachers completed and returned their questionnaires for the FIRST state-wide 'Environmental Education Survey'? To date, only a limited number of questionnaires have been received. The questionnaire will only take 15 minutes to complete and all teachers are eligible to WIN two nights (for the whole family) at Club Crocodile Resort in Mackay, Airlie Beach or The Whitsundays. Please return all questionnaires in the supplied replied-paid envelopes by June 7, 2002 or as soon as possible. If more questionnaires are required please contact Amy Cutter at Central Queensland University on 4930 6873 or at a.cutter@cqu.edu.au

Best wishes and many thanks for your support,

[insert district office name]
Stage Two letter sent to all schools (in addition to questionnaires)
Dear Sir or Madam:

RE: RESEARCHERS SEEK TEACHERS TO PARTICIPATE IN 'ENVIRONMENTAL EDUCATION' SURVEY

This letter is to inform you that Amy Cutter and Professor Richard Smith of Central Queensland University are conducting a research project about Environmental Education in Queensland primary schools. The project forms a substantial component of the investigator’s (Amy Cutter) doctoral studies. Full ethical clearance for this project has been granted by Education Queensland and Central Queensland University.

The project particularly focuses on teachers’ knowledge and beliefs about ‘environmental education’. Environmental education is yet to be fully implemented in primary schools and tends to occur only at the individual teacher and school level. To date, few studies have been carried out in Australia which investigate teachers’ knowledge and beliefs about environmental education.

In order to achieve the desired research objectives, we are using a two-step process. In ‘stage one’, we interviewed primary school teachers in the Central Queensland region about environmental education.

In the ‘second stage’, we are using a state-wide mail survey to elucidate and confirm the findings generated from stage one. Two successful pilot studies have already been administered in the Central Queensland region in order to test the survey data collection and data analysis instruments.

Accordingly, we seek the participation of primary school teachers now to take part in the survey. The questionnaire will take 15 minutes to complete. Of course, all participants will remain anonymous and survey responses are treated as being strictly confidential. All completed surveys and data will be maintained in a locked filing cabinet at the University, accessible only to the researchers.

We would appreciate if you could encourage and seek the participation of your teaching staff. For those teachers who wish to participate in the survey, please distribute the enclosed questionnaires with the attached reply-paid envelopes. We require all questionnaires to be RETURNED by JUNE 7, 2002.

Please note that all teachers who participate in the survey will be eligible to WIN two nights (for the whole family) at CLUB CROCODILE RESORT in Mackay, Airlie Beach or The Whitsundays.

If you have any questions or queries relating to this project please contact Amy Cutter on (Ph) 4930 6873 or at a.cutter@cqu.edu.au. Should there be any further concerns about the nature and/or conduct of this research project, please contact Central Queensland University’s Research Services Office on (Ph) 4930 9828.

Best wishes,

Amy Cutter & Richard Smith.
Stage Two first reminder (post-card) emailed to schools (complete and return questionnaires)
By now your school should have received an appropriate number of questionnaires to participate in the FIRST 'Environmental Education Survey' in Queensland Primary Schools. If your school has not received any questionnaires please contact me immediately so that questionnaires can be resent to your school.

To date we have received a VERY LOW RESPONSE RATE and would appreciate if the teachers at your school could participate in the survey by completing and returning the questionnaire in the reply-paid envelope. All teachers who participate will be eligible to WIN two nights (for the whole family) at Club Crocodile Resort.

Please encourage and support your teaching staff to participate.

Many thanks and best wishes,
Amy Cutter & Richard Smith.
Stage Two second reminder (post-card) emailed to schools to participate in mail survey
To date, we have received a **LOW RESPONSE RATE** and would appreciate if the teachers at your school could participate in the survey by **completing and returning the questionnaire (provided three weeks ago) in the reply-paid envelope.** We have attached an electronic version of the questionnaire for your convenience also which may be returned by email (to a.cutter@cqu.edu.au). We would appreciate if all questionnaires could be returned by **June 21, 2002.**

We would also like to take this opportunity to **thank you** personally for encouraging and supporting teachers to participate in the survey. Further, we would also like to **thank** the teachers themselves for contributing to this study and to the field of environmental education.

Many thanks and best wishes,
Amy Cutter & Richard Smith.
Stage Two third reminder (post-card) emailed to schools to participate in mail survey
Dear Sir or Madam:

RE: REMINDER TO TEACHERS TO PARTICIPATE IN ENVIRONMENTAL EDUCATION SURVEY - ‘WIN TWO NIGHTS AT CLUB CROCODILE’

By now your school should have received an appropriate number of questionnaires to participate in the FIRST state-wide 'Environmental Education Survey'. If your school has not received any questionnaires please contact Amy Cutter at the above-mentioned address so that replacement questionnaires can be re-sent to your school.

To date, we have received a LOW RESPONSE RATE and would appreciate if the teachers at your school could participate in the survey by completing and returning the questionnaire (provided three weeks ago) in the reply-paid envelope. Once again, if teachers require replacement questionnaires please contact Amy Cutter.

We would also appreciate if you could distribute the enclosed Club Crocodile pamphlet and attached thank you note to all teachers at your school. All teachers who participate in the survey will be eligible to WIN two nights (for the whole family) at CLUB CROCODILE RESORT in Mackay, Airlie Beach or The Whitsundays.

We would also like to take this opportunity to thank you personally for encouraging and supporting teachers to participate in the survey. Further, we would also like to thank the teachers themselves for contributing to this study and to the field of environmental education.

If you have any questions or queries relating to this project please contact Amy Cutter on (Ph) 4930 6873 or at a.cutter@cqu.edu.au. Should there be any further concerns about the nature and/or conduct of this research project, please contact Central Queensland University’s Research Services Office on (Ph) 4930 9828.

Best wishes,

Amy Cutter & Richard Smith.
Have you participated in the First State-wide 'Environmental Education Survey'?

Ensure that you have your say......

Best wishes,
Amy Cutter & Richard Smith.

P.S .............. If you have misplaced or did not receive a questionnaire please contact Amy Cutter at Central Queensland University so that a replacement questionnaire can be re-sent (either by email or mail) to you. And remember by returning your completed questionnaire you are eligible to WIN two nights (for the whole family) at Club Crocodile Resort in Mackay, Airlie Beach or The Whitsundays. Many thanks for your participation and contribution.
Stage Two thank you post-card emailed to entire Stage Two Sample
To: ALL SCHOOLS (IN FIVE DISTRICTS)
From: Amy Cutter <a.cutter@cqu.edu.au>
Subject: THANK YOU FOR PARTICIPATING IN THE FIRST ENVIRONMENTAL EDUCATION SURVEY

Many thanks for participating in the FIRST state-wide environmental education survey.
Stage Two announcement of winner of Club Crocodile prize (email post-card)
Thank you for encouraging your teachers to participate in the Queensland Environmental Education Survey. And a special thank you to all those teachers who completed and returned their questionnaires.

Best wishes,
Amy Cutter & Richard Smith.

This email was sent with the permission of Jan Webb (Winner of Club Crocodile Prize)
Stage Two series of analytical models
Analytical Model 1

**Question 1:** At the primary school level, environmental education should *essentially* aim to *(please tick ONE response)*?

**Input**

**Question 1:** At the primary school level, environmental education should *essentially* aim to *(please tick ONE response)*?

**Output** – Relationships with, significance of & to ...

---

**Knowledge**

**Beliefs**

<table>
<thead>
<tr>
<th>Question 5</th>
<th>Question 6</th>
<th>Question 7</th>
<th>Question 10,11,12</th>
<th>Question 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response (knowledge about EE)</td>
<td>Response (beliefs towards own knowledge)</td>
<td>Response (beliefs towards teachers' knowledge)</td>
<td>Response (content knowledge)</td>
<td>Response</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 2</th>
<th>Question 3</th>
<th>Question 4</th>
<th>Question 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td>Response</td>
<td>Response</td>
<td>Response</td>
</tr>
</tbody>
</table>

**Response**

*(beliefs about EE priority, methods and limitations)*

*(beliefs about environmental crisis & environment)*

---

*philosophy statements – technocentrism, accommodation, communalism & Gaia*
Analytical Model 2

Question 2: Is environmental education a priority in your teaching (please circle ONE response)?

Input
Question 2: Is environmental education a priority in your teaching (please circle ONE response)?

Output – Relationships with, significance of & to ...

Knowledge

Beliefs

(beliefs about EE purposes, methods and limitations)

(beliefs about environmental crisis & environment)
Analytical Model 3

Question 3: Please indicate how you teach environmental education (tick ALL APPROPRIATE responses).

Input:
- Question 3: Please indicate how you teach environmental education (tick ALL APPROPRIATE responses).

Demographics:
- Gender
- Age
- Year Level
- Qualifications
- Training in Environmental Education

Output – Relationships with, significance of & to ...

Knowledge

Beliefs

Question 1 Response
Question 2 Response
Question 4 Response
Question 8 Response

Question 9 Response (beliefs about environmental crisis & environment)

Question 5 Response (beliefs about EE priority, purposes and limitations)
Question 6 Response (beliefs towards own knowledge)
Question 7 Response (beliefs towards teachers' knowledge)
Question 10, 11, 12 Response (content knowledge)
Question 4: Please *individually rate* each of the following factors *(from 1-5, with 1 being *limiting* and 5 being *not limiting*) which *prevent* or *limit* the implementation of environmental education in your classroom:

**Input** -

**Output** – Relationships with, significance of & to ...

**Knowledge**

**Beliefs**

(beliefs about EE purposes, priority, methods)

(beliefs about environmental crisis & environment)
Analytical Model 5

Question 5: Do you know of the environmental education approaches, ‘education about the environment’, ‘education in the environment’ and ‘education for the environment’ (please circle ONE response)?

Input:

Question 5: Do you know of the environmental education approaches, ‘education about the environment’, ‘education in the environment’ and ‘education for the environment’ (please circle ONE response)?

Output – Relationships with, significance of & to ...
Analytical Model 6

Question 6: Please rate your knowledge about environmental education concepts, theories and teaching approaches (please circle ONE response)?
Analytical Model 7

**Question 7:** How do you feel about the following statement: ‘Teachers need advanced knowledge of environmental education concepts, theories and teaching approaches at the primary school level’ (please circle ONE response)?

**Input**

**Output** – Relationships with, significance of & to ...

- **Knowledge**
- **Beliefs**

(beliefs about EE purposes, priority, methods & limitations)  
(beliefs about environmental crisis & environment)
Analytical Model 8

Question 8: As a teacher, do you believe that the environment is in a state of crisis? Please tick the most appropriate response:

Input -
Question 8: As a teacher, do you believe that the environment is in a state of crisis? Please tick the most appropriate response:

Output – Relationships with, significance of & to …

Knowledge

Beliefs

Question 5
Response (knowledge about EE approaches)

Question 6
Response (beliefs about own knowledge)

Question 7
Response (beliefs about teachers' knowledge)

Question 10, 11, 12
Response (content knowledge)

Question 1
Response

Question 2
Response

Question 3
Response

Question 4
Response

Question 9
Response (philosophy statements – technocentric, accommodation, communalism & Gaia)

(beliefs about EE purposes, priority, methods & limitations)

(beliefs about environmental crisis)
Question 9: Please *individually rate* each of the following statements *from 1 – 5*, with *one* being *strongly disagree* and five being *strongly agree*.
Analytical Model 10 (Knowledge Content)

**Question 10:** Which of the following phrases refers to the potential ability of a system to support population growth without harming the environment *(please circle ONE response)*?

**Question 11:** Which of the following would be most likely to cause groundwater pollution *(please circle ONE response)*?

**Question 12:** Which of the following do scientists not consider to be a significant contributor to the greenhouse effect *(please circle ONE response)*?

**Input -**

Question 10: Which of the following phrases refers to the potential ability of a system to support population growth without harming the environment *(please circle ONE response)*?

Question 11: Which of the following would be most likely to cause groundwater pollution *(please circle ONE response)*?

Question 12: Which of the following do scientists not consider to be a significant contributor to the greenhouse effect *(please circle ONE response)*?

**Output -** Relationships with, significance of & to ...

**Knowledge**

Question 5: Response *(knowledge about EE approaches)*

Question 6: Response *(beliefs towards EE approaches)*

Question 7: Response *(beliefs towards teachers knowledge)*

**Beliefs**

Question 1: Response *(beliefs about EE purposes, priority, methods & limitations)*

Question 2: Response

Question 3: Response

Question 4: Response

Question 8: Response

Question 9: Response *(beliefs about environmental crisis & environment)*

Question 10: Response *(beliefs about environmental crisis & environment)*
Stage Two factor analysis (four factors)
Factor Analysis

Factor - Beliefs (Environment) 8 & 9 (a & b)

| Question Eight: As a teacher, do you believe that the environment is in a state of crisis? | Initial | Extraction | 1.000 | .542 |
| Question Nine: The environment is a resource to be used by human beings (rate 1-5) | Initial | Extraction | 1.000 | .478 |
| Question Nine: Economic growth should and must continue, even if it results in damage to the environment (rate 1-5) | Initial | Extraction | 1.000 | .536 |
| Question Nine: The environment should be protected, even if it results in a reduction in economic growth (rate 1-5) | Initial | Extraction | 1.000 | .768 |
| Question Nine: The environment should be preserved and protected, no matter what the cost (rate 1-5) | Initial | Extraction | 1.000 | .566 |

Extraction Method: Principal Component Analysis.

Total Variance Explained

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Extraction Sums of Squared Loadings</th>
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</thead>
<tbody>
<tr>
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<td>% of Variance</td>
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<td>5</td>
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<td>7.947</td>
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</tbody>
</table>

Extraction Method: Principal Component Analysis.

Component Matrix

| Question Eight: As a teacher, do you believe that the environment is in a state of crisis? | Component 1 | Component 2 |
| Question Nine: The environment is a resource to be used by human beings (rate 1-5) | -.314       | .666       |
| Question Nine: Economic growth should and must continue, even if it results in damage to the environment (rate 1-5) | -.199       | .662       |
| Question Nine: The environment should be protected, even if it results in a reduction in economic growth (rate 1-5) | -.647       | -.346      |
| Question Nine: The environment should be preserved and protected, no matter what the cost (rate 1-5) | .852       | .206       |

Extraction Method: Principal Component Analysis.

a. 2 components extracted.
Factor Analysis

Factor: Knowledge (EE) 5, 6 & 7

<table>
<thead>
<tr>
<th>Question</th>
<th>Initial</th>
<th>Extraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question Five: Do you know of the environmental education approaches, 'education about, in &amp; for the environment'?</td>
<td>1.000</td>
<td>.738</td>
</tr>
<tr>
<td>Question Six: Please rate your knowledge about environmental education concepts, theories and teaching approaches.</td>
<td>1.000</td>
<td>.714</td>
</tr>
<tr>
<td>Question Seven: How do you feel about the following statement: 'Teachers need advanced knowledge of environmental education concepts, theories and teaching approaches at the primary school level'?</td>
<td>1.000</td>
<td>3.739E-02</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.

### Total Variance Explained

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Extraction Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
<td>Total % of Variance</td>
<td>Cumulative %</td>
</tr>
<tr>
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<td>1.489</td>
<td>49.644</td>
</tr>
<tr>
<td>2</td>
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<td>33.084</td>
</tr>
<tr>
<td>3</td>
<td>.516</td>
<td>17.273</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.

### Component Matrix

<table>
<thead>
<tr>
<th>Component</th>
<th>Question Five: Do you know of the environmental education approaches, 'education about, in &amp; for the environment'?</th>
<th>Question Six: Please rate your knowledge about environmental education concepts, theories and teaching approaches.</th>
<th>Question Seven: How do you feel about the following statement: 'Teachers need advanced knowledge of environmental education concepts, theories and teaching approaches at the primary school level'?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.859</td>
<td>.845</td>
<td>.193</td>
</tr>
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</table>

Extraction Method: Principal Component Analysis.

a. 1 components extracted.
**Factor Analysis**

Factor - Knowledge (Environment) 10, 11 & 12

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<thead>
<tr>
<th>Communalities</th>
<th>Initial</th>
<th>Extraction</th>
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</thead>
<tbody>
<tr>
<td>Question Ten: Which of the following phrases refers to the potential ability of a system to support population growth without harming the environment?</td>
<td>1.000</td>
<td>.417</td>
</tr>
<tr>
<td>Question Eleven: Which of the following would be most likely to cause groundwater pollution?</td>
<td>1.000</td>
<td>.327</td>
</tr>
<tr>
<td>Question Twelve: Which of the following do scientists not consider to be a significant contributor to the greenhouse effect?</td>
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<td>.388</td>
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Extraction Method: Principal Component Analysis.

<table>
<thead>
<tr>
<th>Total Variance Explained</th>
<th>Initial Eigenvalues</th>
<th>Extraction Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Total</td>
<td>% of Variance</td>
</tr>
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Extraction Method: Principal Component Analysis.

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<th>Component 1</th>
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</thead>
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<tr>
<td>Question Ten: Which of the following phrases refers to the potential ability of a system to support population growth without harming the environment?</td>
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</tr>
<tr>
<td>Question Eleven: Which of the following would be most likely to cause groundwater pollution?</td>
<td>.572</td>
</tr>
<tr>
<td>Question Twelve: Which of the following do scientists not consider to be a significant contributor to the greenhouse effect?</td>
<td>.623</td>
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Extraction Method: Principal Component Analysis.

a. 1 components extracted.
Factor Analysis

Beliefs (Practice - Limitations) Q4fac (1)

Communalities

<table>
<thead>
<tr>
<th>Question Four: Constant and on-going changes in curriculum and schools (1-5)</th>
<th>Initial</th>
<th>Extraction</th>
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<tbody>
<tr>
<td>Question Four: Time Constraints (1-5)</td>
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<td>.624</td>
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<tr>
<td>Question Four: Other professional demands (1-5)</td>
<td>1.000</td>
<td>.427</td>
</tr>
<tr>
<td>Question Four: Resource constraints (1-5)</td>
<td>1.000</td>
<td>.814</td>
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<tr>
<td>Question Four: Over-crowded curriculum (1-5)</td>
<td>1.000</td>
<td>.715</td>
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<tr>
<td>Question Four: Lack of knowledge of environmental education (1-5)</td>
<td>1.000</td>
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<td>Question Four: Not considered a priority as a teacher (personally) (1-5)</td>
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<tr>
<td>Question Four: Not considered a priority by school / department (1-5)</td>
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Extraction Method: Principal Component Analysis.

Total Variance Explained

<table>
<thead>
<tr>
<th>Component</th>
<th>Total</th>
<th>% of Variance</th>
<th>Cumulative %</th>
<th>Extraction Sums of Squared Loadings</th>
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</thead>
<tbody>
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<td></td>
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<td>34.159</td>
<td>34.159</td>
<td>2.733</td>
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<td>1.234</td>
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<td>.559</td>
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<td>7</td>
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Extraction Method: Principal Component Analysis.

Component Matrix

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<th>2</th>
<th>3</th>
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<tr>
<td>Question Four: Constant and on-going changes in curriculum and schools (1-5)</td>
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Extraction Method: Principal Component Analysis.

a. 3 components extracted.
Stage Two path analysis
Title

 amyI: Thursday, 23 January 2003  02:02 PM

Our model contains the following variables

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<tr>
<th>Variable</th>
<th>Type</th>
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<tbody>
<tr>
<td>u2</td>
<td>observed</td>
</tr>
<tr>
<td>cdfac</td>
<td>endogenous</td>
</tr>
<tr>
<td>beliefs2a</td>
<td>observed</td>
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<td>knowl</td>
<td>endogenous</td>
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<td>insrr_e</td>
<td>observed</td>
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<td>agegroup</td>
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</tr>
<tr>
<td>gender</td>
<td>observed</td>
</tr>
<tr>
<td>z1</td>
<td>unobserved</td>
</tr>
<tr>
<td>z2</td>
<td>exogenous</td>
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<tr>
<td>z3</td>
<td>unobserved</td>
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<tr>
<td>z4</td>
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<tr>
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Number of variables in your model: 14
Number of observed variables: 7
Number of unobserved variables: 7
Number of endogenous variables: 7
The model is recursive.

Sample size: 349

Model: Default model

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Sample size: 349

Model: Default model

The model is recursive.
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**Summary of models**

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<th>CMIN</th>
<th>DF</th>
<th>F</th>
<th>CMIN/DF</th>
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<th>DELTA2</th>
<th>RHO2</th>
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<th>RFI</th>
<th>FPI</th>
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</tr>
<tr>
<td>Independence model</td>
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<table>
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<th>Model</th>
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<th>HI 90</th>
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</thead>
<tbody>
<tr>
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<th>HI 90</th>
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Execution time summary:

- Minimization: 0.110
- Miscellaneous: 1.260
- Bootstrap: 0.000
- Total: 1.370
APPENDIX TWENTY-FOUR

Publications (refereed and/or peer reviewed) generated from PhD work
Ecological Literacy: the ‘missing paradigm’ in environmental education (part one)

AMY CUTTER-MACKENZIE Charles Sturt University, Bathurst, Australia
RICHARD SMITH Central Queensland University, Rockhampton, Australia

SUMMARY Environmental educators often maintain that primary school education should endeavour to improve and protect the environment through producing an 'environmentally informed, committed and active citizenry', yet existing research shows that the implementation of environmental education in primary schools is problematic and has had limited success. The reasons for these shortcomings are far from clear, with present research merely speculating about barriers to effective implementation.

To this extent, there is a dearth of empirical research about primary school teachers' knowledge of environmental education and the degree to which teachers' knowledge inhibits environmental education practice. As such, this article investigates Australian primary school teachers' knowledge about environmental education, and in so doing utilises a combined-methods approach and the theoretical concept of 'ecological literacy' (eco-literacy) to assess primary school teachers' knowledge (and beliefs) about environmental education.

Based upon the findings of this study, we contend that Australian (specifically Queensland) primary school teachers are likely to be functioning at a 'knowledge' level of ecological illiteracy and/or nominal ecological literacy. Furthermore, such primary school teachers tend to dismiss the importance of knowledge, preferring to focus upon attitudes and values in the teaching of environmental education. As shown in existing research, these trends can be placed in wider theoretical debates to do with knowledge and education generally. In any case, such levels of ecological literacy are inadequate if ecologically literate students and thus an ecologically literate citizenry are to be achieved within schools.

Environmental Education in Primary Schools

'The world's teachers ...' are said to 'have a crucial role to play' in bringing about the extensive social changes needed to address an environmental crisis [1] (World Commission On the Environment Development, 1987, p. xiv), yet little is
known about the extent to which environmental education has been incorporated into primary schools [2]. In Australia, in particular, there have been few empirical investigations of primary school teachers’ knowledge, beliefs and practices of environmental education. Despite the varying levels of support for environmental education, the evaluation studies that have been carried out indicate that policy expectations are rarely met (see Cutter, 1998; Cutter & Smith, 2001a, b; Cutter-Mackenzie, 2003a; Cutter-Mackenzie, 2002; Greenall, 1981; Linke, 1980; Murdoch, 1989; Phipps, 1991; Spork, 1990, 1992; Walker, 1995a, b).

In 1973 and 1974 Linke (1980) conducted a national study in Australia, utilising both quantitative and qualitative methodologies, concerning the implementation of environmental education at all levels of education (primary, secondary and tertiary). Linke’s (1980) study indicated that the environmental education practice was limited in Australia and most often taught through curriculum domains such as science and social studies. The implications for environmental education of this shift to other discipline areas are yet to be fully explored.

Stapp and Stapp (1983) conducted a ‘national’ qualitative study which listed over 100 issues and recommendations for the improvement of environmental education in Queensland. However, this study was limited in that neither primary nor secondary school teachers’ knowledge, beliefs and/or practices of environmental education were thoroughly investigated. Other than the Linke 1973/4 (1980) and Stapp and Stapp (1983) studies, only small-scale regional (see Clark & Harrison, 1997; Cutter, 1998; Phipps, 1991; Skamp, 1996; Spork, 1990, 1992; Walker, 1995b) and state (see Cutter & Smith, 2001a, b; Cutter-Mackenzie, 2003a; Education Department of Victoria, 1981; Greenall, 1981; Robottom et al., 2000) investigations have been carried out.

All of these studies (Cutter, 1998; Cutter & Smith, 2001a, b; Cutter-Mackenzie, 2003a; Education Department of Victoria, 1981; Greenall, 1981; Phipps, 1991; Robottom et al., 2000; Spork, 1990, 1992; Walker, 1995a, b), save Skamp (1996) and Clark and Harrison (1997), claim that the implementation of environmental education in primary schools does not achieve the outcomes communicated in policy documents. In contrast, Skamp’s (1996) and Clark and Harrison’s (1997) New South Wales regional studies suggest that teachers are practising environmental education action components. Clark and Harrison (1997, p. 34) hypothesise that ‘many Australian primary schools are addressing environmental education, although they might not call it that’. However, what they might ‘call it’ is far from self-evident.

Nonetheless, Spork (1990, 1992) claims that primary school teachers consider environmental education to be an important learning area, but seem to lack the skills and knowledge to successfully teach environmental education. Similar statements have also been echoed in the works of Cutter-Mackenzie (2003a) and Cutter and Smith (2001a, b), Murdoch (1989), and Phipps (1991). Robottom et al. (2000, p. 146) also found in a case study of five schools that, in some cases, ‘environmental education curriculum has moved out of the school and into the community’. In short, Robottom et al. (2000, p. 157) concluded that ‘behind every successful environmental education program is a committed teacher’.

Further, no Australian studies to date, other than the recent works of Cutter-Mackenzie (2003a) and Cutter and Smith (2001a, b), have actually investigated
primary school teachers' 'content' knowledge of environmental concepts and issues. Cutter-Mackenzie (2003a) and Cutter and Smith (2001a, b) identified that primary school teachers tend to maintain low levels of content knowledge of environmental concepts and do not consider content knowledge to be overly important. Studies undertaken outside of Australia (see Todt, 1995; Wisconsin Center for Environmental Education, 1997) have also made similar conclusions. In particular, Todt (1995) identified in a study of South-Central Ohio teachers that teachers maintain low levels of environmental knowledge, in addition to many misconceptions about the environment. This issue of 'content knowledge' is taken up further in the theoretical framework of this article.

In these ways, there are theoretical and empirical 'gaps' in environmental education research that require further investigation. Before outlining the methodological approach, we now turn to the theoretical framework of this article. We briefly begin with a discussion about the concept of knowledge.

**Theoretical Framework**

**Knowledge**

Falonsky (1993, p. 7) maintains that the profession of teaching assumes 'that good teachers possess a special knowledge base—'a codified or codifiable aggregation of knowledge, skill, understanding, and technology, of ethics and disposition, of collective responsibility'—as well as a means for representing and communicating it'. Shulman's (1987) earlier work brings focus to this view. Shulman (1987, p. 8) identifies seven categories of teacher knowledge. These include: content knowledge; general pedagogical knowledge; curriculum knowledge; pedagogical content knowledge; knowledge of the learners and their characteristics; knowledge of educational contexts; and knowledge of educational ends, purposes, and values and their philosophical and historical grounds.

Shulman (1987, p. 8) maintains that 'pedagogical content knowledge' lies at the heart of teaching because it represents the ways in which teachers 'blend academic content with teaching methods, organize instruction, and unite all these elements with the interests and abilities of the students in their class'. Grossman (1995, p. 21) claims that 'teachers' knowledge of the content affects both what teachers teach and how they teach it'. In this way, 'teachers are likely to emphasize those areas in which they are more knowledgeable and to avoid or de-emphasize the areas in which they have relatively less content knowledge' (cited in Grossman, 1995, p. 21). To this extent, it could be contended, based upon the arguments presented in the previous section, that primary school teachers may avoid or de-emphasise environmental education if they have relatively less content knowledge about environmental education. Such propositions can be situated in the wider debates surrounding teacher knowledge preparation.

For example, Good (1990), Reynolds (1989) and McMeniman et al. (2000) claim that teacher education is now able to equip pre-service and in-service teachers with 'state-of-the-art' instructional knowledge. It must be noted that such authors fail to mention what is 'state-of-the-art' instructional knowledge and how this is utilised to equip student teachers and practising teachers. Our point relates to a previous argument of Shulman's (1986a) which states 'major ele-
ments of teacher knowledge have not yet been uncovered or sufficiently defined’ (cited in Palonsky, 1993, p. 8).

Furthermore, Holbrook et al. (2000) maintain that educational research has had little impact upon Australian teachers and their teaching practices. Holbrook et al. (2000, p. 6) discovered that ‘university research in schools was largely indirect, unstructured and often mediated through individuals’. Thus, it appears that the state-of-the-art instructional knowledge Good (1990), Reynolds (1989) and McMeniman et al. (2000) referred to is yet to be fully defined and developed so as to ‘impact Australian teachers and their teaching practices’.

It is this form of instructional knowledge which Shulman (1986b) refers to as ‘pedagogical content knowledge’. Almost two decades ago Shulman (1986b, p. 6) argued that teachers’ pedagogical content knowledge is the ‘missing paradigm’ in the discussions surrounding the issue of knowledge. Grossman et al. (1989) outline four types of pedagogical content knowledge, namely content knowledge, substantive knowledge, syntactic knowledge, and beliefs about the subject matter.

This pedagogical content knowledge framework is grounded in the academic rationalist tradition, which assumes that the teacher is an expert of the discipline/s and is able to disseminate this knowledge to students in a capturing and exciting manner. Whelan (1992) argues that Shulman’s academic rationalist model of pedagogical content knowledge is rarely implemented nor achieved in classrooms. Whelan (1992, p. 83) further explains: ‘it is acknowledged ... even among its supporters (Shulman, 1987) ... that there is inadequate support for the claim that this model is achieved often’.

Furthermore, Wilson (1998) maintains that ‘knowledge’ as a focus in education has been more or less abandoned for over 30 years now. In Wilson’s (1998, p. 3) view, knowledge lost its salience for teachers and education systems during the 1960s and 70s. More specifically, Wilson (1998, p. 3) argues that the education profession ‘came to believe that education was no longer about filling up people’s minds with a lot of stuff’. Wilson (1998) further asserts that the latter model, of ‘filling up people’s minds with a lot of stuff’, is now considered to be a ‘bad’ model of education. Wilson’s (1998, p. 3) key argument is that this dramatic shift in thinking was entirely about knowledge:

That was what filled the bucket wielded by teachers. That was what the author had, and has to be disposed of. That was what God was the source of. And it would have been what professors possessed if they has been in their offices... Knowledge.

He claims that ‘... while we weren’t watching, knowledge became a bad thing. It was erased from educational offer, or at least reduced substantially in importance’ (Wilson, 1998, p. 3). In this way, the knowledge which Wilson (1998) is explicitly referring to is content knowledge. Wilson’s (1998, p. 5) explanation of this shift is that educators who anticipated the postmodern age were antagonistic to knowledge and reason, especially empirical knowledge and scientific rationality. Such educators sought self-realisation in personal experience, creativity and imagination as a means for understanding the world, as a reaction to the perception that teaching in the 1960s was too fact oriented and susceptible to rapid changes in knowledge.
Ecological Literacy

The Queensland School Reform Longitudinal Study further supports Wilson’s (1998) contentions, with recent findings revealing that ‘teachers themselves actually rate basic skills as the highest of their priorities, and intellectual engagement and demand as the lowest’ (Education Queensland, 2001, p. 15). Furthermore, Education Queensland (2001, p. 9) reported that teachers ‘viewed behaviour management as a policy issue that required improvement prior to any considerations of classroom practices’. Bernstein’s (1996) analysis of the acquisition-competence model covers the same ground such that the internal workings of the learner rather than measurable learning outcomes dominate teaching and teacher education.

Notwithstanding, so as to situate such arguments in environmental education and specifically in the realm of primary school teachers’ knowledge about environmental education, we now discuss the theoretical concept of ‘ecological literacy’. This concept is utilised for the interpretation, analysis and synthesis of data that appear later in this article.

Ecological Literacy as Pedagogical Content Knowledge

In this section, we set out a model for gauging primary school teachers’ knowledge about environmental education, including environmental concepts and issues. We begin with the concept of knowledge and propose that to teach environmental education, teachers require a relevant stock of knowledge. To do this, we draw on Orr’s (1992) concept of ‘ecological literacy’.

Ecological literacy is an appropriate concept for use in this article for three reasons. First, it emphasises the content knowledge referred to earlier as teachers’ pedagogical content knowledge. Second, ecological literacy evokes those ideas and approaches that environmentalists consider fundamental in environmental education. Third, the concept provides a yardstick or set of criteria against which we gauge teachers’ ecological literacy in the empirical work reported in this article.

In 1989 UNESCO-UNEP positioned environmental literacy (the predecessor to ecological literacy) as the most fundamental goal of environmental education. In syllabus and curriculum terminology, this means that environmental (ecological) literacy has content, skills and processes that learners ought to know and be able to do to demonstrate ‘literacy’. Roth coined the term, environmental literacy, in 1968. Some years later, Harvey (1976, p. 67) defined an environmentally literate person as ‘one who possesses basic skills, understandings, and feelings for the man-environment [sic] relationship’. Buethe and Smallwood (1987) defined it as one’s understanding of environmental facts. As these definitions are fairly limited, environmental literacy was later redefined by a series of authors (see Hurry, 1982; Roth, 1992; UNESCO-UNEP, 1989).

Roth (1992, cited in Todt, 1995, p. 17) categorised individuals’ environmental literacy into four levels, namely nominal environmental literacy, functional environmental literacy, structural/operational environmental literacy and multi-dimensional environmental literacy. Although Roth’s (1992) categorisations are useful, Clacherty (1993, p. 114) alleges that such categorisations are inadequate for what is required to address the ‘dominant technocentric worldview which most of us, unwittingly, support’ [3]. For that reason, the term ‘environmental
literacy' has been reconceptualised to include a transformatory reconstruction of industrial (Western) culture.

It is this reconceptualisation which has seen the phrase 'environmental literacy' transform to become Orr's (1992) refined term 'ecological literacy'. Orr (1992) does not identify any differences between the phrases environmental literacy and ecological literacy and uses them interchangeably. Quammen (1994) notes this ambiguity in Orr's work. For the purposes of this article, we utilise Orr's term 'ecological literacy'.

According to Orr (1992), ecological literacy primarily constitutes 'knowing, caring and practical competence'. Orr (1992, p. 92) further implies that ecological literacy encompasses an understanding of 'how people and societies relate to each other and to natural systems, and how they might do so sustainably'. In other words, knowing how the world works, and therein knowing how to preserve and maintain the environment. To this end, Orr (1992) argues that the ecologically literate person understands the dynamics of the environmental crisis, which includes a thorough understanding of how people (and societies) have become so destructive.

Orr (1990, 1992, 1994) argues that education is the most powerful mechanism to address the world's environmental challenges. He propounds that no student should graduate from any educational facility without knowing 17 key subject areas; in other words pedagogical content knowledge. Orr (1992, p. 109) refers to this complex knowledge base as a 'syllabus for ecological literacy'. Echoing Allan Bloom's approach, he nominates over one hundred articles and books as essential readings for all students and teachers. Orr (1992) draws works from distinguished philosophers such as Ehrlich, Bacon, Kahn, Berry, Merchant, Emerson, Lovelock, Eiseley, Leopold and Thoreau.

It is this knowledge that Orr (1992) claims will enable educators, teachers and citizens to ask 'what then?' Sturdavant (1993, p. 209) postulates that asking 'what then' requires:

Interrogating the interconnected layers of practices, trends, and assumptions upon which we construct our present life style will render those interconnections and their ramifications more explicit, thereby making their sustainability available to assessment.

Orr (1992) and Sturdavant (1993) both argue that asking 'what then' will enable key stakeholders, such as educators, to construct a very different agenda for educational reform. In order to begin the process of reform in education and environmental education, identifying primary school teachers' ecological literacy levels is a necessary step. Table 1 identifies various indicators which can be utilised to gauge teachers' ecological literacy levels about the environment and environmental education. Of course, each level is not mutually exclusive and teachers may be located within and between levels. As indicated earlier, pedagogical content knowledge and beliefs are inextricably related. As such, I coin the concept eco-literacy in order to appropriately encapsulate (measure) both ecological literacy (complex knowledge) and environmental (eco) philosophy (belief) indicators.

Table 1 is based upon the works of O'Riordan (1981), Fien (1992), Roth (1992) and Orr (1990, 1992, 1994). Ecological literacy is ideally about developing a rich knowledge base and multifaceted beliefs and/or philosophies about the environ-
<table>
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ment. The object of Orr’s (1992) theory of ecological literacy is not to develop one particular view of the environment, but rather a complex understanding of the various philosophies which lead to ecological sustainability. As such, we now turn to a brief discussion of the methods, techniques and modes of inquiry utilised to investigate (measure) primary school teachers’ eco-literacy.

Methods, Techniques and Modes of Inquiry

A combined-methods approach was applied to investigate primary school teachers’ eco-literacy. The methodology consisted of two stages, which included a series of ethnographic interviews [4] followed by the use of a quantitative mail survey.

An ethnographic approach was adopted in this study as the ethnographer ultimately seeks to document the ‘knowledge and belief systems’ of a given group. In this case, the authors, as the ethnographers, sought to document the knowledge and beliefs systems of primary school teachers toward environmental education. According to Bernstein (1996, p. 137), in the classic ethnographic position ‘the researcher has first to learn the language of the group or society and know the rules of its contextual use’. Moreover, Bernstein (1996, p. 138) explains:

> From here on, the researcher is developing reading rules (of recognition and realization) to grasp how members construct their various texts or manage their contexts. The researcher here is modelling the members’ recognition and realization rules, or the strategies of practice those rules constrain. The problem is to construct the tacit model. If the researcher fails to construct the model s/he is marooned in the specific contexts and their enactments, is in no position to appreciate the potential of the meaning of that particular culture, and thus its possible enactments. Without a model, the researcher only knows what his/her informants have enacted.

As such, the previous section (Theoretical Framework) presents a tacit model which allowed the authors to ‘grasp how members [teachers] construct their contexts [environmental education]’. Further, this model also enabled the authors to develop the analytical codes (reading rules) for interpreting data. To this end, the application of ethnography, in conjunction with the theoretical model, provided a means for understanding what teachers know and believe about environmental education. In order to determine the extent and distribution of the informants’ meaning and understanding of environmental education among the wider population of primary school teachers, the application of a state-wide quantitative survey was administered so as to confirm and elucidate the theoretical model and the views discovered using ethnography. We now briefly describe the methodological strategies utilised in stage one and stage two.

**Stage One**

In total 26 primary school teachers were interviewed. Eighty-five percent of the participants were female and 15% were male. The most current Education Queensland data reveals that 78% of primary school teaching staff are female
participated in the survey. The pilot survey acts to pretest the survey instrument and procedures for the study, in addition to testing data collection and analysis schools agreed to participate in the pilot survey. The stage one informants also agreed to participate in the pilot survey. The purpose of this article, only the pilot data will be discussed.

To assist with the development of the survey, a pilot study was trialled. Five primary regions were sampled using convenience sampling methods. For the purpose of this article, only the pilot data will be discussed.

So as to elucidate the findings discovered in the stage one phase of data collection, a state-wide survey was administered in Queensland primary schools. To assist with the development of the survey, a pilot study was trialled. For the purpose of this article, only the pilot data will be discussed.

Intensive ethnographic interviewing techniques were utilised in this study. Lofland (1971, p. 76) describes intensive interviewing as ‘a guided conversation whose goal is to elicit from the interviewee (usually referred to as the informant) rich, detailed materials that can be used in qualitative analysis’. According to Lofland (1995) intensive interviewing serves as a tool to discover the perceptions and experiences the informant has had of a particular situation or topic. Whilst the chosen interview technique can be labelled intensive, it was also ethnographic in nature. In Potter’s (1996, p. 96) view, the ethnographic interview ‘is not as balanced as most conversations are’, rather the ‘ethnographer informs the interviewee of the purpose of the interview and then takes control by asking questions and probing the person’s responses’.

In accordance with Potter’s (1996) advice and so that the informants’ perspectives and experiences or, as Marshall and Rossman (1995) describe, ‘rich narrative descriptions’ (1995, p. 82), were elicited and fully understood, one-to-one interviewing was applied. Potter (1996, p. 97) recommends that the ethnographer ‘must cross-examine the subject so the researcher is sure he or she understands the subject’s meaning’. One-to-one interviewing allows for such cross-examination and profundity [5].

We utilised the computer software program NVIVO® (QSR, 2000) to store, categorise, code and analyse all stage one data. As Richards (2000, p. 59) notes, ‘qualitative researchers usually create categories in two different ways “up” from the data, as meanings of the data are noted and stored, and “down” from prior ideas, project designs and theories’. We utilised both methods to categorise (code) the data. Such categories were refined into themes, and then into stories, which in turn formulate the substance of the qualitative data analysis presented in this article.

Stage Two

So as to elucidate the findings discovered in the stage one phase of data collection, a state-wide survey was administered in Queensland primary schools. To assist with the development of the survey, a pilot study was trialled. For the purpose of this article, only the pilot data will be discussed [6].

For the pilot survey, primary school teachers from various Queensland regions were sampled using convenience sampling methods. Five primary schools agreed to participate in the pilot survey. The stage one informants also participated in the survey. The pilot survey acts to pretest the survey instrument and procedures for the study, in addition to testing data collection and analysis.
techniques (using SPSS® software) and identifying variance in the targeted sample population to do with age, gender, experience and training backgrounds.

Ninety primary school teachers were sampled in the pilot survey. Seventy-eight completed questionnaires were received, which equals an 86% response rate. Seventy-eight percent of the sample were female and the remaining 22% were male. The age range of participants was from 22 years of age through to 61 years of age. The average age of participants was 41 years of age. Once again, such gender and age break-ups were consistent with current Education Queensland demographic data (Cheong, 2002).

The pilot questionnaire was personally administered at the five participating school staff meetings, which ensured a high response rate. The stage one informants were mailed and e-mailed a questionnaire. The pilot questionnaire format and structure replicated the mail survey questionnaire. So as to increase the success of the survey, all elements of Dillman’s (1978) total design method for mail surveys were utilised in the pilot study.

The quantitative data was analysed using the statistical software package for the social sciences (SPSS® Version 11.5). As this study was exploratory, each item was analysed individually utilising univariate and bivariate analysis techniques. In doing so, a predictive analytical model was developed to measure the relationships between and significance of data.

Data Presentation

The data are presented in three sections, namely ‘Teachers’ Training in Environmental Education’, ‘Teachers’ Knowledge about (and Practices of) Environmental Education Pedagogy’ and ‘Teachers’ Beliefs (and Knowledge) about the Environment and Environmental Education Content’.

Section One: teachers’ training in environmental education

In order to gauge the participants’ knowledge and beliefs (eco-literacy) about environmental education, it was considered necessary to determine the level of formal environmental education training undertaken by the participants in the sample.

Of the pilot survey sample, 78.1% indicated that they had never undertaken in-service training in environmental education, whereas 21.9% indicated that they had undertaken in-service training. This represents 18.0% of the female sample and 31.8% of the male sample having undertaken in-service environmental education training. Thus, significantly more male participants had participated in in-service environmental education training than their female counterparts.

The majority of teachers (in stage one) indicated that they had not undertaken any in-service training in environmental education because such in-serving was not offered, as outlined by one participant:

The opportunities are not there. When you do professional development, that’s not what we are in-servicing on. We’re in-servicing on other sorts of things. (11) [7]
Several teachers (in stage one) indicated that they would undertake in-service training in environmental education if it were available, although one participant who is a committed teacher of environmental education and who has undertaken ongoing in-service training in environmental education, saw it differently:

I think it is more personal. We give them every opportunity at our place [school]. If they want to go to a workshop, everything is paid for. No commitment to follow up or report. It couldn’t be easier. Like the upcoming workshop organised, there is only one person who has expressed an interest. (2)

Of the sample, 84.5% also indicated that they had never undertaken pre-service training in environmental education, whereas only 15.5% indicated that they had undertaken pre-service training. This represents 16.7% of the female sample and 13.7% of the male sample having undertaken pre-service environmental education training. More specifically, participants aged 21 to 30 had undertaken the most amount of pre-service training (54.5%), followed by participants aged 31 to 40 (18.2%). In contrast, participants aged 41 to 50 (43.3%) and 51 + (31.7%) had undertaken the least amount of pre-service training. Such variances in training between participants of different age groups were statistically significant at 0.000 (Pearson chi-square). These trends were also apparent in stage one.

Section Two: teachers’ knowledge about (and practices of) environmental education pedagogy

The authors sought to determine the stock of ‘environmental education’ knowledge among the participants. In this regard, the following comments are typical perceptions of environmental education offered by the participants in stage one:

In my classroom it means educating the children about the environment and their impact upon the environment. (4)

It is making sure that the people we are teaching understand what has to happen to keep where we live the way it should be and to improve it from what has been done to derogate it or to keep the status quo. (20)

Such comments display simple understandings of environmental education according to Table 1. Even so, another participant displayed a more complex understanding of environmental education through conveying a ‘futures perspective’ as can be seen in the following comment:

That the future generations that we teach understand that the environment, local and global, has to be conserved so that it is there for future generations. (12)

Notwithstanding, the majority of the participants expressed their own lack of knowledge of environmental education. Approximately half of the stage one participants responded with comments such as ‘I don’t know a lot about it [environmental education]’. More specifically, when asked ‘do you feel you know a lot about environmental education?’, one participant said:
No I don't. I think I know a little bit about it and I have an interest in it, so I can maybe start an interest in the children, and perhaps that will lead me to finding more information. I don’t have a good awareness. (4)

As Figure 1 illustrates, the pilot survey results further confirm such findings, with 42.3% of the total sample rating their knowledge of environmental education concepts, theories and teaching approaches as 'low' to 'very low', and 46.5% rating their knowledge as 'average'.

As illustrated in Table 2, female participants rated their knowledge lower (46.9%) than their male counterparts (31.8%). Male participants also tended to rate their knowledge as more 'average' (54.5%), 'high' (9.1%) and 'very high' (4.5%) than their female counterparts (42.9%, 8.2% and 2.0% respectively).

Furthermore, most participants (in stage one) were not familiar with the Queensland P-12 Environmental Education Curriculum Guide (Queensland Department of Education, 1993), as typified in the following comment:

Nope. Never read the document. So we're all just stumbling along doing what we can. (20)

Only several participants (2, 12, 16) in stage one were familiar with the terminology of 'education about the environment, education in the environment and education for the environment'. As Figure 2 demonstrates, 50.0% of the pilot survey sample had never heard of the approaches 'education about the environment, education in the environment and education for the environment'. Of the sample, 22.2% had heard of these approaches, but had never actually practiced them.

Nonetheless, only 11.5% of the total pilot survey sample considered 'lack of knowledge' as a significant barrier impeding environmental education practice.
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<thead>
<tr>
<th>Gender</th>
<th>Expected Count</th>
<th>Very high</th>
<th>High</th>
<th>Average</th>
<th>Low</th>
<th>Very low</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td></td>
<td>0.6</td>
<td>1.9</td>
<td>10.2</td>
<td>7.4</td>
<td>1.9</td>
<td>22.0</td>
</tr>
<tr>
<td></td>
<td>% within Gender</td>
<td>4.5%</td>
<td>9.1%</td>
<td>54.5%</td>
<td>18.2%</td>
<td>13.6%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within 'Please rate your knowledge about environmental education concepts, theories and teaching approaches'</td>
<td>50.0%</td>
<td>33.3%</td>
<td>36.4%</td>
<td>16.7%</td>
<td>50.0%</td>
<td>31.0%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>1.4%</td>
<td>2.8%</td>
<td>16.9%</td>
<td>5.6%</td>
<td>4.2%</td>
<td>31.0%</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td>1.4</td>
<td>4.1</td>
<td>22.8</td>
<td>16.6</td>
<td>4.1</td>
<td>49.0</td>
</tr>
<tr>
<td></td>
<td>% within Gender</td>
<td>2.0%</td>
<td>8.2%</td>
<td>42.9%</td>
<td>40.8%</td>
<td>6.1%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within 'Please rate your knowledge about environmental education concepts, theories and teaching approaches'</td>
<td>50.0%</td>
<td>66.7%</td>
<td>63.6%</td>
<td>83.3%</td>
<td>50.0%</td>
<td>69.0%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>1.4%</td>
<td>5.6%</td>
<td>29.6%</td>
<td>28.2%</td>
<td>4.2%</td>
<td>69.0%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
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<td>6.0</td>
<td>33.0</td>
<td>24.0</td>
<td>6.0</td>
<td>71.0</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>2.8%</td>
<td>8.5%</td>
<td>46.5%</td>
<td>33.8%</td>
<td>8.5%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Environmental Education Approaches

Fig. 2. Participants' knowledge and implementation of environmental education approaches (education about, in & for the environment).

One participant (2), who was identified earlier as a committed teacher of environmental education, saw lack of knowledge on the part of primary school teachers as a significant barrier impeding the implementation of environmental education:

First and foremost there is not enough knowledge ... Understanding of concepts such as sustainability. They wouldn't have the background we would like them to have ... I don't see the issues being addressed. (2)

When asked about personal background the above-mentioned participant (2) indicated a former occupation as a wildlife carer. The participant also noted that environmental education requires 'a personal interest':

My parents had a concern for wildlife and I have been brought up in an environment where we cared for it. (2)

Most participants (in stage one) displayed some level of interest, although clearly admitted that it was not a priority in their classrooms, as indicated in the following comments:

I don't think it is a priority anymore because there is so much else you are dealing with. You have kids that have emotional and social problems. Kids that have shocking upbringings ... I know from my point of view, just covering literacy and numeracy every single day is a struggle. (11)

I wouldn't say I treat it as a priority. It is just one of those things that if it can be done, it might be. (22)
TABLE 3. Environmental education teaching methods

<table>
<thead>
<tr>
<th>Teaching approaches in environmental education</th>
<th>Taught EE using this approach (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidental (when it comes up)</td>
<td>69.2%</td>
</tr>
<tr>
<td>Integrated throughout curriculum</td>
<td>65.4%</td>
</tr>
<tr>
<td>Included with social studies</td>
<td>64.1%</td>
</tr>
<tr>
<td>Included with science</td>
<td>62.8%</td>
</tr>
<tr>
<td>Other</td>
<td>9.0%</td>
</tr>
<tr>
<td>Stand-alone subject (taught separately)</td>
<td>5.1%</td>
</tr>
<tr>
<td>Focus of entire curriculum</td>
<td>2.6%</td>
</tr>
<tr>
<td>Do not teach environmental education</td>
<td>1.3%</td>
</tr>
</tbody>
</table>

It is not my priority. I am more inclined to make sure the children have the basics under their belt. (20)

The pilot survey results confirmed such findings, with the majority of teachers (39.2%) stating that they 'occasionally (from time to time)' make it a priority in their teaching. According to the majority of the stage one participants, reasons as to why environmental education is not a 'specific' priority in schooling is because, as one informant explains:

It is not pushed as a priority. Literacy and numeracy are pushes ... But teachers will also go down the road that principals push and very few are focused on the environment because they are just as overworked. If a principal has a passion the whole school follows it. So it is not just the teachers. (12)

The participants (in stage one) also proclaimed that 'personal choice' dictates what is taught, as two participants clearly state:

I can do that [environmental education] if I wanted to. That's if I wanted to personally. No one is making me do anything. They leave it very open for us to interpret so it depends on how keen I am to teach it. (1)

I don't see too much of anything being pushed at me to teach. I see things put in front of me and say this is what you have to teach but really you go away and you teach what you teach. There's still not a lot of checks and balances. (20)

In this regard, the participants expressed varying levels of environmental education practice, with some teachers saying 'no I don't teach it' (1, 18, 13, 20), others saying 'no I haven't this year at all' (11, 7, 17), many saying 'I build it [environmental education] into other units ... it's incidental' (3, 4, 5, 6, 8, 10, 12, 14, 15, 16, 19) and only one saying 'a lot' (2).

As Table 3 illustrates, the pilot survey results confirm such findings with the majority of teachers in the sample indicating that they teach environmental education incidentally (69.2%), integrated throughout the curriculum (65.4%), and included with social studies (64.1%) and science (62.8%).
Most teachers (in stage one) indicated that they had witnessed effective environmental education during their professional experience by some individual teachers, as typified in the following comment:

Those few who are interested in it keep doing it, and the rest of us just go with the flow. Until something happens that impacts us directly, we just keep going the way we are. (4)

Robottom et al. (2000, p. 157) have also raised this issue and concluded that 'behind every successful environmental education program is a committed teacher'. Such findings indicate that individual commitment to environmental education is a vital component with respect to the implementation of environmental education.

With this in mind, the pilot survey revealed that the sample ranked 'time constraints' (32.8%) as the 'number one' constraint impeding the implementation of environmental education. The sample then ranked 'over-crowded curriculum' (31.1%), 'constant change' (14.8%), 'lack of knowledge' (11.5%), 'resource constraints' (4.9%), 'ongoing professional demands' (3.3%) and 'not prioritised by school/department' (1.6%) as the major barriers preventing or limiting the implementation of environmental education. The stage one teachers also identified such concerns, although these teachers were particularly concerned with the issues of 'constant change' and 'ongoing professional demands' as one participant explains:

Teachers are not reading and discovering and discussing professionally. There are too many changes and demands. I can't think of a week where something hasn't impinged dramatically on me trying to teach. We lose days and days. Our knowledge and skill base is dropping, but it is not necessarily our fault. (12)

These pressures and their effect in Queensland were also reported by Andrews (1997). To this extent, many teachers (in stage one) indicated that 'there is no motivation and no reward' to implement environmental education. Indeed, environmental education appears to be caught in a larger set of historical circumstances exemplified by the comment that there is a lack of 'self-motivation' and 'professionalism' in teaching itself. This same participant explained that the only way in which environmental education could be improved is through teacher education and recognised professional status:

Nobody should get out of teacher training unless they are bloody good. No flick and tick stuff. It is whether they can teach. In environmental education, we need a foundation to start building on. A mentor in the school. There needs to be some level of professionalism. (12)

While we are sympathetic with this view, it collapses teachers' content knowledge into teachers' pedagogical knowledge in a way that prioritises teaching processes over what is taught. As such, it is clear that the majority of the participants (in stage one and stage two) have low levels of understanding in environmental education according to the criteria illustrated in Table 1. At the same time, these primary school teachers generally expressed concern for the environment and varying levels of interest in the environment. So that these issues can be properly understood, we now present data about teachers' beliefs...
(and knowledge) in relation to the environment and environmental education content.

Section Three: teachers’ beliefs (and knowledge) about the environment & environmental education content

In order to gauge the stage one and stage two participants' environmental (eco) philosophies, all participants were presented with four different statements which were representative of the four different philosophies (cornucopian, accommodation, eco-socialist and Gaia) (see Table 1). Participants were then asked to indicate which statement they agreed with most. As such, the majority of the stage one and stage two participants agreed most with the eco-socialist perspective. More specifically, 61.1% of the pilot survey sample agreed most with this perspective ('the environment should be protected, even if it results in a reduction in economic growth'). 66.6% of the female sample and 50.0% of the male sample agreed most with this statement.

Interestingly, 20.8% of the sample agreed most with the Gaia perspective ('the environment should be preserved and protected, no matter what the cost'). Twenty percent of the female sample and 22.7% of the male sample agreed most with this statement.

15.3% of the sample agreed most with the cornucopian technocentric perspective ('the environment is a resource to be used by human beings'). Significantly, 12.0% of the female sample and 22.7% of the male sample agreed most with this statement.

Furthermore, as shown in Table 4, the pilot survey data revealed that 56.0% of the sample indicated that the environment is 'probably' in a state of crisis. 34.7% of the participants indicated that the environment is 'definitely' in a state of crisis. 38.5% of the 31 to 40 age group and 40.9% of the 51 + age group (both female and male participants) indicated that the environment is 'definitely' in a state of crisis. In contrast, only 23.1% of participants aged 21 to 30 indicated that the environment is 'definitely' in a state of crisis. 76.9% of this age group (21 to 30) indicated that the environment is 'probably' in a state of crisis. Furthermore, 15.4% of the 31 to 40 age group were 'unsure' if the environment is in a state of crisis, and 13.6% of the 51 + age group indicated that environment is 'not' in a state of crisis. As such, such variances between age groups were statistically significant at 0.05 (Pearson chi-square).

Notwithstanding, many of the participants (in stage one) revealed a concern for the environment, although it was clearly stated that such concerns do not amount to a belief that there is a 'crisis' (at this time), as one participant indicates:

I don’t know about a crisis. I try to be optimistic. But I am personally fearful what we have done to the environment. But I don’t know about crisis, as there is a lot of awareness out there. (4)

The majority of the participants (in stage one) said that they did not know much about the idea of an environmental crisis, as typified in the following two comments:

I don’t have enough in depth knowledge. I don’t know enough to give an opinion. (16)
### TABLE 4. Participants’ perceptions of the environmental crisis (age groups)

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>Measurements</th>
<th>Definitely</th>
<th>Probably</th>
<th>Not</th>
<th>Unsure</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-30</td>
<td>Expected Count</td>
<td>4.5</td>
<td>7.3</td>
<td>0.5</td>
<td>0.5</td>
<td>0.2</td>
<td>13.0</td>
</tr>
<tr>
<td></td>
<td>% within Age Groups</td>
<td>23.1%</td>
<td>76.9%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within ‘As a teacher, do you believe that the environment is in a state of crisis?’</td>
<td>11.5%</td>
<td>23.8%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>17.3%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>4.0%</td>
<td>13.3%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>17.3%</td>
</tr>
<tr>
<td>31-40</td>
<td>Expected Count</td>
<td>4.5</td>
<td>7.3</td>
<td>0.5</td>
<td>0.5</td>
<td>0.2</td>
<td>13.0</td>
</tr>
<tr>
<td></td>
<td>% within Age Groups</td>
<td>38.5%</td>
<td>38.5%</td>
<td>0.0%</td>
<td>15.4%</td>
<td>7.7%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within ‘As a teacher, do you believe that the environment is in a state of crisis?’</td>
<td>19.2%</td>
<td>11.9%</td>
<td>0.0%</td>
<td>66.7%</td>
<td>100.0%</td>
<td>17.3%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>6.7%</td>
<td>6.7%</td>
<td>0.0%</td>
<td>2.7%</td>
<td>1.3%</td>
<td>17.3%</td>
</tr>
<tr>
<td>41-50</td>
<td>Expected Count</td>
<td>9.4</td>
<td>15.1</td>
<td>1.1</td>
<td>1.1</td>
<td>0.4</td>
<td>27.0</td>
</tr>
<tr>
<td></td>
<td>% within Age Groups</td>
<td>33.3%</td>
<td>63.0%</td>
<td>0.0%</td>
<td>3.7%</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within ‘As a teacher, do you believe that the environment is in a state of crisis?’</td>
<td>34.6%</td>
<td>40.5%</td>
<td>0.0%</td>
<td>33.3%</td>
<td>0.0%</td>
<td>36.0%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>12.0%</td>
<td>22.7%</td>
<td>0.0%</td>
<td>1.3%</td>
<td>0.0%</td>
<td>36.0%</td>
</tr>
<tr>
<td>51+</td>
<td>Expected Count</td>
<td>7.6</td>
<td>12.3</td>
<td>0.9</td>
<td>0.9</td>
<td>0.3</td>
<td>22.0</td>
</tr>
<tr>
<td></td>
<td>% within Age Groups</td>
<td>40.9%</td>
<td>45.5%</td>
<td>13.6%</td>
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<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within ‘As a teacher, do you believe that the environment is in a state of crisis?’</td>
<td>34.6%</td>
<td>23.8%</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>29.3%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>12.0%</td>
<td>13.3%</td>
<td>4.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>29.3%</td>
</tr>
<tr>
<td>Total</td>
<td>Expected Count</td>
<td>26.0</td>
<td>42.0</td>
<td>3.0</td>
<td>3.0</td>
<td>1.0</td>
<td>75.0</td>
</tr>
<tr>
<td></td>
<td>% within Age Groups</td>
<td>34.7%</td>
<td>56.0%</td>
<td>4.0%</td>
<td>4.0%</td>
<td>1.3%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>34.7%</td>
<td>56.0%</td>
<td>4.0%</td>
<td>4.0%</td>
<td>1.3%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
I wouldn't have a clue to be totally honest. I wouldn't know how bad it is. I don’t know how serious the logging situation has become. I don’t know about the destruction of the Amazon rainforest. I know it happens and I know where it is, but I don’t know the impact it’s having. (11)

To gauge the stage one participants’ knowledge in more depth, we asked the participants if any particular environmental issue/s concerned them. In response, all participants identified at least one environmental issue. The majority of these participants identified the greenhouse effect, ozone layer depletion, pollution and biodiversity as issues that concerned them.

The authors sought to understand the participants’ comprehension of such environmental issues/concepts. Most of the participants openly admitted that they could not explain the various issues/concepts in any detail. Some teachers attempted to define a concept/issue and in doing so often revealed a low level of understanding, as typified in the following comment about the greenhouse effect:

The greenhouse effect is to do with the ozone layer around the earth and gases emitted by various industries and cars. It rises into the ozone layer and concentrates over the poles. I read up on the greenhouse effect when I taught it and it was slightly different to this, but it has made holes over the artic and Antarctic and the suns rays penetrate through the holes in the ozone and the heat comes under the ozone layer and is not able to escape because of the gases. (15)

Clearly this particular participant confused elements of ozone depletion with the greenhouse effect. In fact, we queried the participant about possible confusion between the two terms:

I probably do [confuse them] and in the past I may have mixed them up but as I go on I am learning. The information is always changing. (15)

Two participants (2, 16) revealed a better understanding of the greenhouse effect, as typified in the following comment:

The greenhouse effect is where a number of gases are given off from industry, and the environment itself. And [the gases] are caught in the earth’s atmosphere and they can’t escape and this causes a build-up of heat in the atmosphere. (16)

Once again, as mentioned earlier, 88.8% of the pilot survey sample rated their knowledge about environmental education (including environmental concepts) as ‘average’ to ‘very low’ [8].

The authors sought to determine the various teachers’ views about content knowledge and its significance in environmental education. The majority of teachers felt that content knowledge was not overly important, as displayed in the following comments:

I don’t think the content knowledge is vital. It would be really difficult to fill their heads with all this information and figures. You need hands on stuff rather than filling their heads with all the information. (11)

No, I don’t think so. But again it’s attitude. Whereas some teachers will only teach about the things that they know about. The priority is
learning and that includes me ... I want to learn with the kids, so I don't need to know in advance ... I don't plan to have any sort of environmental issues and knowledge and content pushed with young children. (26)

Content is not important ... I don't think it is the be all and end all. (8)

Not a huge content, I think they need to make sure they are not misinformed. I can walk my children along the beach and pick up things and use descriptive words to describe the shapes of things, without having to tell them ... I am not into names of shells or trees and names of habitats, but I would rather say, this is interesting and I wonder why the shell is this shape? (5)

There is an implicit assumption here that 'knowledge' means transmission, the 'empty-vessel' notion of 'teaching'. This is perhaps a reflection of the teacher education theories learned by these participants during pre-service teacher education (Wilson, 1998). Accordingly, it is not surprising that many participants (in stage one) indicated that 'knowledge would come much later and was not needed at the primary school level'. Many participants (in stage one) indicated that knowledge is more about 'knowing how to access information' (16).

Furthermore, the majority of participants revealed that 'a positive attitude' towards the environment is 'definitely' the most important characteristic to develop, as one informant explains:

Definitely attitude. If the world is going to be made better it will be made better by good people not clever; the attitude that the world is important. (18)

Such a view suggests that these primary school teachers were primarily concerned with feelings and attitudes. As shown in Figure 3, the majority of the pilot survey sample considered that the essential aim of environmental education should be to develop either 'attitudes and values' (46.1%) or 'action' (25.0%). Only 21.1% of the sample considered that environmental education should essentially aim to develop knowledge, and only 2.6% of the sample consider that environmental education should (essentially) aim to develop 'attitudes/values, action and knowledge'.

The stage one informants also felt that teachers did not need to have a significant content knowledge base, as one informant describes:

I don't think as a teacher you need a huge content base, as such. Possibly a little bit more than what our teachers are graduating with. There are opportunities for teachers to catch up on that content-base knowledge as time goes on. (5)

Further, stage two participants were asked 'do you feel that teachers need advanced knowledge of environmental education concepts, theories and teaching approaches?' As illustrated in Figure 4, 45.3% of teachers felt that such knowledge was 'needed' and 37.3% of teachers felt that such knowledge was 'not needed'. A further 17.3% stated that they were 'unsure'. Thus, the latter findings indicate that there is a clear divide between this sample of teachers as to the apparent 'value' of knowledge in primary school education.
Aim of Environmental Education

This apparent abandonment of knowledge among a significant proportion of these participants is also consistent with the findings of The Queensland School Reform Longitudinal Study, which maintains that 'teachers themselves actually rate basic skills as the highest of their priorities, and intellectual engagement and demand as the lowest' (Education Queensland, 2001, p. 15).

We now discuss and synthesise such data in the context of the literature review and theoretical framework presented earlier.

Data Synthesis

Based upon the data presented, we contend that the majority of current primary school teachers are likely to be functioning at a 'knowledge' level of ecological illiteracy and/or nominal ecological literacy according to Table 1. We further contend that the majority of current primary school teachers maintain various environmental (eco) philosophies, particularly cornucopian (technocentric) and eco-socialist (ecocentric) philosophies. Such contentions are evident through six key findings:

One, both stage one and stage two participants indicated that they had received no or very little in-service and/or pre-service training in environmental education. Spork (1990, 1992) also reported in her study that primary school teachers receive little professional preparation to teach environmental education.
In comparison to Spork's (1990, 1992) study, the findings of this study indicate that teachers are receiving (slightly) more professional preparation in environmental education. The benefits of such training are yet to be fully explored.

Notwithstanding, the stage two results of this study revealed significant differences between female and male participants' levels of in-service and pre-service training in environmental education. More specifically, significantly more male participants had participated in in-service environmental education training than their female counterparts. Further, participants aged 21 to 30 and 31 to 40 had undertaken the most amount of pre-service training, and participants aged 41 to 50 and 51+ had undertaken the least amount of pre-service training. Such variances were statistically significant.

Two, the stage one and stage two participants displayed limited and simple understandings of environmental education. The majority of the participants openly expressed their lack of knowledge about environmental education. However, once again, there were significant differences between female and male participants, with female participants rating their knowledge as significantly lower than their male counterparts, which may be linked to differences in in-service and pre-service training. Further, the majority of participants in stage one and stage two were not familiar with (nor implemented) the environmental education approaches 'education about the environment, education in the environment and education for the environment'. They were not aware either of environmental education curriculum or policy documents. Such findings confirm that environmental education as a curriculum area, including education for the environment, is failing in many Queensland primary schools.

Three, most stage one participants displayed some level of interest for environmental education, although such informants clearly admitted that it is not
a priority in schooling. Once again, the pilot survey results confirmed such findings, with the majority of teachers stating that they ‘occasionally’ make it a priority in their teaching. Thus, similar to the apparent declination of concerns for the environment in society generally (Organization for Economic Cooperation and Development, 2001), it appears that interest has declined in environmental education also when compared to previous stated interest levels (see Spork, 1990, 1992).

Four, the pilot survey revealed that the majority of teachers perceived time constraints, over-crowded curriculum, constant change and lack of knowledge of environmental education as the major barriers preventing or limiting the implementation of environmental education. The stage one participants also identified such concerns, although these teachers were particularly concerned with the issues of ‘constant change’ and ‘ongoing professional demands’. Such issues of constant change, ongoing professional demands and lack of knowledge of environmental education have not been specifically researched in the field of environmental education, although existing research (Andrews, 1997) identified these pressures in Queensland schools.

Five, many of the participants (in stage one) revealed a concern for the environment, although it was clearly stated that such concerns do not constitute a ‘crisis’ (at this time). Notwithstanding, the majority of the participants (in stage one) said that they did not know much about the idea of an environmental crisis. In contrast, the stage two participants were of the belief that the environment is ‘definitely’ or ‘probably’ in a state of crisis. Furthermore, both stage one and stage two participants maintained various environmental (eco) philosophies, with the majority of teachers displaying eco-socialist (ecocentric), Gaia (ecocentric) and cornucopian (technocentric) perspectives. Such beliefs about the environment may also be connected to teachers’ beliefs about the significance of ‘attitudes’ in the teaching and learning of environmental education.

Six, the (stage one) participants held many misconceptions and simple understandings of various environmental concepts. Most of the participants openly admitted that they could not explain the various concepts in any detail. Furthermore, a significant proportion of teachers felt that content knowledge was not overly important and that ‘a positive attitude’ towards the environment is ‘definitely’ the most important characteristic to develop. Once again, such trends were confirmed in the stage two data. Moreover, a significant proportion of both stage one and stage two participants indicated that primary school teachers do not require substantive content knowledge. Many participants were of the view that it is more important to know how to access information.

This final point indicates that the majority of participants in this study neither obtained sufficient content knowledge of environmental education nor were particularly concerned about that fact. Such findings can be placed in wider theoretical arguments, as discussed earlier, to do with knowledge and its apparent lack of focus in education over the past 30 years (Wilson, 1998). Wilson (1998, p. 3) states that ‘filling up people’s minds with a lot of stuff’ is considered to be a ‘bad’ model of education. He further states that content knowledge is ‘what fills the bucket wielded by teachers’ (Wilson, 1998, p. 3). Based upon the findings of this study, ‘the bucket is empty’ for many teachers in the case of environmental education.
Concluding Comments

It is apparent that the majority of the participants, in stage one and stage two, maintain low levels of ecological literacy in accordance with Table 1. Such findings are important because if these levels of ecological literacy are widespread, it is unlikely that the current Queensland education system will produce an ecologically literate citizenry. Such conclusions will be further confirmed by the stage two state-wide mail survey.

Furthermore, it was apparent that the participants of this study maintain various environmental (eco) philosophies. However, the majority of participants agreed ‘most’ with the eco-socialist (communalism) perspective. Such beliefs about the environment may also be connected to teachers’ beliefs about the significance of attitudes in the teaching and learning of environmental education. This issue is discussed further in Cutter-Mackenzie (2003a, b) and Cutter-Mackenzie and Walker (2003).

We conclude that the introduction of ecological literacy (eco-literacy) in educational policy may advance the goals of environmental education, although such initiatives are unlikely to significantly change the current status of environmental education unless there is a system-wide commitment to environmental education and knowledge production and dissemination on the part of governments, education departments, pre-service teacher education providers, primary schools and teachers themselves.

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Notes
[1] It must be noted that the existence of an environmental crisis is not universally accepted, with commentators such as Kahn et al. (1976), Manes (1990), Ray et al. (1992) and Lomborg (2001) contending that the predictions of catastrophe arising out of research identifying changes to various environmental indicators are ill-conceived and overly pessimistic.
[2] It is important to verify that there is no more known about the teaching of environmental education in primary schools than secondary or tertiary education. However, this article only focuses upon primary school-level environmental education.
[3] Environmental education approaches such as education for the environment have been criticised in a similar vein (see Jickling, 1992, 1994; Jickling & Spork, 1998).
[4] Participant observation is also a technique commonly applied in ethnographic research. Ethnographic interviewing was only used to collect data for stage one of this study because an interpretative approach was adopted for the research design. The central premise of interpretative research is understanding human experiences. According to Berry (1999), in-depth or intensive ethnographic interviewing as a stand-alone method is a legitimate means of understanding human experiences about any given subject or issue. Adding to this, participant observation was also not utilised in this study for reasons to do with teacher access and teacher confidence.
[5] An unstructured ethnographic interview guide was prepared for the interviews. As Potter (1996, p. 97) suggests, the ethnographic interview guide is structured in relation to its direct, indirect and open-ended questions, but unstructured in that each interview is 'responsive to the situation rather than standardized'. Thus, the interview guide could be described as 'a list of things to be sure to ask about when talking to the person being interviewed' (1995, p. 76). The content of the interview guide was derived from the issues raised in the literature, which in turn formulated the impetus for the research problem and questions. The theoretical framework also directed a significant proportion of the content of the interview guide.
[6] A dedicated paper about the state-wide survey data results is currently in progress (Part Two).
[7] All comments indicate a number (code), which allows the authors to check and identify data sources.
[8] In the actual mail survey questionnaire, participants are requested to answer three multiple-choice questions about environmental concepts. This was the only item not included in the pilot questionnaire due to restricted time constraints requested by the individual schools.
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MEETING COMMITMENTS FOR A SUSTAINABLE FUTURE:
ENVIRONMENTAL EDUCATION IN PRE-SERVICE TEACHER EDUCATION

Amy Cutter-MacKenzie and Daniella Tidbury

ABSTRACT

Education is key to the implementation of commitments made at the recent United Nations World Summit on Sustainable Development (WSSD) in Johannesburg. The Implementation Plan demands communication of the issues and engagement of people in action and informed decision-making for an improved environment. It positions education as a critical tool for social change and places high expectations upon education and more specifically upon formal environmental education. However, there are concerns that prospective and practising teachers are not up to the challenge.

This paper reports the results of two independent studies, namely a qualitative ethnographic study and a quantitative survey, which investigated final year primary education student teachers' pedagogical content knowledge of environmental education. Both studies revealed that student teachers possess limited knowledge of environmental education content and pedagogy. The student teachers tended to dismiss the importance of substantive knowledge, preferring to focus upon the formation of attitudes towards the environment. Thus, the
results of this study suggest that Australian primary schools will struggle to meet the outcomes agreed upon at the World Summit for Sustainable Development. These findings have significant implications for environmental education and, in particular, for the commitments made at Johannesburg. A lack of teacher education in environmental education may explain why primary schools are not meeting policy expectations in this area of learning. However, this study suggests that a renewed focus upon knowledge, specifically pedagogical content knowledge, is timely and necessary in environmental education if the field is to evolve.

EDUCATION: KEY TO A SUSTAINABLE FUTURE

As the recent United Nations World Summit on Sustainable Development reached its conclusion, nation states reaffirmed their commitment to protecting environments and improving the quality of life for people around the world (United Nations, 2002). Environmental and biodiversity conservation, changing unsustainable patterns of production and consumption and protecting and managing the natural resource base, poverty eradication and socio-economic development were key ingredients of the sustainable development plan agreed upon at Johannesburg (United Nations, 2002).

Education was identified as a cross-cutting theme within the Implementation Plan (United Nations, 2002) which commits governments to undertaking concrete actions and measures at all levels to make a transition towards a more sustainable future. Goldstein (2002) reiterates such views and maintains that without education this plan of action cannot be implemented. Communication of issues and engagement of people in action and informed decision-making for an improved environment are central to the Implementation Plan (United Nations, 2002).

The Implementation Plan provided that to achieve an improved environment and quality of life we need active and knowledgeable citizens as well as informed decision makers capable of making the right choices about complex and interrelated economic, social and environmental issues facing the world today (UNESCO, 2002, p. 7).

UNESCO (2002) is particularly critical of the lack of social learning taking place in schools and teacher education. The Implementation Plan calls for education that questions our current mental models and the assumptions which underpin them and for reflection upon cultural models of understanding, rather than a focus upon the development of attitudes for the environment (UNESCO, 2002, p.7). The Implementation Plan calls for 'deeper, more ambitious ways of thinking about education, one that retains a commitment to critical analysis while fostering creativity and innovation' (United Nations, 2002, p.8). This interpretation of education has been promoted by environmental educators such as Saul (2000) who calls for culturally critical perspectives and by Huckle (1983;1996;1997) who argues that only through asking socially critical questions can we progress towards a more sustainable future. UNESCO (2002, p.9) notes that 'society must be deeply concerned that much of current education falls far short of what is required'. In particular:

Few attempts are made to link the health of people to the health and sustainability of ecosystems: and students and community members are rarely asked to reflect upon the impacts of their activities, and those of their families and wider society on the functioning of ecosystems


This is despite the fact that the ambitious goals for education outlined by UNESCO (2002) in the abovementioned document mirror those contained in earlier environmental education documents which have informed practice over the past thirty years. It was the 1972 United Nations Conference on Human Environment which formally acknowledged the emerging field of environmental education and recommended it be promoted in all countries. The United Nations International Environmental Education Programme (IEEP 1975-1995) which resulted from this recommendation did much to inspire and promote environmental education policies designed to question thinking and assumptions and promote action for change. The 1977 Tbilisi Declaration gave momentum to these early commitments to environmental education, although translating these into classroom practice, as UNESCO (2002) recognises, has proved to be a considerable challenge.

ENVIRONMENTAL EDUCATION IN THE PRIMARY SCHOOL YEARS

There are over 60 million teachers in the world – and each one is a key agent for bringing about the change in lifestyles and systems that we need

Many authoritative international documents confirm the important role that teachers play in bringing about the social change needed to address environment and sustainable development concerns (Tilbury 1993; 1994; 2002). Teachers are seen as key multipliers who can help society learn from past actions, question current relationships with the environment and consider actions towards a sustainable future. However, there is little evidence to suggest that teachers, in particular primary school teachers, are taking on board the goals set out in the various UNESCO agreements such as those identified in Agenda 21 (UNESCO-UNEP 1992).

Accordingly, little is known about the extent to which environmental education has been incorporated into school systems, particularly in regards to primary schools. In Australia, there have been relatively few studies examine environmental education practice. Despite the rising levels of policy advocacy for environmental education, the evaluation studies that have been conducted indicate that policy expectations are rarely met (Cutter, 1998; 2001a, 2001b; Cutter-Mackenzie, 2003 forthcoming; Gough, 1997; Greenall, 1981; Murdoch, 1989; Phipps, 1991; Spork, 1990, 1992; Walker, 1995a, 1995b).

In 1973 and 1974 Linke (1980) conducted a combined qualitative and quantitative national study of environmental education practice in Australia. In short, Linke’s (1980) study revealed that the implementation of environmental education was scant in Australian primary schools, and that primary school teachers’ knowledge of environmental education was quite limited. Linke (1980) also discovered that environmental education was occasionally included with other discipline areas, namely science education and social studies (studies of society and environment).

Robottom et al. (2000) conducted a qualitative study, using a case study methodology, in five different Australian primary schools. Like Linke (1980), Robottom et al. (2000) also found that environmental education is most often incorporated into subjects such as ‘studies of society and environment’. Robottom et al. (2000) also reported that, in some cases, ‘environmental education curriculum has moved out of the school and into the community’ (Robottom, 2000, p. 146). Robottom et al. (2000, p. 157) concluded that ‘behind every successful environmental education program is a committed teacher’.

Stapp and Stapp (1983) conducted 530 interview sessions about environmental education with various people, including primary and secondary school teachers, students, educational organisations, ministers of education and the environment, business and industrial representatives and the general public. This study outlined over one hundred items identifying the environmental education advancements, with regards to policy and curriculum, at the state and territory levels in Australia. Despite a rigorous methodological approach, this study was limited as issues to do with teachers’ practices, knowledge and attitudes about environmental education, for example, were not investigated.

Other than the abovementioned studies (see Linke, 1980; Robottom, 2000; Stapp, 1983), only small-scale regional (see Clark, 1997; Cutter, 1998; Phipps, 1991; Skamp, 1996; Spork, 1990, 1992; Walker, 1995a, 1995b) and state (see Cutter, 2001a, 2001b; Cutter-Mackenzie, 2003 forthcoming; Education Department of Victoria, 1981; Greenall, 1981) investigations have been carried out.

All of these studies, save Skamp (1996) and Clark and Harrison (1997), claim that the present status of environmental education practice is substandard. Contrary to wider belief, Skamp’s (1996) and Clark’s and Harrison’s (1997) New South Wales regional studies suggest that teachers are practising environmental education action components, namely education for the environment. Clark and Harrison (1997, p. 34), hypothesise that ‘many Australian primary schools are addressing environmental education, although they might not call it that’.

Notwithstanding, Spork (1990; 1992) claims that primary school teachers consider environmental education to be an important learning area, but seem to lack the skills and knowledge to effectively practise (teach) environmental education. Similar statements have also been echoed in the works of Cutter-Mackenzie and Smith (2001a; 2001b; 2003 forthcoming), Gough (1997), Greenall (1981), Murdoch (1989) and Phipps (1991).

According to Tilbury (1992; 1994), this problem has been largely associated with the lack of preparation which teachers receive in their teacher education. In the case of Queensland Australia, Spork (1990; 1992) found that only 4.9% of a sample of primary school teachers had undertaken preservice training in environmental education with 6.6% having received later in-service training. Cutter-Mackenzie and Smith (2001a; 2001b; 2003 forthcoming) further reiterated such trends in a state-wide (Queensland) study of primary school teachers.

To date, a dearth of research exists regarding student teachers’ interpretations of and knowledge about environmental education. Scott (1996)
notes that there is yet to be comprehensive research about how and why
teachers implement environmental education in the classroom, but
suggests that the awareness, motivation and disposition of the individual
teachers will determine the extent to which opportunities for teaching
environmental education will be taken up.

In accordance with Scott's (1996) research, this paper focuses upon
student teachers' knowledge, specifically pedagogical content knowledge,
about environmental education. We now discuss the latter concepts, before
turning to a discussion of the research methodology.

A Focus upon Pedagogical Content Knowledge

There is a well documented tension between traditional knowledge as
'knowing facts, being able to recall important ideas and concepts, having a
well-stocked memory' and knowledge as 'knowing how to do things, being
able to evaluate information, having access to learning skills and competencies' (Wilson, 1998). The former view did not prevail until the 1970s and 1980s
as education theorists turned to learning theory as the basis of communication
and pedagogy.

Palonsky (1993, pg.7) maintains that the profession of teaching assumes
'that good teachers possess a special knowledge base - a codified or codifiable
aggregation of knowledge, skill, understanding, and technology, of ethics and
disposition, of collective responsibility' - as well as a means for representing
and communicating it. Shulman's (1987) work has brought focus to this view.
Shulman (1987, pg.8) maintains that 'pedagogical content knowledge' lies at
the heart of teaching because it represents the ways in which teachers 'blend
academic content with teaching methods, organize instruction, and unite all
these elements with the interests and abilities of the students in their class'.
Shulman (1987) claims that 'teachers' knowledge of the content affects both
In this way, 'teachers are likely to emphasize those areas in which they are
more knowledgeable and to avoid or de-emphasize the areas in which they
have relatively less content knowledge' (cited in Grossman, 1995, pg.21). To
this extent, it could be contended, based upon the arguments presented in this
paper, that primary school teachers, including prospective student teachers,
may avoid or de-emphasise environmental education if they have relatively
less content knowledge about environmental education. Such propositions can
be situated in the wider debates surrounding teacher knowledge preparation.

Grossman, Wilson and Shulman (1989) outline four types of
'pedagogical content knowledge', namely content knowledge, substantive
knowledge, syntactic knowledge, and beliefs about the subject matter:
- content is the substance of the discipline, the facts, principles, concepts
  (Grossman, 1989, pg.27);
- substantive knowledge is associated with the structures of the discipline
  and the paradigms in which such structures are located so as to guide
  inquiry (Grossman, 1989, pg.29);
- syntactic knowledge is created in the discipline, about the canons of
evidence (Grossman, 1989, pg.29); and
- beliefs influence what teachers select to teach and in turn how such
point out that beliefs have not been thoroughly researched and are
less understood than the other identified areas of knowledge (cited in
Whelan, 1992, pg.82).

This 'pedagogical content knowledge' framework is grounded in the
academic rationalist tradition which assumes that the teacher is an expert of
the discipline/s and is able to effectively disseminate such knowledge to
students. However, Whelan (1992) argues that Shulman's academic rationalist
model of 'pedagogical content knowledge' is rarely implemented nor achieved
in classrooms. Whelan (1992, pg.83) further explains: 'it is acknowledged...
even among its supporters (Shulman, 1987)... that there is inadequate support
for the claim that this model is achieved often'.

According to Wilson (1998), 'knowledge' as a focus in education has
been more or less abandoned for over thirty years now. In Wilson's (1998, p. 3)
view, this emerged during the 1960's and 70's when '... while we weren't
watching, knowledge became a bad thing. It was erased from educational
offer, or at least reduced substantially in importance'. Wilson's (1998, p. 5)
explanation of this shift is that educators who anticipated the postmodern
age were antagonistic to knowledge and reason, especially empirical
knowledge and scientific rationality. Such teachers sought self-realisation in
personal experience, creativity and imagination as a means for understanding
the world, as a reaction to the perception that teaching in the 1960's was too
'fact' oriented and susceptible to rapid changes in knowledge content.

Thus, Bernstein's (1990) position is that an emphasis on the internal
workings of the learner rather than measurable learning outcomes have
dominated teaching and teacher education for at least thirty years. This is
also reflected in the acquisition-competence model that dominates thinking and practice in much contemporary pedagogy. Accordingly, the emphasis and importance of 'knowledge', both in primary schools and teacher education courses has declined. In the environmental education field, it is not surprising then that Cutter-Mackenzie and Smith (2001a; 2001b; 2003 forthcoming) point out that, in attempting to produce environmentally educated teachers and students, curriculum developers and teachers have promoted and implemented environmental values, in lieu of knowledge.Ormrod and Cole (1996, pg.37) have also reported that geography, a closely related subject area to environmental education, ‘is a discipline for which many teachers have little content knowledge or pedagogical content knowledge’. Thus, if the commitments made at Johannesburg are to be met, a renewed focus upon knowledge, specifically pedagogical content knowledge, is necessary.

INVESTIGATING ENVIRONMENTAL EDUCATION PRACTICE: SEEKING EVIDENCE

Two independent investigations were carried out for the purpose of this paper. The first investigation was a qualitative ethnographic study of twenty-three pre-service teacher education students. The second investigation consisted of a small-scale quantitative survey of twenty-one teacher education students.

Investigation one

The researchers investigated two pre-service teacher education courses in two different universities (U1 and U2). Drawing on the experience of Tilbury (1993), the study employed an ethnographic interviewing approach to capture the complexity and key variables within the pre-service teacher education context. Twenty-three informants (fourteen and nine fourth year students in U1 and U2 respectively), enrolled in two different pre-service environmental education courses were interviewed. Both cohorts received pre-service environmental education preparation. U1 students received their training by studying a specialised subject, whereas U2 students received their training through integrated social science subjects. This paper does not specifically compare the two courses, although the data suggest some differences between the U1 and U2 students’ understandings. Rather, the focus of this paper is about the common features of environmental education internalised by students in both samples.
environmental education within the primary school curriculum. The latter is typified in the following student teacher comments:

'Attitudes are more important than knowledge.'

'Without attitudes, knowledge seems useless.'

'I think it really starts with the children's attitudes towards the environment.'

'Depending on their attitudes, their skills and knowledge will build from there.'

'Teachers as a whole can give a child the emotion to go out and take action.'

The implicit message of such comments is that environmental education is treated as an exercise in inducing 'positive' attitudes towards a socially valued object. Moreover, university based teacher education reinforces 'attitude' by its emphasis on what Wilson (1998) refers to as 'the down-playing of knowledge'. Students are positioned by social experience and tertiary education to adopt a relativist view of knowledge (see Orr, 1992; Wilson, 1998). The students in question confirmed such propositions, as exemplified in the following comments: 'Knowledge will always be up-dated and out-dated.' 'Knowledge can be disproved many years later.' 'Knowledge is always changing.'

To this extent, the interviews reinforced the survey results which revealed that student teachers were primarily concerned with the development of values and attitudes in environmental education.

Environmental Education Principles

During the interviews, the researchers sought to engage the participants in discussions about environmental education principles, such as those documented in the environmental education literature. Students struggled to identify principles, and tended to affirm their lack of knowledge about environmental education. The survey further reinforced student teachers' lack of knowledge about the principles of environmental education and their awareness of their limitations in this area. Eighty percent of those sampled rated their knowledge about environmental education as 'low to average'. Ten percent of the sample rated their knowledge as 'very low'.

Environmental education is grounded in a field of knowledge including 'facts'. It has a specific vocabulary, a set of concepts and theories, and should motivate disciplined inquiry if it is to effectively develop an environmentally informed, committed and active citizenry (Gardner, 1999). Students seemed to lack not only the vocabulary, but also an understanding of the basic concepts about the environment as well as theories associated with learning in environmental education.

Environmental Concepts

The questionnaire (second investigation) included three multiple-choice questions about three different environmental concepts, namely carrying capacity, pollution and the greenhouse effect. As such, the sample revealed a low understanding of the latter concepts. For instance, the participants were asked 'Which of the following phrases refers to the potential ability of a system to support population growth without harming the environment?' As Figure 1. conveys, eighty-seven percent of the sample selected the incorrect answer, with only thirteen percent selecting the correct response (carrying capacity).

Dove's (1996) research of student teachers' understanding of environmental concepts further supports this finding. She (1996, p. 97) wrote that there appears to be 'widespread confusion' among student teachers insofar as understanding key environmental concepts. This type of finding was common in both investigations, suggesting that the level of concept awareness and consequential theoretical foundation is low in these samples of prospective teachers.
Notwithstanding, as shown in Figure 2, seventy percent (thirty percent and forty percent respectively) of student teachers indicated that the environment is in a state of crisis.

Figure 2 Belief in the Concept of an Environmental Crisis

The majority of student teachers in both investigations indicated that 'radical' action is warranted on a widespread scale to protect and preserve the environment. Clearly though, their ability to participate in such action is severely hampered by their apparent lack of knowledge in and about the area of environmental education.

Pedagogical Knowledge of Environmental Education

At least three quarters of the interviewed student teachers acknowledged that they lacked significant knowledge of environmental education and environmental concepts. They displayed general, simplistic views when asked to define and conceptualise environmental education in a pedagogical framework. Comments tended to lack substantive content and terminology associated with environmental education processes. As Figure 3 illustrates, the survey further confirmed such findings with seventy-four percent of the sample indicating that they 'had never heard of the (common) approaches education about the environment, education in the environment and education for the environment'.

Figure 3 Awareness of EE Approaches

Notwithstanding, both the interviewed students and surveyed participants were not particularly concerned about their own lack of knowledge. As shown in Figure 4, the majority of the surveyed participants disagreed that teachers need a thorough knowledge of environmental education concepts, approaches and theories in order to practise environmental education at the primary school level.

Figure 4 Teachers Need EE Knowledge – Likert Scale
Clearly the student teachers who participated in these independent investigations lack content, substantive and syntactic knowledge of environmental education. Their beliefs about the subject matter (environmental education) are also hindered by their lack of knowledge in and about the area. To these ends, more research is needed to identify the core pedagogical content knowledge components of environmental education and the extent to which these are known by student teachers and teachers, and are taught in schools. Indeed, it warrants as a priority area in environmental education and education generally.

CONCLUSION

If the situation captured by this small-scale study is correct, then prospective teachers do not have the pedagogical content knowledge to effectively teach environmental education in primary schools. This has significant implications for environmental education and for the commitments made at Johannesburg. Steps towards a better world require the use of education, including knowledge, as a tool for change. Evidence suggests that, novice teachers in Australia, will not have the necessary pedagogical content knowledge to reorient environmental education practice in primary schools towards approaches promoted at Johannesburg. Even so, if the commitments made at Johannesburg are to be met, a renewed focus upon knowledge, specifically pedagogical content knowledge, is timely and essential. Thus, this research suggests that teacher educators, key stakeholders and environmental educators have significant work to do if they are to produce graduates capable of pursuing environmental education for a sustainable future.

ENDNOTES

1. It must be noted that there is no more known about environmental education at the primary school level than there is at the secondary and tertiary levels. However, this paper specifically focuses upon primary level environmental education in the pre-service teacher education domain.

2. There is limited research about the inclusion of environmental education in other discipline areas such as Studies of Society and Environment (Social Studies). Thus, the implications of this shift in paradigm are yet to be fully explored.

3. Shulman (1987, pg.8) identifies seven categories of teacher knowledge. These are: content knowledge; general pedagogical knowledge; curriculum knowledge; knowledge of the learners and their characteristics; knowledge of educational contexts, knowledge of educational ends, purposes, and values and their philosophical and historical grounds; and pedagogical content knowledge which is ‘that special amalgam of content and pedagogy that is uniquely the province of teachers, their own special form of professional understanding’

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Gauging Primary School Teachers' Environmental Literacy: An Issue of 'Priority'

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Over the past thirty years, it has often been stated that primary school education should endeavour to improve and protect the environment through producing an 'environmentally informed, committed and active citizenry'. Even so, existing research shows that the implementation of environmental education in primary schools is problematic and has had limited success. However, the reasons for these shortcomings are far from clear, with present research merely speculating about barriers to effective implementation. This paper presents a detailed discussion and analysis of primary school teachers' knowledge and beliefs about environmental concepts and environmental education. In so doing, the paper identifies a perceived gap within the field of environmental education research and literature. This field has neglected studies of Australian primary school teachers' knowledge and beliefs about environmental education as a factor affecting the capacity of schooling to achieve environmental education goals. To these ends, we utilise the concept of 'environmental literacy' to assess primary school teachers' knowledge and beliefs about environmental education. Based upon preliminary data analysis, we tentatively claim that current Queensland primary school teachers are variably committed to and demonstrably lack content knowledge of environmental concepts and environmental education. More significantly, these primary school teachers tend to diminish the importance of content knowledge, preferring to focus upon attitudes towards environmental education and environmental concepts. Clearly these levels of environmental literacy are inadequate if environmentally literate students and thus an environmentally literate citizenry are to be achieved within schools. We conclude that the introduction of environmental literacy in educational policy would advance the goals of environmental education, namely the production of an informed, committed and active citizenry.

Environmental Education: Policy Directions
and Premises

In 1992 the Union of Concerned Scientists, representing more than sixteen hundred senior members of the scientific community, including 102 Nobel Prize recipients, warned that:

Human beings and the natural world are on a collision course. Human activities inflict harsh and often irreversible damage on the environment and on critical resources. If not checked, many of our current practices put at serious risk the future that we wish for human society and the plant and animal kingdoms, and may so alter the living world that it will be unable to sustain life in the manner that we know... We the undersigned, senior members of the world's scientific community, hereby warn humanity of what lies ahead. A great change in our stewardship of the earth and the life on it is required, if vast human misery is to be avoided and our global home on this planet is not to be irretrievably marred (Suzuki, 1993, p. 4)

These concerns reflect an abundance of research indicating that human activities contribute to severe and potentially irreversible changes to the biosphere. Among the environmental issues giving rise to these concerns are:
The debate, despite conflicting views about the existence of a crisis, 'public concern for the environment is at unprecedented levels throughout the world' (Fien, 1995, p. 1). In turn, it has been proposed that:

What is needed is a fundamental transformation of people's attitudes and practices—only a new world view and morality can change the basic relation of people to the earth. People's behavior is a matter of choice based upon values. The need for a world view of sustainability—new ethical orientations that people cooperate with one another and nature for the survival and well-being of all individuals and the biosphere—could not be greater (UNESCO-UNEP, 1990; Fien, 1993a, pp. 4-5).

Initially, the concept of 'sustainable development', also referred to as 'sustainability', was a catch-all idea for future development (UNESCO-UNEP, 1992). However, sustainable development is a fluid concept, encompassing a range of technological perspectives as well as a range of ecological perspectives. Technological perspectives of sustainable development promote the view that advances in technology and the operation of free market economic forces will be sufficient to remedy the environmental crisis. In contrast, ecological perspectives of sustainable development promote radical world-views towards more fundamental, transformative cultural changes (O'Riordan, 1981). O'Riordan (1981, p. 377) states that ecological perspectives promote a 'humane and humane approach of harmony with ecological processes and a sense of true solidarity with the earth'—which in turn requires 'a fundamental change of attitude away from a sense of technological hubris'. This theoretical divide has given rise to much conflict between and among academics, environmental groups, governments and educators with regards to determining the preferred sustainable development model for future development.

Notwithstanding the debates, coupled with the endorsement of sustainable development, at least since the United Nations Conference on the Human

Environment held in Stockholm in 1972, there has been strong support for the development of environmental education as one of the most critical elements of an all-out attack on the world's environmental crisis (UNESCO-UNEP, 1976, p. 2). This same support is reiterated in the recent discussion paper authored by Environmental Education Task Team (1993: p. 13) which asserts: 'It is widely agreed that education is the most effective means that society possesses for confronting the challenges of the future. Indeed, environmental education will shape the world for tomorrow.' The foundation of this support, particularly during the 1990s, primarily lay with the search for sustainable methods of development and living (World Commission On the Environment Development, 1990). In this regard, Agenda 21, a lengthy blueprint for global implementation of sustainable development, particularly emphasized the role of education as an agent of change for sustainable development:

- Education is critical for promoting sustainable development
- Improving the capacity of the people to address environment and development issues
- It is called for achieving environmental and ethical awareness, values and attitudes, skills and behaviour consistent with sustainable development and for effective public participation in decision-making (UNESCO-UNEP, 1992, p. 2).

Numerous environmental education definitions have been developed which reflect this definition in whole or in part. In fact, environmental education is also referred to as 'environmental education for sustainable development', 'education for a sustainable future' and 'education for sustainability'. However, due to the changing nature of environmental problems and solutions, environmental education conceptions change with each generation and, thus, too does its definition. Distinger (1983) claims that environment education definitions contain common ground and therefore differences in the definition of environmental education need not hinder the progress and implementation of environmental education. In contrast, Jickling (1994) claims that environmental education has a 'definitional problem'. More specifically, Jickling (1994, p. 115) argues that environmental education will continue "to swallow along rocky shores until this field allows an important place for conceptual analysis within its research community". Indeed, it is apparent that there is a divide in the field with respect to defining environmental education.

Whatever the debates, environmental education is viewed as a lifelong process encompassing all levels of education, both within and beyond the formal school system (see Abraham, 1990; Queensland Department of Education, 1993; UNESCO-UNEP, 1976, 1978, 1988, 1995, 1996). Thus, environmental education at primary, secondary and tertiary levels has an important role to play in the development of students who are capable of understanding and who are motivated to respond to the issues which give rise to an environmental crisis. Central to this argument, it is considered that the primary school years have a particular importance as:

- young learners develop most of their adult physiological capacity quite early in life, and therefore learning, especially of attitudes and values important to imaginative action in environmental problems, is vital and needs to be considered carefully early in these sequences of lifelong learning (Fien, 1994, p.41).
It is only when the overall intention is education for the environment that real environmental education is actually taking place (Board of Teacher Registration, 1993). In recent times, this contention has been the centre of much debate. Jickling and Sporke (1998), in a critique of education for the environment, argued that education for the environment indoctrinates students into one specific way of knowing and believing. Jickling and Sporke (1998, p.319) maintained the argument put forth in an earlier paper by Jickling (1991, pp.154-155) stating that students should participate as intelligent individuals in the constant re-examination and re-casting of society. They concluded that education for the environment is conceptually and linguistically flawed and that we may not need, or want, the structures that it imposes (Jickling, 1998, p.309). The works of Gough (1987) also echoed similar conclusions, as did Walter’s (1997, p.155) study which concluded that ‘if environmental education is to become important in school education a more adequate theory is required’. Thus, it has been suggested that the field of environmental education is characterised by vagueness, complexity and contradictions. Moreover, in the debates, there is little evidence of the take-up of ‘education for the environment’, nor any other forms of environmental education, in schools systems. We interpret such findings to mean that little is known about the effectiveness of dominant and subsidiary environmental education approaches in the teaching and learning of environmental education. It can be seen that a study of environmental education practice is timely and essential if the field is to evolve with respect to bringing clarity and direction to environmental education. Thus, this paper is a contribution to the endeavours outlined by such research and we now review the various debates.

Environmental Education in Primary Schools

The word’s teachers... are said to ‘have a crucial role to play’ in bringing about the extensive social changes needed to address an environmental crisis (World Commission On the Environment Development, 1987, p. xiv). Yet little is known about the extent to which environmental education has been incorporated into school systems. In Australia, in particular, there have been few studies examining environmental education teaching practice in primary school systems. Despite the rising levels of support for environmental education, the evaluation studies that have been conducted indicate that policy expectations are rarely met (see Linke, 1980; Murdock, 1989; Philips, 1991; Sporke, 1990, 1992; Walker, 1995). In 1973 and 1974 Linke (1980) conducted a national study in Australia, utilising both quantitative and qualitative methodologies, concerning the take-up of environmental education content and pedagogy in all levels (primary, secondary and tertiary) of education. Linke’s (1980) study indicated that environmental education teaching practice was limited in Australia and most often taught through curriculum domains such as science and social studies. The implications of this shift to other disciplines remains to be fully explored.

Like Linke (1980), Robertton et al. (2000) also found in a case study of five schools, that environmental education is most often incorporated into subjects such ‘Studies in Society and Environment’. They also reported that in some cases, ‘environmental education has moved out of the school and into the community’ (Robertton, 2000, p.146). In short, Robertton et al. (2000, p.157) concluded that ‘behind every successful environmental education program is a committed teacher’.

Like Linke (1980), Stapp and Stapp (1983) also conducted a qualitative study which listed over one hundred issues and recommendations for the improvement of environmental education in Australia. However, this study was limited in that neither primary or secondary school teachers’ knowledge, attitudes and/or practices of environmental education were thoroughly investigated.

Other than the Linke 1973/4 (1980), Robertton et al. (2000) and Stapp and Stapp (1983) studies, only small-scale regional (see Clark, 1997; Cutter, 1998; Philips, 1991; Stapp, 1996; Sporke, 1990, 1992; Walker, 1995) and state (see Education Department of Victoria, 1981; Greenall, 1981) investigations have been carried out. All of these studies (see Cutter, 1998; Education Department of Victoria, 1981; Greenall, 1981; Philips, 1991; Sporke, 1990, 1992; Walker, 1993), save Stapp (1996) and Clark and Harrison (1997), claim that environmental education practice, with regards to its take-up in primary schools, is inadequate in that it does not achieve the outcomes communicated in policy documents. In contrast, Stamp’s (1996) and Clark and Harrison’s (1997) study which listed over one hundred issues and recommendations for environmental education practice stresses that environmental education is crucial and that it needs to be an important learning area, but seems to lack the skills and knowledge to teach successful environmental education. Similarly, Stapp and Stapp (1996) and Clark and Harrison (1997) report that many Australian primary schools are addressing environmental education, although they might not call it that.

Nonetheless, Sporke (1990; 1992) claims that primary school teachers consider environmental education to be an important learning area, but seem to lack the skills and knowledge to teach successful environmental education. Similar statements have also been echoed in the works of Cutter (1998), Murdoch (1989), Philips (1991) and Walker (1995). To date, Sporke’s (1990) study remains to be the only Queensland study, since Linke’s (1980) national study, of primary school teachers’ take-up of environmental education content and pedagogy. Therefore, her study is particularly significant, and we now briefly recount the conclusions of Sporke’s (1990) investigation.

The ‘Queensland’ Case

Sporke (1990; 1992) randomly selected and surveyed 300 state primary school teachers from the Brisbane north region and achieved a 76 percent (228 teachers) response rate. The purpose of her study was to determine the level of environmental education practice particularly in relation to education about the environment, education in the environment and education for the environment. She found that the practice of education for the environment among the primary school teacher in question was relatively low even though the research and literature argues that education for the environment is central to environmental education. Similarly, it was noted, in relation to teachers’ beliefs about the different levels of importance of education in, about and for the environment, that the sampled teachers considered education in and about the environment to be of more importance than education for the environment. However, the sampled teachers conveyed positive attitudes towards environmental education as a whole. Consequently, this sample had received relatively little professional preparation to teach environmental education. Only 4.9% of these teachers received pre-service environmental education training and only 6.6% received such in-service training.

Among the reasons offered for low levels of environmental education practice were a perceived lack of (see training in environmental education and time and resource constraints for teachers (Sporke, 1990; 1992). As a consequence of this study and the other studies (see Fifin, 1996; Tibbury, 1992; UNESCO-UNEP, 1990) indicated earlier, environmental education research has tended to conclude that the problems associated with the implementation of environmental education are due to a perceived lack of adequate pre-service and in-service environmental education training. Thus, the provision of further or restructured teacher education has been identified as the priority of priorities for environmental education (see Ballantyne, 1995; Fifin, 1996; Tibbury, 1992; UNESCO-UNEP, 1990).

However, such propositions tend to be based on both a lack of empirical evidence and a theoretical presumption that the 'content' of environmental education is unproblematic. Sporke’s (1990, p.101) study has contributed a phenomenon through her recommendation that more research on curriculum education was warranted because teachers possess inadequate 'knowledge of how to do environmental education or what environmental education is'. Conversely, her study was not a dedicated study of teacher’s environmental education knowledge. Her questionnaire only questioned teachers about general concepts in the three different approaches, particularly education for the environment. Environmental education consists of many concepts and varied forms of pedagogy which Sporke (1990) did not include in her research design. Further, Sporke (1990) did not pay heed to the problematic nature of 'education for the environment', nor environmental education for that matter. Thus, it appears that her conclusions about primary school teachers and what they might or might not know about environmental education were indicative but require further and deeper investigation.

In this respect, Walker (1997, p.160) also recognised the problematic nature of education for the environment and environmental education and concluded that poor environmental education practice can be directly related to 'a difference, or 'gap' between theories held by policy makers, curriculum developers and educational researchers.
and the theories held by practitioners. Thus, we interpret
this research to mean that there are many inconsistencies
about what the various individuals and groups consider
environmental education to be. Therefore, a better
understanding of these inconsistencies appears to be
necessary so as to lead to a more inclusive and defined
definition of environmental education.

So that primary school teacher's knowledge and
beliefs about environmental concepts and environmental
education can begin to be understood, we now discuss the
theoretical concept of 'environmental literacy' so as to
establish a framework for the interpretation, analysis
and synthesis of data that appear later in this paper.

Environmental Literacy

According to Orr (1992, p.92), environmental literacy is the 'knowledge necessary to comprehend
relatedness, and an attitude of care or stewardship';
[An environmentally literate] person would also have
the practical competence required to act on the basis of
knowledge and feeling'. UNESCO-UNEP (1989)
suggests that 'environmental literacy is the ultimate
goal of environmental education.

Orr (1992) argues that environmental literacy is
primarily concerned with 'knowing, caring and
practical competence'. Orr (1992, p.93) further implies
that environmental literacy encompasses an understanding of
how people and societies relate to each other and to
natural systems, and how they might do so sustainably'. In other words, knowing how the world
works, and therein knowing how to preserve and
maintain the environment. To this end, Orr (1992)
argues that the environmentally literate person
understands the dynamics of the environmental crisis
which includes a thorough understanding of how
people (and societies) have become so destructive. Orr
(1992), in particular, identifies three crises, namely:
food crisis; an energy crisis; and a biodiversity crisis.
In Orr's (1992) view, these problems together
constitute a planetary crisis which requires fundamental
changes in the way humans relate to each other and to
the environment. It is this interpretation of the
environmental crisis which separates this theory from
other environmental education approaches, including
education for the environment, which continue to
maintain technocentric (technological) characteristics.

Orr (1990; 1992; 1994) argues that education is the
most powerful mechanism to address the worlds
environmental challenges. He propounds that no student
should graduate from any educational facility without
knowing seventeen key subject areas. This is what he
calls 'a syllabus for environmental literacy' (1992, p.109). He lists, in a similar way to Allan Bloom's
approach, over one hundred articles and books as
essential readings for all students and teachers. Orr
(1992) draws works from distinguished philosophers
such as Erhlich, Bacon, Kahn, Berry, Merchant,
Emerson, Lovelock, Eiseley, Leopold and Thoreau.
Table 1.1 illustrates Orr's (1992) key subject areas.

It is in this knowledge that Orr (1992) claims will
enable educators, teachers and citizens to ask 'what
then?' Sturdavant (1993, p.209) postulates that asking
'what then?' requires:

In order to begin the process of reform in
education and environmental education, identifying primary
school teachers' environmental literacy levels is a necessary
step. Table 1.2 identifies various indicators which can
be utilized to target teachers environmental literacy
levels. Of course, levels of literacy are not mutually
exclusive and teachers may be positioned within and
between levels.

Table 1.2. Identifying Environmental Literacy Levels

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Table 1.2 is based upon the works of O'Briordan (1981), Flew (1992), Roth (1992) and Orr (1990, 1992, 1994). It can be seen that Table 1.2 sets out a considerable knowledge-based agenda for environmental education. The agenda is, in this sense, essential professional 'content knowledge'. As such, environmental literacy is about developing a rich knowledge base, in turn allowing for the development of beliefs and/or philosophies about the environment and therein consequent action in the environment. Of course, these elements are interdependent.

So as to contextualise this framework, we now turn to a brief discussion of the methods being utilised to investigate primary school teachers' knowledge and beliefs about environmental concepts and environmental education.

Methods

A combined-methods approach is being applied to investigate primary school teachers' knowledge and beliefs about environmental concepts and environmental education. The methodology consists of two stages. In stage one, ethnography is the core approach while principals were approached via letter initially and then via email to seek their support for the study. As such, via email to seek their support for the study. As such, stage one, ethnography is the core approach while principals were approached via letter initially and then to interview forty primary school teachers, of which to interview forty primary school teachers, of which preliminary (stage one) data analysis findings. The ethnographic interview lies in its focus on culture through the participant's perspective and through a firsthand experience'. As this study particularly focuses upon primary school teachers' knowledge and beliefs about environmental education and environmental concepts, one-to-one interviewing was applied in the empirical fieldwork so as to elicit the participants meaning and rich narrative descriptions (Marshall, 1995, p.82). To date, all participant's have been interviewed once for an average duration of twenty minutes at the participants' chosen location. An unstructured interview guide was prepared for the interviews. The interview guide could be described "as a list of things to be sure to ask about when talking to the person being interviewed" (1995, p.76).

Furthermore, probes were utilised within the interviewing process so as to "amplify or clarify an answer" (Lofland, 1984, p.57). Probes enable the researcher to elicit or extend information that may not have been given otherwise. For instance, a probe utilised to extend a response was usually structured as follows: "You mentioned ... was that the main point you were making?" For instance, suppose the person being interviewed elicits a question such as "I'm not sure what happened?" was utilised to open a conversation. Each interview began with a "grand tour" question such as "Tell me, what does environmental education mean to you?" This is designed to open up broad issues, then allowing the interview to proceed according to the participants' responses. Face sheets and post-interview comment sheets were utilised for the purposes of data identification (filming), bookkeeping and keeping a record of the experience. A micro-cassette recorder was utilised to record each interview. Tape recording has been acclaimed to be a very successful method as it allows the interviews to be recorded accurately, in turn enabling the entire interview process to flow smoothly.

Further, during the course of each interview handwritten notes were taken. Once the interview process was completed the interviews were transcribed verbatim. This process is tedious, but impels the researcher to listen to the interview, piece by piece, thus stimulating analysis. Analytical notes were recorded in a somewhat similar fashion to a diary. This experience is similar to that suggested by Lofland and Lofland (1995, p.88) as it takes "twice as long writing up the interview in this fashion as you spent in conducting it". Whilst writing-up the interview, new questions and puzzlements were raised and were then incorporated into future interviews.

The interview guide could be described as a list of things to be sure to ask about when talking to the person being interviewed (1995, p.76).

Data Presentation (Stage One): Teachers' Knowledge and Beliefs about Environmental Education

The authors sought to determine the stock of 'environmental education' knowledge among the participants. In this regard, the following comments is a typical perception of environmental education offered by these participants:

In my classroom it means educating the children about the environment and their impact upon the environment (4).

Such a comment displays a simple understanding of environmental education according to Table 1.2 illustrated earlier. However, another participant displayed a more complex understanding of environmental education through conveying a futures perspective as can be seen in the following comments:

Due to the future generation that we teach understand that the environment, local and global, has to be conserved as that it is there for future generations (7).

Even so, the majority of the participants openly expressed their lack of knowledge about environmental education. Approximately half of the participants responded with comments such as "I don't know a lot about it [environmental education]" (1, 3, 4, 11, 13, 15, 18, 20). More specifically, when asked 'do you feel you know a lot about environmental education?' one participant said:

No I don't. I think I know a little bit about it and I have an interest in it, so I can maybe start me in the children, and perhaps that will lead me to finding more information. I don't have a good awareness (4).

Further, only one participant (2) was familiar with the terminology of education about the environment, education in the environment and education for the environment. Most participants were neither familiar with the Queensland P-12 Environmental Education Curriculum guide (Queensland Department of Education, 1993). Moreover, one participant (2), who is a committed teacher of environmental education and who has undertaken ongoing in-service training in environmental education, sees 'lack of knowledge' on the part of primary school teachers as a significant barrier impeding the implementation of environmental education:

First and foremost there is not enough knowledge; understanding of concepts such as sustainability. They wouldn't have the background we would like them to have-- I don't see the issues being addressed (2).

The issue of 'not enough knowledge' is explored in more detail later in this paper. Notwithstanding, when asked about personal background the above-mentioned participant...
indicated a former occupation as a wildlife carer. The participant also revealed:

My parents had a concern for wildlife and I have been brought up in an environment where I cared for it (2).

The participant also noted that environmental education requires 'a personal interest'. Most participants displayed some level of interest, although clearly admitted that it is not a priority in schooling, as one participant explained:

I don't think it is a priority anymore because there is so much else you are dealing with. You have kids that have emotional and social problems. Kids that have shocking upbringing— I know from my point of view, just covering literacy and numeracy every single day is a struggle (9).

This view was confirmed by the majority of participants, as further exemplified in the following comment:

It is not pushed as a priority. Literacy and numeracy are push... But teachers will also go down the road that principal's push and very few are focused on the environment because they are just as overwhelmed. If a principal has a passion the whole school follows it. So it is not just the teachers (12). Be that as it may, the participants also proclaimed that 'personal choice' dictates what is taught, as one participant clearly states:

I can do that [environmental education] if I want to. That's if I wanted to personally. No-one is making me do anything. They leave it up open for us to interpret so it depends on how keen I am to teach it (3).

In this regard, the participants expressed varying levels of practice with some teachers saying 'No, I don't teach it' (1, 18, 13, 20), others saying 'No, I haven't this year at all' (11, 7, 17), with many saying 'I build it [environmental education] into other subjects... it's incidental' (3, 4, 5, 6, 8, 11, 12, 14, 15, 16, 19) and only one saying 'a bit' (2). However, most teachers indicated that they had witnessed effective environmental education during their professional experience by some individual teachers, as typified in the following comment:

Those few who are interested in it keep doing it, and the rest of us just go along with the flow—Until something happens that impacts us directly, we just keep going the way we are (6).

Robottom et al. (2000, p.157) have also raised this issue and concluded that 'behind every successful environmental education program is a committed teacher'. Such findings indicate that individual commitment to environmental education, while not apparent among the majority of this group of primary school teachers, is a vital component with respect to the implementation of environmental education.

Notwithstanding, many teachers indicated that they had not received any training in environmental education, as outlined by one participant:

The opportunities are not there. When you do professional development, that's not what we are in-service on. We're in-service on other sorts of things (11).

Most teachers indicated that they would undertake in-service in environmental education if it were available, although one participant, who was identified earlier as a committed environmental educator, saw it differently:

I think it is more personal. We give them every opportunity at our place [school] if they want to go to a workshop, everything is paid for. No commitment to follow-up or report. It couldn't be easier. Like the upcoming workshop organised, there is only one person who has expressed an interest (2).

With this in mind, the participants did not consider 'in-service' in environmental education to be the major problem which was surprising considering the apparent low levels of understanding. These teachers were more concerned with other issues such as 'constant change' and 'not giving professional demands' as one participant explains:

Teachers are not willing and discussing and discussing professionally. There are too many changes and demands. I can't think of a week where something hasn't happened dramatically on me trying to teach. We learn days and days. Our knowledge and skill base is dropping, but it is not necessarily our fault (12).

These pressures and their effect in Queensland were also reported by Andrews (1997). To this extent, many teachers indicated that 'there is no motivation and no reward' to implement environmental education. Indeed, environmental education appears to be caught in a longer set of historical circumstances exemplified by the comment that there is a lack of 'self-motivation' and 'professionalism' in teaching itself. This same participant explained that the only way in which environmental education could be improved is through teacher education and recognised professional status:

Nobody should get paid out of teacher training, unless they are bloody good. No fluff and frills stuff. It is whether they can teach. In environmental education, we need a condition to start building an. A mentor in the school. There needs to be some level of professionalism (12).

While we are sympathetic with this view, it collapses teachers' content knowledge into teachers' pedagogical knowledge in a way that prioritises teaching processes over what is taught. Thus, the barriers impeding the take-up of environmental education appear to be far more serious than a lack of resources and time constraints as identified by Spork (1992). In fact many teachers believed resources are available, as one participant explains: 'the resources for environmental education are absolutely brilliant'. Further, while 'time constraints' were identified by some participants as a problem, others said 'time is just something you manage. It is part of life'. Several participants said teachers 'and the system are the problem'. Such issues require further investigation.

It is clear that the majority of the participants have low levels of understanding in environmental education according to the criteria illustrated in Table 1.2. At the same time, these primary school teachers generally expressed concern for the environment and varying levels of interest in the environment. So that these issues can be properly understood, we now present data about teachers' knowledge and beliefs in relation to the environment and environmental concepts.

Teachers' Knowledge and Beliefs about the Environment and Environmental Concepts

Many of the participants revealed a concern for the environment, although it was clearly stated that such concerns do not constitute a 'crisis', as one participant indicates:

I don't know about a crisis. I try to be optimistic. But I am personally fearful what we have done to the environment. But I don't know about crisis, to me is a lot of awareness not them (14).

On the other hand, some participants were quite pessimistic and openly said that they 'did not maintain much hope for a better future', such that one participant said:

-- It is all about the big beasts, they don't care about the environment. Everyone is saying their hands are tied. Well, if everyone's hands are tied, Australia is going to be destroyed and so is the world. If everybody is off at that and doing their own thing, well the place is going to fall apart (7).

Further, the majority of the participants said that they did not know much about the idea of an environmental crisis as typified in the following two comments:

I don't have enough in depth knowledge. I don't know enough to give an opinion (10).

I wouldn't have a clue to be totally honest. I wouldn't know how bad it is. I don't know how serious the logging situation has become. I don't know about the destruction of the Amazon rainforest. I know it happens and I know where it is, but I don't know the impact it's having (11).

These remarks mirror some populist environmental issues. To gauge their awareness in more depth, the participants were asked if any particular environmental issues concerned them. In response, all participants identified at least one environmental issue. The majority of these participants identified issues such as the greenhouse effect, ozone layer depletion, pollution and biodiversity as issues that concerned them.

The authors sought to understand the participants' perception of such environmental concepts. Most of the participants openly admitted that they could not explain the various concepts in any detail. Some teachers attempted to define a concept and in doing so often revealed a low level of understanding, as typified in the following comment about the greenhouse effect:

The greenhouse effect is to do with the ozone layer around the earth and gases emitted by various industries and cars. It ties into the ozone layer and is a matter of gases emitted by industries and cars. It ties into the ozone layer and is a matter of gases emitted by various industries and cars. It ties into the ozone layer and is a matter of gases emitted by industries and cars. It ties into the ozone layer and is a matter of gases emitted by various industries and cars (13).

Clearly this particular participant conflated elements of ozone depletion with the greenhouse effect. In fact, we queried the participant about possible confusion...
I probably do (condense then) and in the past I may have missed them up but as I go on I am learning. The information is always changing (15).

Two participants (2, 16) revealed a better understanding of the greenhouse effect, as typified in the following comment:

The greenhouse effect is where a number of gases are given off from industry, and the environment itself. And [the gases] are caught in the earth's atmosphere and they can't escape and this causes a build-up of heat in the atmosphere (16).

The authors sought to determine the various teachers' views about content knowledge and its significance in environmental education. The majority of teachers felt that content knowledge was not overly important, as displayed in the following explanation:

I don't think the content knowledge is vital. It would be really difficult to fill their heads with all this information and figures. You need hands on stuff (11).

There is an implicit assumption here that 'knowledge' means transmission, the 'empty-vessel notion' of teaching. This is perhaps a reflection of the teacher education theories learned by these participants during pre-service teacher education (Wilson, 1998). Accordingly, it is not surprising that many participants indicated that 'knowledge' would come much later and was not needed at the primary school level. The majority of participants revealed that 'a positive attitude' towards the environment is 'definitely' the most important characteristic to develop. Such a view suggests that these primary school teachers were primarily concerned with feelings and attitudes. This is consistent with the findings of the 'Queensland School Reform Longitudinal Study' stating that after commitment to basic skills development, teachers valued social interaction goals as the second most highly rated set of goals (Education Queensland, 2001, p. 10). Notwithstanding, only one teacher indicated otherwise, and stated that 'the changing of attitudes is the outcome we must achieve, but you can't make these decisions without the knowledge and the

So that such data can be contextualised, we now briefly discuss the stage one data in relation to environmental literacy.

Synthesising Comments

Based upon the data presented, we assert that current primary school teachers are likely to be functioning at environmental illiteracy and/or nominal environmental literacy levels according to Table 1.2. The participants, as a group, displayed little understanding of environmental issues and/or the idea of an environmental crisis. Some individuals were able to recognize basic terms, although misconceptions were present. Further, such teachers displayed varying levels of commitment to the environment and environmental education, with most participants only revealing an awareness and sensitivity towards the importance of natural systems and the human impacts on them. Several teachers did reveal individual commitments to environmental education, although only one teacher, who maintained an environmental background, displayed a functional level of environmental literacy.

Based upon preliminary data analysis, it is apparent that the majority of these participants maintain low levels of environmental literacy in accordance with Table 1.2. This hypothesis will be further explored and elucidated in the stage two phase of data collection of this research project. Such an investigation is important because if these levels of environmental literacy are widespread, it is unlikely that the education system will produce an environmentally literate citizenry. We conclude that the introduction of environmental literacy to educational policy may advance the goals of environmental education, although such initiatives are unlikely to significantly change the current status of environmental education unless there is a system commitment to environmental education on the part of education departments and pre-service teacher education providers.

References


1. It is important to verify that there is no more known about the teaching of environmental education in primary schools that secondary or tertiary education. However, this paper only focuses upon primary level environmental education.

2. Defining 'knowledge' is always controversial in education. With this in mind, it is important to identify that the 'type' of knowledge being referred to in this paper is 'essential professional content knowledge', also associated with 'pedagogical content knowledge' (Shulman, 1987).

3. Defining the concept of belief is also controversial in education. Notwithstanding, Whelan (1992, p. 82) argues, 'beliefs influence what teachers select to teach and in turn how such subject matter is interpreted'. Grossman, Wilson and Shulman (1989) claim that the concept of belief is yet to be fully explored and is less understood than the other identified areas of knowledge.

4. The participants' teaching practices were not observed during this study as this was not a focus of the study nor was it feasible within the limited time scale of the project.

5. All comments indicate a number (code) which allows the authors to check and identify data sources.

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A CHASM IN ENVIRONMENTAL EDUCATION: 
WHAT PRIMARY SCHOOL TEACHERS 'MIGHT' OR 'MIGHT NOT' KNOW

AMY CUTTER AND RICHARD SMITH

Abstract

Over the past thirty years, it has often been stated that primary school education should endeavour to improve and protect the environment through producing an 'environmentally informed, committed and active citizenry'. To this end, environmental education has been incorporated into the existing discipline 'Studies of Society and Environment'. However, research shows that the implementation of environmental education in primary schools is problematic and has had limited success. The reasons for these shortcomings are far from clear, with present research merely speculating about barriers to effective implementation.

This chapter presents a detailed discussion and analysis of the existing literature concerning environmental education in the primary school years. In so doing, the chapter identifies a perceived gap within the field of environmental education research and literature. This field has neglected studies of Australian primary school teachers' knowledge and beliefs about environmental education as a factor affecting the capacity of schooling to achieve environmental education goals. We conclude that this omission is a significant factor limiting environmental education theory and practice.

Introduction

Since the 1960s there has been a growing understanding that the continued economic, environmental, social and technological developments instigated by human beings have
changed the biosphere. There are substantial concerns among some scientific experts that the limits of the earth's capacity to provide for human existence are within sight (see Merchant, 1992; Starke, 1998; Suzuki, 1993; Suzuki & Dressel 1999; World Commission On the Environment Development, 1987). These concerns have led many researchers, including the above-mentioned pundits, to re-examine prevailing cultural norms about the nature of the earth as an infinite resource for human exploitation, and to promote moves to more sustainable patterns of development.

To these ends, environmental education has been identified at the international policy level, by the 'United Nations Educational, Scientific and Cultural Organisation' (UNESCO) and the 'United Nations Environment Programme' (UNEP), as an important change agent for sustainable development. The focus upon environmental education has resulted in efforts being made over the past three decades, once again initiated by UNESCO and UNEP, to incorporate environmental education into national and state education policy and curriculum documents. In the case of Australia, efforts have been made to incorporate environmental education into state curriculums and policy documents, although education departments have been slow to take-up environmental education and, consequently, implement it into schools systems. Quite critical for this chapter, in Queensland, environmental education is predominantly incorporated into the recently developed 'SOSE' syllabus (Queensland School Curriculum Council, 2000a) and associated policy documents.

At the policy and theoretical level, three approaches to environmental education have been developed and consequently dominated the field, namely, education about the environment, education in the environment and education for the environment. In the past two decades education for the environment has been identified as the preferred approach for environmental education. However, in recent times, the requirements of this approach have been the focus of much debate, with many critics suggesting that the field of environmental education is characterised by vagueness, complexity and contradictions. This is coupled by limited evidence of the practical implementation of 'education for the environment', or other forms of environmental education in schools systems. Thus, little is known regarding the effectiveness of either the dominant or subsidiary environmental education approaches in the teaching and learning of environmental education. This is particularly so in the case of primary schools.

There has been limited research about the effectiveness of environmental education practice in primary schools. In particular, there have been no Australian studies investigating primary school teachers' personal beliefs about the environment, or their base-line knowledge of environmental issues. As such, little is known about what primary school teachers know or believe about the environment or environmental education.

In these ways, there are theoretical and empirical 'gaps' in environmental education research that require further investigation. In order to elaborate upon this agenda we now substantiate the above-mentioned claims by reviewing the arguments.

**Environmental education: Policy directions and premises**

In 1992 the Union of Concerned Scientists, representing more than sixteen hundred senior members of the scientific community, including 102 Nobel Prize recipients, warned that:

*Human beings and the natural world are on a collision course. Human activities inflict harsh and often irreversible damage on the environment and on critical resources. If not checked, many of our current practices*
put at serious risk the future that we wish for human society and the plant and animal kingdoms, and may so alter the living world that it will be unable to sustain life in the manner that we know... We hereby warn all humanity of what lies ahead. A great change in our stewardship of the earth and the life on it is required, if vast human misery is to be avoided and our global home on this planet is not to be irretrievably mutilated (cited in Suzuki, 1993, p. 4).

These concerns reflect an abundance of research indicating that human activities are presently contributing to severe and potentially irreversible changes to the biosphere. Among the environmental issues giving rise to these concerns are:

- Climatic changes and altered weather patterns (see Agarwal and Narain, 1992; International Union for the Conservation of Nature, 1980; Middleton, O’Keefe and Moyo, 1993; Pickering and Owen, 1994; World Commission on the Environment Development, 1990; Wright, 1993);
- depletion of the ozone layer (see Milbraith, 1989; Suzuki and McConnell, 1997; Washington, 1991; World Commission on the Environment Development, 1987; Wright, 1993);
- depletion of forests (see Beale & Fray, 1990; Orr, 1992; Pickering et al., 1994; Starke, 1998; UNEP, 1983; World Commission on the Environment Development, 1987; Wright, 1993);
- loss of species habitat and loss of biodiversity (see Beale et al., 1990; Carson, 1965; Ehrlich & Ehrlich, 1991; Middleton et al., 1993; Starke, 1998; Suzuki, 1993, Suzuki & Dressel, 1999; UNEP, 1983; World Commission on the Environment Development, 1990; Wright, 1993); and

Complementing the body of scientific research identifying environmental changes, there is a growing body of literature that identifies the present pattern of technological, economic, environmental and social developments by human beings as the primary cause of what some coin an 'environmental crisis' (see Carson, 1965; Durning, 1992; Ehrlich, 1986; Evernden, 1989; Gore, 1992; Hillcoat, 1999; Milbraith, 1989; Orr, 1992; Schumacher, 1973; Suzuki & Dressel, 1999; Weston, 1994, 1999). There are predictions that the current pattern of development is causing critical, irreversible changes to the biosphere. In turn, jeopardising the earth’s capacity to sustain human life as presently known. As such, a view has been put forth which asserts that the human race is not only witnessing, but giving rise to an environmental crisis.

It must be noted that the existence of an environmental crisis is not universally accepted, with commentators such as Kahn et al. (1976), Manes (1990) and Ray et al. (1992) contending that the predictions of catastrophe arising out of research identifying changes to various environmental indicators are ill-conceived and overly pessimistic.

Whatever the debates, and despite conflicting views about the existence of a crisis, 'public concern for the environment is at unprecedented levels throughout the world' (Fien, 1995, p.1). In turn, it has been proposed that:
What is needed is a fundamental transformation of people's attitudes and practices... Only a new world view and morality can change the basic relation of people to the earth. People's behaviour is a matter of choice based upon values... The need for a world ethic of sustainability—an ethic that helps people cooperate with one another and nature for the survival and well-being of all individuals and the biosphere—could not be greater (IUCN, UNEP & WWF, 1990, cited in Fien, 1993a, p. 4-5).

Initially, the concept of 'sustainable development', also referred to as 'sustainability', was a catch-all idea for future development (UNESCO-UNEP, 1992). However, sustainable development is a fluid concept, encompassing a range of technological perspectives as well as a range of ecological perspectives. Technological perspectives of sustainable development promote the view that advances in technology and the operation of free market economic forces will be sufficient to remedy the effects of an environmental crisis. In contrast, ecological perspectives of sustainable development promote radical world-views towards more fundamental, transformative cultural changes (O'Riordan, 1981). O'Riordan (1981, p. 377) states that ecological perspectives promote a 'humble and humane approach of harmony with ecological processes and a sense of true association with the earth... which in turn requires 'a fundamental change of attitude away from a sense of technological hubris'. This theoretical divide has given rise to much conflict between and among academics, environmental groups, governments, educators and the like with regards to determining the preferred sustainable development model for future development.

Notwithstanding the debates, coupled with the endorsement of sustainable development, at least since the United Nations Conference on the Human Environment held in Stockholm in 1972, there has been strong support 'for the development of environmental education as one of the most critical elements of an all-out attack on the world's environmental crisis' (UNESCO-UNEP, 1976, p. 2). This same support is reiterated in the recent discussion paper written by Environment Australia (1999, p. 13) which asserts that: 'It is widely agreed that education is the most effective means that society possesses for confronting the challenges of the future. Indeed, environmental education will shape the world for tomorrow'. The foundation of this support, particularly during the 1990's, primarily lies with the search for sustainable methods of development and living (World Commission On the Environment Development, 1990). In this regard, Agenda 21, a lengthy blueprint for global implementation of sustainable development, particularly emphasised the role of education as an agent of change for sustainable development:

*Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues.... It is critical for achieving environmental and ethical awareness, values and attitudes, skills and behaviour consistent with sustainable development and for effective public participation in decision-making* (UNESCO-UNEP, 1992, p. 2).

Numerous environmental education definitions have been developed which reflect this definition in whole or in part. Due to the changing nature of environmental problems and solutions, environmental education conceptions change with each generation and, thus, so too does its definition. Disinger (1983) claims that environmental education definitions all contain common ground and therefore differences in the definition of environmental education need not hinder the progress and implementation of environmental education. In contrast, Jickling (1994) claims that environmental education definitions all contain common ground and therefore differences in the definition of environmental education need not hinder the progress and implementation of environmental education. In contrast, Jickling (1994) claims that environmental education has a 'definitional problem' which is quite problematic for future environmental education theory and practice. To these ends, it is noted that no clear and universally accepted definition for environmental education exists.
Whatever the debates, environmental education is viewed as a lifelong process encompassing all levels of education, both within and beyond the formal school system (see Abraham, 1990; Queensland Department of Education, 1993; UNESCO-UNEP, 1976, 1978, 1988, 1995, 1996). Thus, environmental education at primary, secondary and tertiary levels has an important role to play in the development of students who are capable of understanding and who are motivated to respond to the issues which give rise to an environmental crisis (see Abraham, Lacey & Williams, 1990; Pien, 1996; Queensland Department of Education, 1993; UNESCO-UNEP 1989).

Central to this argument, it is considered that the primary school years have a particular importance as: ... young learners develop most of their final adult physio-neurological capacity quite early in life, and therefore learning, especially of attitudes and values so important to imaginative action in environmental problems, is vital and needs to be considered carefully early in these sequences of lifelong learning (Fien, 1996, p. 41).

As might be expected, there are a variety of disparate views about the proper role of environmental education (see Clacherty, 1993; Fien, 1992, 2000; Gough, 1997; Jickling, 1998; Orr, 1992; Rossen, 1995; Walker, 1997). In this vein, a number of approaches have been developed and often are the subject of many debates in the environmental education field. These approaches include: education about the environment, education in (or through) the environment and education for the environment. More specifically:

*Learning how to care for our environment involves understanding concepts about the environment, developing sensitivities through (in) the environment and fostering values that commit us to acting for the environment. This last aspect is perhaps the most important; knowledge about and experience of the environment have limited value unless they are accompanied by a desire to actively care for the Earth, other people and ourselves* (Queensland Department of Education, 1993, p. 5).

For the past two decades, education for the environment has been identified by authorities in the environmental education field as the preferred approach (Fien, 1988, 1992, 1993, 2000, 1996; Huckle, 1991; Queensland Department of Education, 1993). Fien (1992) claims that education about the environment and education in the environment should play a subsidiary role insofar as providing the necessary skills and knowledge to support education for environment. To this extent, it is often argued 'that it is only when the overall intention is education for the environment that real environmental education is actually taking place' (Board of Teacher Registration, 1993, pp. 23-24). In recent times, this contention has been the centre of much debate. Jickling and Spork (1998) recently critiqued education for the environment and suggested that education for the environment indoctrinates students into one specific way of knowing and believing. Jickling and Spork (1998, p. 319) maintained the argument put forth in an earlier paper written by Jickling (1991, pp. 154-155) stating that students should participate ‘as intelligent individuals in the constant re-examination and re-casting of society’. As such, they concluded that education for the environment ‘is conceptually and linguistically flawed and that we may not need, or want, the structures that it imposes’ (Jickling, 1998, p. 309). The works of Gough (1987) also echoed similar conclusions, as did Walker’s (1997, p. 155) study which concluded that ‘if environmental education is to become important in school education a more adequate theory is required’.

Thus, in recent times, it has been suggested that the field of environmental education is characterised by vagueness, complexity and contradictions. However, in the debates, there is little evidence of the take-up of ‘education for the environment’, nor any other forms of environmental education, in schools systems. In this way, I interpret such findings to mean that little is known regarding the
effectiveness of dominant and subsidiary environmental education approaches in the teaching and learning of environmental education. It can be seen that a study of environmental education practice is timely and essential if the field is to evolve with respect to bringing clarity and direction to environmental education. Thus, this chapter is a contribution to the endeavours outlined by such research and we now review the various debates.

Environmental education in primary schools

'The world's teachers...' are said to 'have a crucial role to play' in bringing about the extensive social changes needed to address an environmental crisis (World Commission On the Environment Development, 1987, p. xiv), yet little is known about the extent to which environmental education has been incorporated into school systems. In Australia, in particular, there have been few studies examining environmental education teaching practice in school systems. Despite the rising levels of support for environmental education, the evaluation studies that have been conducted indicate that policy expectations are rarely met (see Gough, 1997; Greenall, 1981; Linke, 1980; Murdoch, 1989; Phipps, 1991; Spork, 1990, 1992; Walker, 1995).

In 1973 and 1974, Linke (1980) conducted a national study in Australia, utilising both quantitative and qualitative methodologies, concerning the take-up of environmental education content and pedagogy in all levels (primary, secondary and tertiary) of education. Linke's (1980) study indicated that environmental education teaching practice was limited in Australia and most often taught through curriculum domains such as science and social studies. The implications of this shift to other disciplines is yet to be fully explored.

Like Linke (1980), Robottom et al. (2000) also found in a case study of five schools, that environmental education is most often incorporated into subjects such 'Studies in Society and Environment'. They also reported that, in some cases, 'environmental education curriculum has moved out of the school and into the community' (Robottom, 2000, p. 146). In short, Robottom et al. (2000, p. 157) concluded that 'behind every successful environmental education program is a committed teacher'.

Stapp and Stapp (1983) also conducted a qualitative study which listed over one hundred issues and recommendations for the improvement of environmental education in Australia. However, this study was limited in that neither primary or secondary teachers' knowledge, attitudes and practice of environmental education were thoroughly investigated.

Other than Linke's 1973/4 (1980), Robottom's et al. (2000) and Stapp and Stapp (1983) studies, only small-scale regional (see Clark, 1997; Cutter, 1998; Phipps, 1991; Skamp, 1996; Spork, 1990, 1992; Walker, 1995) and state (see Education Department of Victoria, 1981; Greenall, 1981) investigations have been carried out.

All of these studies (see Cutter, 1998; Education Department of Victoria, 1981; Greenall, 1981; Phipps, 1991; Spork, 1990, 1992; Walker, 1995), save Skamp (1996) and Clark and Harrison (1997), claim that environmental education practice, with regards to its take-up in primary schools, is inadequate in that it does not achieve the outcomes communicated in policy documents. In contrast, Skamp's (1996) and Clark and Harrison's (1997) New South Wales regional studies suggest that teachers are practising environmental education action components. Clark and Harrison (1997, p. 34) hypothesise that 'many Australian primary schools are addressing environmental education, although they might not call it that'.

Nonetheless, Spork (1990; 1992) claims that primary school teachers consider environmental education to be an important
learning area, but seem to lack the skills and knowledge to teach successful environmental education. Similar statements have also been echoed in the works of Cutter (1998), Gough (1997), Greenall (1981), Murdoch (1989), Phipps (1991) and Walker (1995). To date, Spork’s (1990) study remains to be the only Queensland study, since Linke’s (1980) national study, of primary school teachers take-up of environmental education content and pedagogy. Therefore, her study is particularly significant for Queensland, and we now briefly recount the conclusions of Spork’s (1990) investigation.

The ‘Queensland’ case

Spork (1990; 1992) randomly selected and surveyed 300 state primary school teachers from the Brisbane north region and achieved a 76 percent (228 teachers) response rate. The purpose of her study was to determine the extent of environmental education practice particularly in relation to education about the environment, education in the environment and education for the environment. As such, she found that the practice of education for the environment among the primary school teachers in question was relatively low even though the research and literature argues that education for the environment is central to environmental education. Similarly, it was noted, in relation to teachers’ beliefs about the different levels of importance of education in, about and for the environment, that the sampled teachers considered education in and about the environment to be of more importance than education for the environment. However, the sampled teachers conveyed positive attitudes towards environmental education as a whole.

Consequently, this sample had received relatively little professional preparation to teach environmental education. Only 4.9% of these teachers received pre-service environmental education training and only 6.6% received such in-service training.

Among the reasons offered for low levels of environmental education practice are a perceived lack of teacher training in environmental education and time and resource constraints for teachers (Spork, 1990, 1992). As a consequence of this study and the other studies indicated earlier, environmental education research has tended to conclude that the problems of effective implementation of environmental education are due to a perceived lack of adequate pre-service and in-service environmental education training. Thus, the provision of further or restructured teacher education has been identified as the ‘priority of priorities’ for environmental education (Tilbury, 1992).

However, such propositions tend to be based on both a lack of empirical evidence and a theoretical presumption that the ‘content’ of environmental education is unproblematic. Spork’s (1990, p. 101) study has contributed to this phenomenon through her recommendation that more teacher-education was warranted because teachers possess inadequate ‘knowledge of how to do environmental education or what environmental education is’. However, her study was not a dedicated study of teachers’ environmental education knowledge. Her questionnaire only questioned teachers about general concepts in the three different approaches, particularly education for the environment. Environmental education consists of many concepts and varied forms of pedagogy which Spork (1990) failed to include in her research design. Further, Spork (1990) did not pay heed to the problematic nature of ‘education for the environment’, nor environmental education for that matter. Thus, it appears that her conclusions about primary school teachers and what they might or might not know about environmental education requires further and deeper investigation.

In this respect, Walker (1997, p. 160) also recognised the problematic nature of education for the environment and
environmental education and concluded that poor environmental education practice can be directly related to 'a difference, or 'gap' between theories held by policy makers, curriculum developers and educational researchers and the theories held by practitioners'. Thus, we interpret this research to mean that there are many inconsistencies about what the various individuals and groups consider environmental education to be. Therefore, a better understanding of these inconsistencies appears to be necessary which will hopefully lead to a more inclusive and defined form of environmental education.

Conclusion

In this chapter, three points have been established. Firstly, it has been established that there is a growing belief that development instigated by human beings has changed the biosphere. There are concerns that such development is in turn limiting the earth's capacity to provide for human existence. The idea of an environmental crisis has gained popularity and so too has the concept of the earth as an infinite resource for human exploitation come into question. This has, in turn, promoted calls for more sustainable patterns of development. However, sustainable development is a fluid concept, embracing both technological and ecological perspectives, which has resulted in a theoretical divide in the field as to which ought to be the preferred method for sustainable development.

Secondly, environmental education has been identified at the international policy level as a potential change agent for sustainable development. The focus upon environmental education over the past three decades has led to environmental education being included into national and state education policy and curriculum documents. Three dominant approaches to environmental education have been developed, namely, education about the environment, education in the environment and education for the environment. For the past two decades education for the environment has been identified as the preferred approach for environmental education. However, in recent times, this approach has been the centre of much debate. Thus, leading to the conclusion that the field of environmental education is characterised by vagueness, complexity and contradictions.

Whatever the debates, there is little evidence of the take-up of 'education for the environment', nor other forms of environmental education, in schools systems. In this way, we interpret such findings to mean that little is known regarding the effectiveness of dominant and subsidiary environmental education approaches in the teaching and learning of environmental education. Thus, it can be seen that a critique of environmental education practice is timely and essential if the field is to evolve with respect to bringing clarity and direction to environmental education.

Thirdly, there is limited research about environmental education practice, with regards to pedagogy and content, in primary schools. However, this limited research does suggest that environmental education practice is inadequate. Explanations for this situation have consisted of: lack of teacher training; theoretical inconsistencies between teachers, researchers, policy writers and curriculum developers; and conceptual problems with environmental education theory. It is identified that these explanations have not been thoroughly investigated and require further discussion and critique. Thus, these issues form the impetus and basis of the research (PhD) which is currently in process.

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