Pre-service Early Childhood Teachers' Preparedness to Teach Education for Sustainability

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Abstract

Children in their early childhood years have proven to be capable of becoming active citizens in their communities through engagement in sustainability practices, with the support of their teachers. However, EfS is currently not widespread within the early childhood sector and tends only to be implemented in centres by teachers who are passionate about sustainability.

This thesis examines the perceptions of how a cohort of pre-service early childhood teachers, who completed an EfS paper in their final year of teacher education, felt they had been prepared to teach EfS. It also examined how four new graduates from this cohort perceived their preparation to teach EfS when they began teaching.

This research was undertaken in two phases and used a mixed method approach to collect qualitative and quantitative data. A questionnaire was used to collect data during phase one of the study. Open and closed questions were used to investigate pre-service teachers' conceptions of sustainability and the environment, their perceptions of the relationship between humans and nature, the role of the teacher when teaching EfS, teaching and learning in EfS, and confidence and motivation to teach EfS. Data gathered from the questionnaire were analysed using a thematic approach and simple statistical analysis. Data collection for phase two of the study was via interviews with four new graduates who were in the first four months of their teaching career. The interviews were semi-structured using open questions. Data from the interviews were analysed and categorised into three general sections – background of the centre, affordances of the centre for EfS and the graduates' perceptions of their readiness to teach EfS within that centre.

Findings showed that undertaking a paper in EfS in their final year of study had influenced the pre-service teachers' knowledge of sustainability, particularly in relation to protection of the planet. Pre-service teachers felt that it was important for teachers to support young children to develop connections and sensitivity toward nature, and to support children to actively engage in sustainable practices to protect the environment. The majority felt it was important for teachers to have prior knowledge of sustainability issues in order to teach young children. All students felt a level of confidence and motivation to teach EfS on completion of

the paper. However, despite feeling confident and motivated to teach EfS when beginning their employment in early childhood centres, the level to which the new graduates had actually engaged in EfS was influenced by the realities of being a new teacher and the value placed on EfS by the centre they were teaching in. All four graduates felt they would engage more with EfS once they felt more settled into their teaching roles.

These findings suggest that if EfS is to become more widespread in the early childhood sector, then pre-service teacher education providers need to include dedicated EfS papers that provide a balanced approach to sustainability education within their teacher education programmes, and consider how new graduates can effectively incorporate their EfS learning into their teaching in their new positions.

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Chapter 1 Introduction

1.1 Overview

This chapter provides an introduction to my thesis. It outlines the background to the study and my experience as an early childhood teacher and lecturer of pre-service early childhood teachers that has led me to undertake this research. It includes my research questions and an overview of the following chapters.

1.2 Background

Concern about protection of the natural environment has a long history. In Aotearoa New Zealand the first National Park was developed in 1887 to protect unique flora and fauna (Swarbrick, 2015). Environmentalism emerged to protect precious resources and species, and as awareness of environmental degradation of the Earth grew, calls were made internationally for this to be addressed. This culminated in the Intergovernmental Conference on Environmental Education in Tbilisi in 1977 (UNESCO-UNEP, 1978). The term Environmental Education (EE) had been in use since the United Nations Conference on the Human Environment was held in Stockholm in 1972, and the Tbilisi declaration gave governmental objectives to implement EE into education systems. The 1992 Earth Summit in Rio de Janeiro, broadened the focus from environmental concerns to also include poverty, economic and social development, with EE evolving into Education for Sustainable Development (ESD), which encompassed environmental, economic and social pillars of sustainability (United Nations, 1992).

The terms relating to EE and ESD, or Education for Sustainability (EfS), have been used interchangeably in different situations and the term sustainability means different things to different groups of people. The definition I will be using is based on the definition from the United Nations Report of the World Commission on Environment and Development (1987) for there to be changes to thinking and behaviour patterns to "meet the needs of the present without compromising the ability of future generations to meet their own needs" (chap 2, para. 1).

1.3 EfS and early childhood

When the UN declared 2004-2015 as the 'Decade of Education for Sustainable Development', early childhood did not feature as a significant part of resulting governmental policies related to ESD, both in Aotearoa New Zealand and internationally. In response to this, an international workshop was held in 2007 on "the role of early childhood education for a sustainable society" (Hägglund & Pramling Samuelsson, 2009, p. 51). The workshop was held in Sweden and early childhood researchers and educators from around the world participated. The conclusions from the workshop indicated that early childhood had an important role to play in EfS. As such, in recent years environmental practices have been implemented in early childhood services across the globe. A body of research has emerged showing that when pedagogical approaches are understood in relation to EfS, then very young children can become agents of change (Davis, 2005; Duhn, Bachmann, & Harris, 2010; Kelly & White, 2012; Ritchie, 2010; Vaealiki & Mackey, 2008).

However, many of the practices that are undertaken in early childhood settings are at a practical level, with little attention to the pedagogical approach that embeds sustainability within the culture of the centre and the wider community (Elliott, 2010). Sobel (1996, as cited in Greenfield, 2011) stated, "What is important is that children have the opportunity to bond with the natural world, to learn to love it before being asked to heal its wounds" (p. 16). As such, early childhood teachers often focus on giving young children experiences in nature. This ideology means the sustainable practices that happen in early childhood settings generally relate to care of the environment, such as through gardening, composting, care of living things and recycling. These are holistic and experiential practices that teachers and children engage in together, sometimes involving families and the wider community.

EfS remains non-mandatory in the early childhood sector in Aotearoa New Zealand, and sustainability practices tend to be implemented by one or two passionate teachers (Vaealiki & Mackey, 2008). Furthermore, pre-service early childhood teacher education institutions in Aotearoa New Zealand determine if, and how, they are going to incorporate EfS into their teacher education

programmes (Education Council of Aotearoa New Zealand, 2015a), resulting in a wide range of understanding of how and why EfS should be incorporated into the early childhood sector amongst the early childhood teaching profession.

1.4 My background

I am a middle-aged Pakeha (European) woman and have been teaching for eleven years. I taught in a bi-lingual (Māori/English) early childhood centre for one year, before moving to a semi-rural early childhood centre where I taught infants and toddlers. During this time I developed my thinking in relation to very young children's experiences in the natural world. We had some very young infants in our centre and I was very conscious of my responsibility as their teacher to ensure they had experiences in nature, such as feeling the grass under their hands and legs as they crawled, and developing a sense of wonder at the insects and birds that visited our garden. I became involved in implementing environmental practices such as vegetable gardening, herb gardening and worm farming with our infants and toddlers.

After five years teaching in that centre I moved into the tertiary sector. I joined a private early childhood initial teacher education provider that taught a Diploma of Teaching (Early Childhood Education). For the last four years I have taught a one year compulsory paper in environmental education to students in their final year of study. As I engaged in further Master of Education study I began thinking about what was happening in early childhood centres in Aotearoa New Zealand in regard to EfS and reflecting on my experiences as a teacher in an early childhood centre. I realised that for EfS to become an embedded practice and part of a centre's culture there needed to be more than one or two passionate teachers in centres to lead it. I reflected on my position as a lecturer and began to wonder whether pre-service teachers participating in a paper about EfS would result in EfS pedagogies and practices becoming more embedded within an early childhood centre's culture.

1.5 Research Questions

The research questions that evolved from this background are:

What are early childhood teachers' perceptions of their preparedness to engage in Education for Sustainability at the beginning of their teaching career?

Sub-questions:

1. What are pre-service early childhood teachers' perceptions of their preparedness to teach EfS at the end of their teaching qualification?

2. What are new graduate early childhood teachers' perceptions of their preparedness to teach EfS once they begin teaching?

1.6 Context of the study

Early childhood education (ECE) in Aotearoa New Zealand is not compulsory, however approximately 96% of children aged between 0 and 5 attend some form of ECE. The New Zealand Government provides free ECE for children aged 3 and 4 for 20 hours per week (Ministry of Education, n.d.).

Throughout New Zealand, there are approximately 4000 early childhood services. Within this number are a range of services with differing educational philosophies. The largest of these is grouped under the title, Education and Care. Services under this title are either privately owned or community based services, with the majority being privately owned. Other types of services include kindergartens, parent-led playcentres, kohanga reo (Māori language nests), and home-based care. All teacher-led ECE services are legally required to have 50% qualified and registered teachers, however some services opt to have more qualified teachers. The remaining number of adults employed to meet legal ratio requirements are unqualified (Education (Early Childhood Services) Regulations, 2008).

ECE services in Aotearoa New Zealand are required to use the ECE curriculum document, *Te Whāriki* to guide their practice. It is a holistic curriculum that allows for the diverse nature of services to implement their own curriculum based on its principles, strands and goals (Ministry of Education, 1996). The document does not directly outline the principles of EfS, although within its strands and goals it uses the language of EfS to guide teachers toward such practices.

As the Aotearoa New Zealand government has not, to date, mandated the requirement for EfS to be included in Aotearoa New Zealand's education systems, there is no requirement for EfS to be taught in ECE services. Likewise, there is no requirement for EfS to be a compulsory requirement of early childhood pre-service teacher education.

This thesis seeks to find out if a compulsory EfS paper in pre-service early childhood teacher education provides student teachers with the confidence and motivation to engage with EfS when they begin teaching.

1.7 Outline of thesis

The remainder of this thesis is outlined in four chapters.

Chapter 2 provides a review of the literature about key ideas related to EfS and the early childhood sector, and the preparation of pre-service teachers for engaging with EfS when they begin their teaching careers.

Chapter 3 describes the methodology and the approach taken for data collection and analysis. It describes the choice of paradigm employed in this study, the research sample and instrument design. It also discusses the limitations of the study, trustworthiness of the study and ethical considerations.

Chapter 4 presents the findings of this study through identification and analysis of themes that emerged from the data. The findings are presented in five sections: student teachers' understanding of sustainability and the environment, the relationship between humans and nature, the role of the teacher when teaching EfS, confidence and motivation to teach EfS, and the presentation of four case stories.

Chapter 5 presents a discussion of the study's findings in relation to both sub-questions. The conclusion addresses the overall research question. Finally, implications and recommendations that have emerged from the study are discussed.

Chapter 2 Literature Review

2.1 Chapter overview

This review seeks to explore EfS within early childhood pre-service teacher education. A lack of published literature within this specific sector of education has resulted in the exploration of pre-service teacher education across sectors, intersecting with early childhood where possible. The review begins by setting the context of early childhood education and its role in EfS, exploring the role of nature, the concept of young children as global citizens and how a culture of change toward EfS within early childhood may be achieved. As pre-service teacher education has a large role to play in creating a culture of change, it then examines what is currently occurring in this sector, nationally and internationally. It outlines pre-service early childhood teacher education in Aotearoa New Zealand and explores early childhood policy documents. It then examines what early childhood teacher education pre-service teachers think they need to know about EfS, through the exploration of values and beliefs, content knowledge, theoretical perspectives and pedagogical approaches. It then briefly reviews student expectations of the workplace for EfS in early childhood.

2.2 Why teach EfS in early childhood?

Education has been recognised as a key factor in creating a society that lives in a sustainable manner. However, international documents promoting EfS have steered away from including early childhood education in their recommendations (Hägglund & Pramling Samuelsson, 2009). This section examines why EfS should begin in early childhood, arguing that experiences in and with nature provide the foundations for children to become active citizens within their communities. It goes on to examine how early childhood teachers can support young children by creating a culture of EfS within their centres.

2.2.1 Links to nature

It has long been recognised that children are drawn to nature. They are fascinated by their experiences with the natural world, what they learn about it and what they learn from it. In 1984, Edward O. Wilson introduced the term ‘biophilia’ to explain the way that children are innately attracted to nature, claiming that

"[b]iophilia is biologically based and integral to our development as individuals" (Wilson, 2012, p. 15). This suggests that children need experiences in, and interactions with, nature to support their holistic development. The natural world can give children instant responses to their curiosity through all of their senses as they touch, taste, smell, see and hear what is going on around them. Such connections tend to foster an ethic of care for the natural environment and the life systems within it (Phenice & Griffore, 2003). Positive experiences in nature can support children to develop the understanding that humans are interconnected with the Earth and its life supporting systems, and that all humans have a responsibility to ensure its survival for future generations (Chawla, 2007).

Positive childhood experiences in nature have been linked to pro-environmental behaviour and activism in adulthood. Chawla (2007) interviewed 56 environmentalists in Norway and the United States of America and found that most cited positive experiences in nature during childhood as motivators for becoming involved in environmental issues. These findings are supported by studies undertaken in other countries around the world (Chawla & Cushing, 2007). Such findings support the argument that positive nature experiences in early childhood are fundamental for developing environmental attitudes and concepts.

However, there is growing evidence to show that in the Western world, the present generation of children do not have the same opportunities for connection with nature as previous generations. As such, there appears to be a growing disconnection with nature. Richard Louv (2008) has called this the 'Nature-deficit disorder'. Children's access to large open spaces for play and experiencing nature has been diminished as large empty sections have been built on to meet housing demands. Media reports have also added to a growing list of parents' fears for their children, from stranger danger to harming themselves as they play, leading to less opportunities for children to engage in unstructured play outside (Elliott, 2015; Rosenow, 2008). Furthermore, children's access to technology has dramatically increased and children are spending more time inside playing computer games and watching television than playing outside (Louv, 2008; Rosenow, 2008). This reduction in opportunities for outdoor nature play could also lead to a developing fear of nature and a lack of respect for the life systems

within it. When children do get the opportunity to spend time in nature, this fear can impact on their ability to have positive experiences. Moreover, this growing disconnection with nature leads to children seeing nature as something separate to themselves. If the disconnection is not addressed then as the children get older they may see nature as something to be "controlled and dominated" (Phenice & Griffore, 2003, p. 168) rather than something to work with and protect for future generations (Wilson, 2012; Phenice & Griffore, 2003).

Children's disconnection with nature has become a subject of concern for environmental educators. As more children than ever before are enrolled in early childhood services, there is an increasing need for early childhood teachers to address this disconnect (Elliott & Davis, 2009; Prince, 2010). For children to develop a connection to nature, not only do they need opportunities for unstructured play outside, they also need to engage in joint attention with sensitive adults who can share their sense of wonder at their discoveries and support their growing understanding of the world around them (Chawla & Cushing, 2007; Elliott & Davis, 2009). The participants in the research by Chawla (2007) reported that their positive childhood experiences were made memorable due to the joint attention they had with significant adults during those experiences. This suggests that early childhood teachers have a crucial role to play in ensuring that children engage in positive nature experiences in order to develop their connections with the environment and the living systems that are supported by it.

2.2.2 Children as citizens

Whilst connections with nature are critical for children to develop an ethic of care (Phenice & Griffore, 2003), EfS is more than caring for the environment. It includes addressing societal change and economic challenges to ensure there are enough resources to sustain both present and future generations of all life systems, including humanity. If present and future generations of children are going to be asked to undertake change when they are adults, and address the environmental damage that past generations have caused, then their education needs to prepare them to undertake this task (Tilbury, 1995). Children are citizens within their local and wider communities and have a right to be involved in decisions and changes that will impact on their own lives. This would allow children to show agency in

issues that involve them. The United Nations *Convention on the Rights of the Child* (1989) states in article 29 (d) that children have a right to an education that will prepare them to be "responsible for life in a free society, in the spirit of understanding, peace, tolerance, equality of sexes, and friendship among all peoples, ethnic, national and religious groups and persons of indigenous origin"; and in (e) "to develop respect for the natural environment". It has long been understood that if change toward sustainability is going to occur, one of the key drivers is through education (Tilbury, 1995).

There has been a tendency in international documents, such as the 1987 United Nations *Report of the World Commission on Environment and Development*, and the 2005-2014 *UN Decade of Education for Sustainable Development*, to focus on children from primary school age onwards, with very little or no mention of children in their early childhood years (Hägglund & Pramling Samuelsson, 2009). One of the reasons for this may be that children in their early years are considered too young to comprehend the complexities of sustainability and the issues that face the planet (Elliott & Davis, 2009; Pramling Samuelsson, 2011).

In response to these documents, an international workshop was held in 2007 on "The Role of Early Childhood Education for a Sustainable Society" (Hägglund & Pramling Samuelsson, 2009, p. 51). The workshop was held in Sweden and early childhood researchers and educators from around the world participated. The conclusions of the workshop were that early childhood has an important role to play in EfS. Children begin to develop their beliefs and values about society in their early years, therefore beginning EfS in early childhood could help shape children's values and attitudes toward sustainability. Furthermore, the workshop concluded that in early childhood, EfS should begin in the local community with hands-on practical experiences that have real life meaning for children (Pramling Samuelsson & Kaga, 2008). With the support and guidance of ecologically-aware teachers who engage in pedagogies that encourage children in their early childhood settings, young children have shown they are able to comprehend the implications of sustainability issues such as water conservation, rubbish reduction, and connections to nature and each other. They act on their understandings and enact change within and beyond their centre environments, making them active citizens within the wider community (Davis, 2005; Vaealiki & Mackey, 2008;

Ritchie, 2010; Duhn, 2012).

For young children to become active citizens, they need the support and guidance of teachers who are committed to underpinning their teaching with ecological pedagogies. Teaching pedagogies in early childhood tend to be holistic, involving an interactive approach to teaching and learning. The co-construction of knowledge that develops within this approach, and the actions for the environment that emerge from it, support children to be active citizens within their community (Pramling Samuelsson, 2011; Robinson & Vaealiki, 2010). Some studies undertaken in early childhood settings in Australia and Aotearoa New Zealand involved all teachers in a whole-centre approach. Within these projects the teachers observed and listened to children. They took their cues from the children and engaged in meaningful discussion to support their learning. A culture of shared understanding developed as children and teachers worked alongside each other, learning about caring for their environment, both within the centre and within the local community, through a variety of projects. The fostering of children's democratic understanding for enacting change came about through their active engagement in decision making (Davis, 2005; Vaealiki & Mackey, 2008; Ritchie, 2010; Duhn, 2012). Whilst these studies have shown that children in early childhood are capable of engaging in sustainability practices when supported by their teachers, in Aotearoa New Zealand this is generally only happening in centres where there are teachers who are passionate about EfS, with little research evidence to support their practices (Kelly & White, 2012; Vaealiki & Mackey, 2008). For EfS to become embedded in early childhood, a change in culture may be required.

2.2.3 Culture of change toward embedded EfS in early childhood

Dedicated teachers in early childhood have been implementing environmental experiences with children for a number of years (Vaealiki & Mackey, 2008). With early childhood conferences that have had sustainability as a theme (Davis, 2010), and literature placing an emphasis on the importance of young children having experiences in nature (Kelly & White, 2012; Chawla, 2007; Phenice & Griffore, 2003), environmental practices, such as gardening, worm farming, composting and recycling are becoming more common within the sector (Kelly &

White, 2012). However, whilst these environmental practices are occurring, it is not happening in all centres as EfS is not mandatory in the Aotearoa New Zealand early childhood sector (Duhn, 2012). Elliott (2010) suggests that for EfS to become part of early childhood culture, then change would need to come from the teachers. Researchers have been working with early childhood centres to determine the best approaches for including EfS in the everyday curriculum. The results are showing that when a whole centre approach is undertaken, involving the staff, children, families and community, EfS can become embedded within centre culture (Duhn et al., 2010; Ritchie, 2010; Vaealiki & Mackey, 2008).

In Aotearoa New Zealand, one such whole centre approach is the enviroschool. Enviroschools were initially set up to have a "whole-school approach to environmental education" (Eames & Cowie, 2004, p.20). The success of this programme has led to it extending to the early childhood sector and currently five percent of services are registered as enviroschools (Toimata Foundation, 2015). For these centres, EfS is central to their philosophy and involves all members of the early childhood community. EfS is integrated within the curriculum and is embedded in every day practices, where all participants in the teaching and learning process co-construct their knowledge. This approach encourages children to be active citizens within their early childhood communities, supporting them to be involved in decision making and to instigate change (Duhn et al., 2010; Vaealiki & Mackey, 2008).

In addition to centres registered as enviroschools, there are other early childhood settings that are engaging in whole centre approaches to EfS. The Forest Kindergarten movement in Scandinavia and the United Kingdom has influenced early childhood education in New Zealand (Kelly & White, 2012). The Ngahere project investigated nature-based learning and sustainability by taking young children on regular outings where they could experience and investigate the natural world (Kelly & White, 2012). Other whole centre approaches to teaching EfS have used Māori (Aotearoa New Zealand's indigenous people) principles of interconnectedness to enable young children to become active citizens who can make change within their community (Ritchie, 2010). These whole centre approaches may be instrumental in preparing young children to be active citizens who are willing to make change to ensure the sustainability of the planet.

However, for this to become extensive throughout the sector, all teachers need to be willing to engage in EfS. In order for this to happen, a shift in thinking and understanding will need to occur (Elliott, 2010).

Whilst raising awareness is a way of encouraging teachers to engage in EfS and may result in an increase in sustainability practices, it may not create a change in thinking toward a culture of embedded EfS in early childhood (Elliott, 2010). As research previously cited shows, when the whole centre community is engaged in EfS, a culture of change can occur (Davis, 2005; Duhn et al., 2010; Ritchie, 2010; Vaealiki & Mackey, 2008). As currently there are no mandatory requirements in Aotearoa New Zealand for EfS to be included in a centre's curriculum (Duhn, 2012), it falls on the shoulders of passionate teachers to lead a change of thinking within their centres.

Professional development opportunities that focus on EfS pedagogies could be one way for teachers to lead change in their centres (Davies et al., 2009; Gibson, 2010). For teachers to lead a change in thinking that transforms centre culture to embedded EfS, they will need the support of centre owners, management and the centre community. This will take time as teachers need to engage in dialogue with their colleagues and centre management, share their visions and ideas and undertake professional development (Gibson, 2010). However, change may also come from centre management and centre owners who have a personal motivation to create a centre culture that has EfS as a core value (Gibson, 2010). As such, they are likely to employ teachers who have a shared motivation toward sustainability. Whether a change of culture comes from within the organisation or from management and ownership, teachers will need to have an understanding of, and motivation to, teach EfS. Alongside professional development, another way to develop this within teachers is through pre-service teacher education (Ferreira & Davis, 2010). As early childhood has a key role in teaching EfS to support young children to develop connections with nature and become active citizens within their communities, then pre-service early childhood teacher education institutions have a responsibility to prepare their students to teach EfS when they graduate and gain employment in centres (Ferreira & Davis, 2010).

2.3 Preparation in pre-service teacher education for teaching EfS

The *Tbilisi Declaration* (UNESCO-UNEP, 1978) outlined objectives for member countries to implement enviromental education into their education systems. This section examines how the pre-service teacher education sector has responded to this call in relation to EfS. It then examines the current state of early childhood pre-service education in Aotearoa New Zealand and current policy pertaining to the early childhood sector.

2.3.1 Pre-service teacher education for sustainability

Since the *Tbilisi Declaration* there have been calls for a re-orientation of initial teacher education to embed EfS into the curriculum (Scott & Gough, 2002; UNESCO, 2005; UNESCO-UNEP, 1990), based on the assertion that:

> Institutions of teacher education fulfil vital roles in the global education community; they have the potential to bring changes within educational systems that will shape the knowledge and skills of future generations. Often, education is described as the great hope for creating a more sustainable future; teacher-education institutions serve as key change agents in transforming education and society, so such a future is possible (UNESCO, 2005a, p.11).

This asserts that teacher education should equip teachers to develop the skills, knowledge and attitudes to teach EfS. UNESCO documents (UNESCO, 2005; UNESCO-UNEP, 1990) have tended to focus on preparation for teaching in the formal sector, however, it appears that across the board, initial teacher education institutions internationally have been slow to embed EfS into their curriculum (Ferreira, Ryan, & Tilbury, 2007a; O'Gorman & Davis, 2013; Van Petegem, Blieck, Imbrecht, & Van Hout, 2005). One barrier to embedding EfS has been a lack of governmental support at a policy level, despite member countries pledging to ensure EfS became part of the education system (Hopkins & McKeown, 2002). Consequently, not all initial teacher education institutions have required that EfS be embedded within their courses and it has largely been left to the institutions themselves to decide how EfS is going to be included in their programmes

(Ferreira, Ryan, & Tilbury, 2007b). Furthermore, a lack of commitment by leaders of pre-service teacher education institutions can be viewed as an obstacle to incorporating EfS into programmes, as they govern the direction of funding and curricula (Falkenberg & Babiuk, 2014; Ferreira et al., 2007b). It appears that when institutions do implement initiatives, there is a reluctance of some teacher educators to incorporate EfS due to a lack of knowledge and understanding of how it fits within their existing teaching (Van Petegem et al., 2005). When EfS has been included it has been in individualised pockets, taught by educators who have an interest in it (Falkenberg & Babiuk, 2014; Ferreira et al., 2007a). Miles, Harrison & Cutter-Mackenzie (2006) found that pre-service teachers' engagement in EfS had a correlation to their own values and beliefs, however, many felt they had a lack of content knowledge and thus were unprepared to teach. This highlights the importance of pre-service teacher education in equipping beginning teachers with the skills, knowledge and attitudes to teach EfS when they begin their teaching careers. However, despite the slow uptake of EfS by the pre-service teacher education sector, there have been examples of institutions internationally that are working toward embedding EfS into their teacher education programmes (Boon & Wilson, 2011; Corney & Reid, 2007; Falkenberg & Babiuk, 2014; Ferreira, Ryan, Davis, Cavanagh, & Thomas, 2009; Van Petegem et al., 2005).

Much of the literature relates to the formal sector of teacher education, with few articles related to early childhood teacher education. Of those found, one was based in Sweden and reported on a study with in-service day care attendants. This study showed that by engaging in a paper about EfS, participants developed their understanding of EfS in relation to their experiences and used this knowledge to plan related activities for children (Ärlemalm-Hagsér & Sandberg, 2011). A further study, from the United States, used a 'Draw-An-Environment Test Rubric' to analyse pre-service early childhood teachers conceptualisation of the environment (Moseley, Desjean-Perrotta, & Utley, 2010). Findings from this study showed initially there was little understanding of the interconnectedness between humans and the environment, suggesting that pre-service teacher education should ensure its curriculum has an integration of the concepts of environment and interconnectedness, using local examples as a starting point (Moseley et al., 2010). The remaining studies were from Australia, and were generally tied in with cross

sector teacher education (Boon & Wilson, 2011; Ferreira et al., 2009). Boon & Wilson (2011) undertook a survey of pre-service teachers from across the education sectors and found that they had little understanding of sustainability issues. Correspondingly, a study using an online Ecological Footprint Calculator had pre-service early childhood students shocked and surprised at the size of their ecological footprint, even when they thought they were doing everything they could to keep their footprint small (O'Gorman & Davis, 2013). This study was focused on action that the students would take after receiving the results of their calculation and respondents linked their results to their responsibilities to teach EfS as future teachers of young children (O'Gorman & Davis, 2013). These two studies, combined with the study by Ärlemalm-Hagsér & Sandberg (2011), provide further evidence for the importance of EfS to become embedded within pre-service teacher education. Early childhood teachers need to have an understanding and awareness of the issues of sustainability and the pedagogical approaches they can use when working with young children (Ärlemalm-Hagsér & Sandberg, 2011; Boon & Wilson, 2011; O'Gorman & Davis, 2013).

Elliott (2010) contends that "early childhood has a pedagogical advantage for education for sustainability" (p. 35), as the holistic, experiential and inquiry-based approaches suggested as being beneficial for teaching EfS are approaches that early childhood teachers use on a daily basis. However, teachers' values, beliefs and understandings influence the pedagogical approaches they take when teaching young children. Providing pre-service teachers with the opportunity within their training to engage with EfS should encourage them to recognise and challenge their own values and beliefs, and reflect on how these may influence their teaching (Ärlemalm-Hagsér & Sandberg, 2011). Kennelly and Taylor (2007) reported on a one semester-long teaching unit on EfS within a primary Bachelor of Education degree at the University of New England in Australia. This unit used a variety of strategies that focused on "the processes of learning" (p. 6), giving students opportunities to apply pedagogical approaches that they could use when they begin their teaching careers. A case-study of a student teacher from this research found that the unit had helped her to further develop her values and beliefs and equipped her with pedagogical content knowledge, giving her the confidence to incorporate EfS into her teaching when on a teaching internship (Kennelly, Taylor, &

Maxwell, 2008a). The unit that the students undertook in the study by Ärlemalm-Hagsér and Sandberg (2011) in Sweden showed that their developing competencies and understanding of what sustainability meant for their teaching strengthened their pedagogy in planning and implementing EfS within their centres. It therefore appears that engaging pre-service teachers in EfS pedagogies during their training helps to build their understanding of, and competencies in, EfS when they begin teaching (O'Gorman & Davis, 2013).

If pre-service early childhood teacher education institutions in Aotearoa New Zealand and internationally were to embed EfS within their programme, then it is possible that beginning teachers will be able to support a change in culture toward embedded EfS in the early childhood sector (O'Gorman & Davis, 2013). No research was found to be reported in the literature regarding early childhood pre-service teacher education in EfS in Aotearoa New Zealand. This thesis sought to address that gap. To provide some context for this, the next section examines early childhood pre-service teacher education in Aotearoa New Zealand.

2.3.2 Early childhood pre-service teacher education in Aotearoa New Zealand

There are currently a range of early childhood qualifications available in Aotearoa New Zealand. The benchmark for qualified early childhood teachers is a Bachelor degree in Teaching (ECE), a Diploma in Teaching (ECE) or an Education Council approved level seven qualification (TeachNZ, 2015). There are 19 early childhood initial teacher education providers approved to teach the benchmark qualifications. The majority of the qualifications taught are Bachelor degrees (TeachNZ, 2015). On 1 January 2013 the entry criteria to enter teacher education at a Diploma of Teaching level changed and applicants were now required to have a minimum qualification of University Entrance. This now equals the entry criteria of a Degree in Teaching (Education Council of Aotearoa New Zealand, 2015a). Consequently, the Diploma of Teaching appears to be undergoing a phasing out stage by the teacher education providers who were offering the qualification (TeachNZ, 2015).

In addition to the benchmark, there are early childhood qualifications at levels five and six offered at various training providers throughout the country (New Zealand Qualifications Authority, 2015). As teacher-led early childhood services are

required to only have 50% qualified and registered teachers, the remaining staff employed to meet legal ratio requirements can be unqualified (Education (Early Childhood Services) Regulations, 2008). The additional non-teaching qualifications at levels five and six may help to bridge the gap between qualified and non-qualified teachers. However, in most centres qualified teachers will be working alongside untrained teachers to implement curriculum for young children (Education (Early Childhood Services) Regulations, 2008).

For a teacher to gain a benchmark qualification, all pre-service teacher education institutions must ensure their graduates meet the Graduating Teacher Standards (GTS) (Education Council of Aotearoa New Zealand, 2015b). The GTS are applicable for all pre-service teacher education trainees across the sectors from early childhood to secondary education. There are seven standards within the GTS that fall under the categories of professional knowledge, professional practice and professional values and relationships. The purpose of the GTS is to determine what a graduating teacher "will know, will understand, will be able to do, and the dispositions they will have that are likely to make them effective teachers" (Education Council of Aotearoa New Zealand, 2007, pp. 2–3). Currently, as in other education sectors in Aotearoa New Zealand, EfS is non-mandatory and hence is not explicitly identified in the standards as a requirement for graduating teachers to understand or know how to teach. This leaves initial teacher education providers to choose if, and how, they are going to include EfS within the qualifications they offer, as occurs across other education sectors in Aotearoa New Zealand and internationally (Ferreira et al., 2007b).

2.3.3 Early childhood policy documents in Aotearoa New Zealand

Whilst it is non-mandatory to include EfS in pre-service teacher education qualifications, it is mandatory for pre-service early childhood teachers to develop their professional knowledge of the early childhood curriculum, and how to draw on the curriculum using their pedagogical content knowledge to plan for and assess young children's learning (Education Council of Aotearoa New Zealand, 2015b). *Te Whāriki*, the New Zealand Early Childhood Curriculum (Ministry of Education, 1996), is a holistic curriculum with a bicultural approach. The framework of the curriculum is structured with four interwoven principles –

Empowerment/Whakamana, Holistic Development/Kotahitanga, Family and Community/Whānau Tangata, and Relationships/Ngā Hononga (Ministry of Education, 1996, p. 14), and five strands with associated goals that evolve from these principles (Ministry of Education, 1996). The document was developed to provide for young children's care and education within the diverse range of philosophies in Aotearoa New Zealand's early childhood sector (Carr & May, 2000). The key aspiration is for children to:

> grow up to as competent and confident learners and communicators, healthy in mind, body, and spirit, secure in their sense of belonging and in the knowledge that they make a valued contribution to society (Ministry of Education, 1996, p. 9).

Whilst Te Whāriki does not have explicit links to EfS, the above aspiration and the content within the principles, strands and goals do provide an implicit link (Duhn et al., 2010; Vaealiki & Mackey, 2008). For example, in the strand of Belonging – Mana Whenua, goal one states, "Children…experience an environment where connecting links with the family and the wider world are affirmed and extended" (Ministry of Education, 1996, p. 56), and in the strand of Exploration – Mana Aotūroa, goal four states, "Children experience an environment where they develop working theories for making sense of the natural, social, physical, and material worlds" (Ministry of Education, 1996, p. 90). Early childhood teachers are required to provide contexts for young children to develop these skills. However, the approach for how they will achieve this, and what the focus will be, is determined by each individual centre, and in some cases individual teachers (Carr & May, 2000; Vaealiki & Mackey, 2008). Furthermore, other early childhood policy documents in Aotearoa New Zealand do not currently contain mandatory requirements for EfS to be taught in the sector (Duhn, 2012). This implies that if a centre does not have EfS as a value, their choice of how they implement the curriculum may not provide children with opportunities to engage with issues related to sustainability. One way for this to be addressed could be through embedding EfS into pre-service teacher education programmes (Ferreira & Davis, 2010).

2.4 What pre-service teachers think they need to know about EfS

Pre-service teacher education can support student teachers in the development of their values and beliefs, knowledge, and approaches to teaching EfS. This section explores the challenging of values and beliefs to develop teacher identity. It goes on to explore pre-service teachers' content knowledge, theoretical and pedagogical approaches to EfS. The section finishes with a brief review of student expectations of the workplace for EfS in early childhood.

2.4.1 Values and beliefs

"Values reflect why we do what we do; beliefs underpin them by defining and giving meaning to our world" (Murray, 2011, p. 68). Hence, a person's values and beliefs guide their attitudes and behaviour, and help shape identity (Kennelly et al., 2008a; Tilbury, 1995). Early childhood student teachers generally enter the profession as a result of past experiences with teachers who made an impact on their lives, or with the desire to make a difference in the lives of children (Chang-Kredl & Kingsley, 2014). Whilst their personal histories provide the impetus for their decision to become teachers, their beliefs and ensuing values, the context of their training, and professional teaching experiences help to shape and strengthen their identity as a teacher (Chang-Kredl & Kingsley, 2014; Flores & Day, 2006). Chang-Kredl & Kingsley (2014) contend that pre-service teacher education has a role in supporting early childhood student teachers to understand the meaning of their personal histories and the choices they make in developing their teacher identities, to build their confidence as future teachers. Along with their values and beliefs about the care and education of children, pre-service teachers will have values and beliefs about other aspects of their lives, including sustainability. Challenging student teachers to explore their early experiences, values and beliefs in relation to the environment and sustainability may help them to build or strengthen EfS within their developing teaching identity (Kennelly et al., 2008a; Miles et al., 2006; Raus & Falkenberg, 2014).

One of the difficulties of teaching EfS is that it is a values-laden concept and people have different values and beliefs toward it (Tilbury, 1995). Consequently, actions and behaviours toward sustainability differ greatly. One of the roles of EfS is to support students to shape their values toward an environmental ethic (Murray, 2011; Tilbury, 1995). It has been acknowledged that knowledge alone is not

enough to change behaviour (Meyers, 2006). It is also "dependent on personal motivation and a sense of responsibility which results from the development of a personal environmental ethic" (Tilbury, 1995, p. 201). Hart (2003) contends that a teacher's values and beliefs are an important component for teaching EfS. He found that teachers who had "an affinity with nature had a desire to provide educational opportunities for their students to have experiences in nature" (p. 72), thus building an environmental ethic into their teaching philosophy and identity. Correspondingly, in a case-study of a pre-service primary teacher, Kennelly et al. (2008a) found that the values about sustainability that the student brought to her study were linked to her early environmental experiences. Through her engagement with the unit of work, her values became incorporated into her identity as a teacher who wanted to incorporate EfS into her practice. Burmeister and Eilks (2013) also found that positive attitudes towards sustainability led student teachers in chemistry to identify meaningful topics and pedagogies that could be incorporated into their chemistry teaching. These findings imply that pre-service teacher education should provide opportunities for students' attitudes toward sustainability to be investigated and questioned, so they may become "more conscious in their beliefs and values" (Hart, 2003, p. 227).

It appears that supporting pre-service teachers to challenge their own values and attitudes toward sustainability has the potential to elicit change in their own behaviour and influence the decisions they make when teaching children (Miles et al., 2006; O'Gorman & Davis, 2013). Raising pre-service teachers' understanding that the role of the teacher can influence what young children learn, and the values they develop in relation sustainability, may be an important aspect to be considered in EfS within pre-service education (Kennelly et al., 2008a). The student teacher in the case study by Kennelly et al. (2008a) reported that the unit of teaching helped her define her values and how she could teach children. Pre-service early childhood teachers in the study by O'Gorman and Davis (2013) reported a personal change in their own attitudes and actions when they used an online ecological calculator and supporting learning material to determine their ecological footprint. This increased awareness led to the shaping of students' identities as teachers, and a heightened awareness of their moral obligations for including EfS in their future teaching (O'Gorman & Davis, 2013). Likewise, the

in-service day care attendants who participated in a unit of EfS in Sweden brought with them knowledge, values, attitudes and life experiences that they were able to explore within the context of their learning. Their heightened environmental awareness led to them planning and implementing experiences with children that fostered environmental awareness through the social and ecological elements of sustainability (Ärlemalm-Hagsér & Sandberg, 2011). However, whilst values and beliefs are a key component of EfS, they are not enough on their own for teachers to engage in EfS with children. Miles et al. (2006) found that an interest in sustainability increased pre-service teachers' willingness to teach EfS, however a lack of knowledge and preparedness of how to teach it was a barrier to implementation.

2.4.2 Content knowledge

Pre-service teachers are more likely to teach EfS if they have knowledge of what to teach and how to teach it (Miles et al., 2006). However, as with values and beliefs, pre-service teachers come to their training with a range of knowledge about sustainability. Pre-service teachers report that their knowledge of sustainability has been determined by what they learned in school, the media, and life experiences (Ärlemalm-Hagsér & Sandberg, 2011; Miles et al., 2006). The knowledge of sustainability that pre-service teachers hold appears to be largely in relation to the environmental element (Birdsall, 2013; Evans, Whitehouse, & Hickey, 2012; Summers, Corney, & Childs, 2004). It also appears that despite their knowledge being environmentally centred, there is little understanding of the interrelated nature of humans and the natural environment (Moseley et al., 2010). Students in the study by Moseley et al. (2010) were tasked with drawing their definition of the environment. Many of the students did not feature humans within their depiction, with some not even drawing the natural world. Similar results were found in a study of 112 pre-service primary teachers in Australia, who described the environment as something surrounding, and separate from, them (Taylor, Kennelly, Jenkins, & Callingham, 2006). It appears that the complexity of sustainability and the connection between the elements of environment, society and economics are not clearly understood by pre-service teachers (Birdsall, 2013). This has implications for pre-service early childhood teachers if one of their key roles as a teacher of EfS is to provide very young children with experiences so

they can develop their connections with nature and instil "a sense of responsibility for care of the Earth" (Wilson, 2012, p. 84). Meyers (2006) suggests that a beginning point for learning is an "understanding of ecological processes, human impacts on them, and human need for ecosystem amenities" (p. 467). From this point learning can expand to the socio-political issues that affect human engagement with sustainability (Meyers, 2006).

Addressing the levels of knowledge of pre-service teachers is a complex task for teacher education providers. Effeney and Davis (2013) found that pre-service teachers self-efficacy toward EfS increased as their perceived content knowledge increased. However, it could be easy to engender helplessness amongst students when studying issues such as climate change and global warming if care is not taken to raise awareness without instilling fear. Moseley et al. (2010) contend that content knowledge should begin by addressing issues that relate to the student's local environment and personal concerns. Providing opportunities for engagement with environmental issues within the local context has been shown to increase the knowledge of sustainability and equip pre-service teachers with the confidence to use their knowledge in their teaching (Cheong, 2005; Kennelly, Taylor, & Maxwell, 2008b; Kennelly & Taylor, 2007). The pre-service primary teacher in the case study by Kennelly et al. (2008a) reported that engaging in a unit of work that required her to choose an issue, plan and teach it gave her confidence to know how to transfer this knowledge to other situations when working with children about issues that concern them.

Similarly, Ärlemalm-Hagsér & Sandberg (2011) found that engaging in-service day care attendants in a unit of work that addressed theoretical and practical components of teaching EfS to young children increased knowledge and confidence to plan for young children's social and environmental learning.

However, one of the contentions in early childhood is the role of content knowledge within an early childhood environment, where children's knowledge is co-constructed within an experientially-focused environment. It has been recognised that providing children with open-ended play experiences is not enough for young children to develop conceptual knowledge about sustainability and the environment (Cutter-Mackenzie, Edwards, & Moore, 2014; Davis, 2015).

Cutter-Mackenzie & Edwards (2006) reported that there are "questions regarding the role and position of content in early childhood education from both the educators' and children's perspectives" (p. 14). Some teachers see the process of teaching as more important than content in early childhood (Cutter-Mackenzie & Edwards, 2006). However, a study by Edwards (2005) found that early childhood teacher content knowledge was an important component in building young children's knowledge of sustainability, implying that content knowledge, theoretical, and pedagogical approaches are equally important in early childhood pre-service teacher education programmes for equipping teachers to teach in EfS.

2.4.3 Theoretical approaches to teaching and learning EfS

Research has shown that traditional approaches to teaching and learning have been less effective in preparing pre-service teachers for teaching EfS when they begin their careers (Lindemann-Matthies et al., 2009). Pre-service primary teachers in three countries in the study by Lindemann-Matthies et al. (2009), who had been exposed to transmission approaches of learning, focusing on knowledge and theory alone, felt unprepared to teach EfS. This teacher-centred approach places the educator in the role of 'expert', imparting their knowledge to the learner, who remains passive with little opportunity to engage in creative thinking and interaction (Jenkins, 2009). As the key aim of EfS is to promote change toward a more sustainable society, a didactic approach toward the teaching and learning of EfS at a pre-service level may not be enough (Varga, Kószó, Mayer, & Sleurs, 2007). Correspondingly, Kennelly, Taylor, & Serow (2012) found that for the pre-service teachers involved in their study, a combination of knowledge development and engagement in activities requiring them to research their own information was beneficial in preparing them to engage with EfS when they began teaching.

A shift toward an education that is more transformative in nature was outlined in the 'Priority of Priorities' published by UNESCO UNEP (1990):

> Utilize current theories of learning in selecting, developing and implementing curricular strategies to effectively achieve EE goals. (The methodology of EE as well as the nature of many EE goals is problem solving. A pragmatic approach on the part of teachers to theories of learning development, such as Piaget's, can do much to

> increase EE effectiveness in such methodologies and goals as environmental problem solving) (p. 2).

Lev Vygotsky (1869-1934) was at the forefront of the social constructivist approach. His approach situates the learner as active in their learning, and the environment and the people within it are guides and facilitators of their knowledge construction (Meyers, 2006). Meyers (2006) contends that there is "an agreement on the usefulness of constructivist learning theory" (p. 466), whereby the learning environment is 'semi-structured' by the educator, allowing students to have direct experiences of the natural environment, explore their knowledge, values and beliefs toward it, and determine how they can make effective change toward their environmental concerns. A social constructivist approach to teaching EfS also sits well with early childhood education. As Elliott (2010) identifies, early childhood has a "pedagogical advantage" (p. 35), as the approaches that are advocated as applicable for teaching EfS, such as experiential learning and problem-solving, already occur in early childhood teaching. Experiential learning and problem-solving situate children as active participants in their learning. They work with and alongside others to construct their knowledge of a particular topic (Helm & Katz, 2011). Applying a constructivist approach to EfS in early childhood pre-service teacher education could have benefits in increasing an early childhood teacher's content knowledge and giving them pedagogical approaches to implement in their early childhood settings.

Early childhood education in Aotearoa New Zealand is grounded in a sociocultural approach to teaching and learning. Te Whāriki, the early childhood curriculum states that "the relationships and environments that children experience have a direct impact on their learning and development" (Ministry of Education, 1996, p.7). Thus, the pedagogical approach to building children's knowledge would be socially constructed with teachers, family and peers (Cutter-Mackenzie & Edwards, 2006).

2.4.4 Pedagogical approaches

The general consensus is that pedagogical approaches for teaching EfS should be holistic (Barker & Rogers, 2004; Tilbury, 1995). Such an approach situates EfS across the curriculum, considering all elements of sustainability and engaging

learners in experiential learning ‘in, about and for’ the environment (Barker & Rogers, 2004). These three approaches cannot be taught independently of each other. They need to be taught together as a whole. This approach is underpinned by social constructivist theory that provides learners with opportunities to learn alongside others to gain knowledge and develop their values and beliefs, whilst engaging in hands-on learning about the environment or sustainability issue. The key to the approach is learning how to undertake action ‘for’ the environment in order to bring about change (Barker & Rogers, 2004). Education ‘for’ the environment provides learners with opportunities to discuss issues, develop critical thinking skills, and the ability to make decisions in order to take action (Tilbury, 1995). Jensen & Schnack's (1997) action competence model could inform a teaching approach that can be used to support learners to develop a greater awareness of environmental issues, develop their own set of values that prompt them to consider change, and develop skills to perform democratic action ‘for’ the environment that will have a positive impact for the future.

Some early childhood centres engage in a number of practices that give children hands-on experiences of environmental practices, learning ‘about and in’ the environment. However, often they do not engage in ‘for’ the environment (Elliott, 2010). Elliott (2010) contends that it requires people to make change for the environment. This has been reinforced through research in early childhood education, where teachers and children worked together to make change within their early childhood centres and wider community (Davis, 2005; Duhn et al., 2010; Ritchie, 2010; Vaealiki & Mackey, 2008). It has been suggested, however, that the reluctance of early childhood teachers to engage fully in EfS is due to historical beliefs that providing young children with experiences in nature is enough, and that children in early childhood are too young to comprehend the issues of sustainability. Furthermore, recent research in early childhood has ignored intergenerational and inter-species connections (Elliott & Davis, 2009). If pre-service early childhood teacher education can prepare beginning teachers for EfS through engagement with the ‘in, about and for’ model (Barker & Rogers, 2004), beginning teachers may be able to challenge some of the reluctance that exists in the sector (Ferreira & Davis, 2010).

Research in pre-service primary teacher education has shown that engaging students within a course of EfS, that provided them with opportunities to design and implement a project which culminated in social action, was an effective way to provide beginning teachers with the skills and confidence to teach EfS (Kennelly et al., 2012). Being engaged in a constructivist approach to their own learning where they were required to research and use information pertinent to their projects appeared to prepare them to use those skills with children when they began their teaching careers (Kennelly et al., 2012). Whilst there is little research available regarding such approaches to teaching EfS in pre-service early childhood education, Ärlemalm-Hagsér and Sandberg (2011) found that engaging in-service day care attendants in a course that addressed theoretical and practical skills for teaching EfS increased their confidence to plan and engage in experiences of sustainability with children in their centres. In addition, O'Gorman and Davis (2013) found that integrating sustainability into a visual arts and humanities course raised awareness of sustainability issues and provided pre-service early childhood teachers with a model of how a transdisciplinary approach to EfS could be used with children. These two studies suggest that a combination of challenging values, developing content knowledge and exploring pedagogical approaches may equip pre-service early childhood teachers with the skills and confidence to incorporate EfS into their teaching, enabling it to become part of the culture of early childhood education.

2.4.5 Student expectations of the workplace for EfS in early childhood

A search of the literature failed to find research regarding student expectations of the workplace for EfS in early childhood and very little research in other teacher education sectors. In the study by Kennelly et al. (2012), a beginning primary teacher found that her expectations that EfS would be prevalent in schools was incorrect. She found that the school she began her teaching career in did not hold environmental concerns as a priority. This impacted on her drive to teach EfS, however she persisted with her belief that the children needed to learn and understand. Through her own motivation she was able to introduce the children she was teaching to EfS (Kennelly et al., 2012). Correspondingly, as EfS is non-mandatory and is not widespread throughout the early childhood sector in Aotearoa New Zealand (Duhn, 2012; Vaealiki & Mackey, 2008), early childhood

teacher graduates may gain employment in centres that do not hold EfS as a core value, and despite their expectations that they will receive support for implementing EfS into their practice, this may not be the case.

However, early childhood teacher graduates in Aotearoa New Zealand may have experienced centres with a range of EfS practices within their training, as it is a requirement of the Education Council that pre-service teachers "experience practicum placements across a range of socioeconomic, cultural and (ECE/school) learner age settings" (Education Council of Aotearoa New Zealand, 2015a, para.11). This may or may not influence their expectations of levels of support for teaching EfS when they begin their employment.

2.5 Summary

Since the *Tbilisi Declaration* was signed by member countries in 1978, there have been calls for EfS to become embedded in education systems worldwide. Member countries have been slow to meet this call within all sectors of education (Ferreira et al., 2007a). This literature review has identified that EfS begins in early childhood. Very young children are innately attracted to nature, and experiences in and with nature help to develop a sense of care for the environment. Unfortunately, in Western countries, children's opportunities for experiences in nature are reducing and children are beginning to show a disconnection with nature. At the same time there is a growing understanding that very young children are capable of perceiving the complexities associated with sustainability and have a capacity to problem-solve and enact societal change. Consequently, early childhood is becoming recognised as an important sector for laying the foundations of EfS. However, this will require a change in culture toward embedded EfS in early childhood.

One of the ways that such a change can occur is through pre-service teacher education. Internationally and nationally, pre-service teacher education institutions have been slow to include EfS in their programmes. A lack of obligation at a policy level has allowed institutions to choose if, and how, they will incorporate EfS into their programmes. One of the reasons for a lack of commitment by institutions has been the complexity in understanding sustainability and the wide range of values and beliefs associated with it.

This literature review has revealed that pre-service teachers enter teacher education with a wide range of values, beliefs and knowledge of sustainability issues, and generally there appears to be a lack of understanding of the complexity of sustainability. Programmes that challenge these views and beliefs have been shown to be effective in raising pre-service teachers' willingness to engage with EfS with children. However, values and beliefs are not enough. Content knowledge and pedagogical approaches are also needed for pre-service teachers to gain the confidence in their ability to teach EfS, especially when they are employed in settings that do not have EfS as a priority.

Gaps around the inclusion of EfS in early childhood pre-service teacher education have been identified through this literature review. Internationally there is very little literature, and in Aotearoa New Zealand no literature, about how teacher education institutions are addressing EfS in early childhood teacher education. This thesis seeks to address this gap.

Chapter 3 Methodology

3.1 Introduction

This chapter documents the approach employed to undertake this study. It outlines the methodology chosen, the methods of data collection and the research context. The chapter discusses the research design and data analysis. Finally, it discusses the limitations of the study, the trustworthiness of the data and ethical considerations.

3.2 Research question

The following research question guided this study:

What are early childhood teachers' perceptions of their preparedness to engage in Education for Sustainability at the beginning of their teaching career?

Two further sub-questions were:

- What are pre-service early childhood teachers' perceptions of their preparedness to teach EfS at the end of their teaching qualification?
- What are new graduate early childhood teachers' perceptions of their preparedness to teach EfS once they begin teaching?

3.3 Research methodology

The choice of research methodology influences how the researcher designs the project. There are several research methodologies in education research, however the three that are most prevalent are positivism, interpretivism and critical theory (Mutch, 2005). Positivism and interpretivism are seen as two different ways of looking at the same social phenomenon, while critical theory has a different approach, as it looks beyond understanding what is happening and seeks to make change (Cohen, Manion, & Morrison, 2011).

3.3.1 Positivism

A positivist methodology is aligned to a scientific approach in order to interpret social phenomena. It holds that "social phenomena could be researched in a similar way to natural, physical phenomena, i.e. generating laws and theories that

could be investigated empirically" (Cohen et al., 2011, p. 7). Thus, human behaviour is viewed as being observable, with the researcher drawing conclusions based on objective and deductive reasoning (Mutch, 2005). Positivism is usually aligned to quantitative research, with its emphasis on "objectivity, measurability, predictability, controllability, patterning, the construction of laws and rules of behaviour" (Cohen et al., 2011, p. 31). However, while such an approach can be applied to the scientific world, the complexity of human behaviour makes it difficult for positivism to be applied to social phenomena. A positivist approach views human beings as inanimate, disregarding their ability to have freedom, make their own choices and have individuality, drawing conclusions to generalise across populations without taking account of individual and social differences (Cohen et al., 2011).

3.3.2 Interpretivism

Interpretivism, like positivism, is concerned with human behaviour, but in this case is viewed though a subjective lens. Interpretivism holds that there is a "systematic analysis of socially meaningful action through direct detailed observation of people in natural settings in order to arrive at understandings and interpretations of how people create and maintain their social worlds" (Neuman, 1994, as cited in Mutch, 2005, p. 64). Thus, interpretivism strives to determine the meaning of social phenomena, from the participant's perspective, by focusing on their actions, reactions and intentional behaviour. Researchers employing interpretivism will usually collect the data themselves, within the participant's setting. They will typically gather multiple sources of data, then apply inductive and deductive data analysis to determine patterns, categories and themes, keeping the participant's meanings at the forefront of their analysis while developing a holistic picture of the research (Creswell, 2014). However, while the focus is on the participant and determining the meanings of their behaviour, the power of external influences that shape such behaviour is often not considered. This can lead to artificial boundaries around the subject's behaviour being set, leading to "narrow micro-sociological perspectives" (Cohen et al., 2011. p. 21).

3.3.3 Critical theory

Critical theory holds that while both positivism and interpretivism seek to understand human behaviour, they are incomplete, as they do not consider political and ideological aspects in their conclusions. Hence, critical theory seeks to "not merely understand situations and phenomena but to change them" (Cohen et al., 2011, p. 31). Neuman (1994, as cited in Mutch 2005) stated critical theory was "a critical process of inquiry that goes beyond surface illusions to uncover the real structure of the material world in order to help people change conditions and build a better world for themselves" (p. 64). Hence, critical theory seeks transformation of society in order to redress inequality and freedom within a social democracy. As critical theory is inherently ideological and political, researchers cannot claim to be neutral, as what and who they choose to research is based on their own points of interest (Cohen et al., 2011).

3.3.4 Choice of research methodology

In reviewing the methodological approaches in educational research above it became apparent that a positivist methodology was unsuitable for this study. Positivism applies a scientific approach to research, treating participants as separate from their contexts, not taking into account individual differences and perspectives. This research seeks to understand participants' different perspectives toward EfS. Likewise, critical theory is unsuitable for this study. Critical theory seeks to make transformational change to society which is not appropriate for this research at this time.

Therefore, this study is more closely aligned to interpretivism, which seeks to gain understanding of participants' perspectives of their world. This study seeks to understand pre-service early childhood teachers' and new graduates' perceptions of their preparedness to teach EfS. It treats each participant as an individual with their own constructed meanings and understandings, with the researcher considering the contexts and events that shape these meanings.

3.4 Types of research data

An interpretive study can employ the use of both quantitative and qualitative data collection, integrating them to provide a "more comprehensive understanding of

the phenomena" (Cohen et al., 2011, p. 24). These two types of data collection are outlined in the following sections.

3.4.1 Quantitative data

Quantitative research data are grounded in a scientific approach to educational research that uses research questions or hypotheses to guide the research. The purpose is to determine relationships and regularities between two or more variables that can be generalised across populations (Creswell, 2014). The researcher applies deductive logic to statistical data that have been collected to prove or disprove their research question or hypothesis (Mutch, 2005).

Quantitative data collection methods may use pre-set questions that seek to determine "scores, frequencies, trends, and measures" (Mutch, 2005, p. 21) in the data. This type of data collection is useful if the population being sampled is large, as statistical analysis can be applied to determine frequencies and generalisability of the data. However, this type of data collection does not consider the social context of the participants, or allow for personal perspectives to be considered (Cohen et al., 2011).

3.4.2 Qualitative data

Qualitative research data are grounded in anthropology and social sciences. The purpose is to understand how "individuals create, modify and interpret the world in which they find themselves" (Cohen et al., 2011, p. 6). The researcher applies mainly inductive logic to the data and the key ideas arise out of the responses given by the participants. The sample in qualitative research is small, allowing the researcher to gain deeper understandings of how the individuals interpret the world (Mutch, 2005).

Qualitative data collection methods gather descriptive data, typically in using broad open-ended questions. Data analysis is interpretive and seeks to identify key themes and ideas to gain a deeper understanding of the individual's perspective of the world (Mutch, 2005). However, as the researcher is selective in choosing their participants, and the sample size is small, it is difficult for the results to be generalised across other populations and contexts. Furthermore, due to the nature

of the data collected and its analysis, the data is more open to researcher bias (Cohen et al., 2011).

Both quantitative and qualitative data have their strengths and weaknesses as outlined above. It is important for these to be considered in order to make the decision about the type of data collection to employ. This study is mixed methods, and collects both quantitative and qualitative data. These data collection methods are outlined below.

3.5 Data collection methods

Quantitative data collection was gathered through the use of a questionnaire which contained clear statements and closed questions that were analysed using a simple statistical analysis. Qualitative data was collected through the questionnaire, asking participants to explain their rating of the closed questions. Qualitative data was also collected through individual interviews with four participants. The qualitative data was analysed using a thematic approach.

3.5.1 Questionnaires

Questionnaires are a useful tool for gathering information from a large number of respondents (Mutch, 2005). They are relatively easy to administer as they do not require the researcher to be present. The data collected are generally easy to analyse as it is often statistically based, however, if the population size is small, then less structured questions may be used, allowing the respondents to provide more information to support the answers to their questions (Cohen et al., 2011).

There are many types of questions that can be used in questionnaires. Closed questions are used in highly structured questionnaires where frequency and trends in responses are required, while open-ended questions are used in semi-structured or unstructured questionnaires when more qualitative information is sought (Cohen et al., 2011). Closed questions can be coded and analysed relatively quickly, while open-ended questions take time. There is a range of ways that closed questions can be structured to obtain responses. Some examples include: “dichotomous questions; multiple choice questions and rating scales” (Cohen et al., 2011, p. 382).

The closed questions in the questionnaire in this study used five point rating scales with a pre-determined point at each end. The rating scale allowed the respondent to determine their response within a given range. The questionnaire also included four pairs of semantic differential statements with a five point scale that had a description at each end of the scale. Rating scales and semantic differential statements are useful tools for collecting data as they allow the respondent a range within which to give their response, whilst also giving the researcher a wider range of data to analyse (Cohen et al., 2011). However, a weakness of rating scales is that the scale may not have equal intervals between each point. There may also be variance in the interpretation of the wording in the scale by the respondents (Cohen et al., 2011).

To help overcome this, open questions were also used in the questionnaire. "Open questions allow respondents to state their responses in their own way" (Mutch, 2005, p. 120). This allows the respondent to have some control over the responses they give, rather than the possible responses being pre-determined by the researcher (Cohen et al., 2011). The open questions in the questionnaire employed in this study were used to give the respondent the opportunity to justify their choice of response to the closed questions.

A weakness of open-ended questions is that they assume respondents will be able to articulate their responses in written form. Furthermore, the variety of responses may make it difficult to draw comparisons from. However, open-ended questions have the benefits of providing "authenticity, richness, depth of response, honesty and candour" (Cohen et al., 2011, p. 393) that closed questions do not give.

The questionnaire was administered to a cohort of stage 3 Diploma of Teaching (ECE) students at the completion of an environmental education paper (EE3) and just prior to graduation. The questionnaire is included in Appendix A.

3.5.2 Interviews

Interviews are a widely used tool for collecting qualitative data, involving interactions between two or more individuals to "construct the meanings of the other's words, expressions, and gestures" (Taylor & Bogdan, 1998, p. 98). As a method of data collection, interviews are undertaken for a specific research

purpose to seek and supply information on a topic of mutual interest. The questions are designed to "enter the other person's perspective" (Patton, 2002, p. 341) to determine meaning. Interviews are advantageous as they allow for a depth of information to be attained, and the interviewer has the ability to probe for further information to provide clarity. Individual interviews were held with four new graduates of EE3, who were four months into their teaching careers, for the purpose of finding out how prepared they felt for teaching EfS when they began teaching.

In qualitative interviews, the interviewer does not pre-determine the responses that the interviewee will give, rather their role is "to capture the complexities of the individual perceptions and experiences" (Patton, 2002, p. 348). Hence, the interviewer needs to ensure they build a rapport with the interviewee, showing respect and sensitivity toward their emotions and create an atmosphere that encourages the interviewee to respond in their own way, without bias or judgement (Cohen et al., 2011). As the interviewees were previous students of the researcher, care was taken to create an atmosphere that encouraged them to respond honestly without bias or judgement.

The nature of the research question will determine the types of questions that will be asked in an interview. Patton (2002) suggests that combining standardised questions and open questions provides the interviewer with flexibility to pursue subjects in greater depth, as necessary. The four interviews conducted were semi-structured, allowing for a sequence of open questions to be asked, providing the opportunity for the researcher to probe for further clarification when required, and allowing the interviewees to ask questions and make comments. The interview questions are included in Appendix B.

3.6 Research context

I teach a one year compulsory Environmental Education paper (EE3) to early childhood pre-service teachers in their third and final year of a Diploma of Teaching (ECE). The aims of the paper are for students to gain an understanding of EfS, why it is important to be introduced to children during early childhood, and how it can be incorporated into their teaching.

The academic year is 42 weeks, including Orientation week, and follows the school terms. Stage 3 (third year) students have 19 face-to-face teaching weeks, and 16 weeks of practicum, split into two blocks of five weeks and one block of six weeks. EE3 is taught once per week for the entire academic year for two hours each week (see Appendix C). There were 38 students in the 2014 cohort, all female, with the majority being 20-21 years of age as shown in Table 3.1.

Table 3.1
2014 Student cohort by age

Age range	Number of students
20-21	24
22-25	12
>25	2

Each session in EE3 had a range of teaching methods applied to it. Students engaged in group work, individual tasks, small group and large group discussion, in most sessions. In the three first weeks of the paper, the students were introduced to sustainability, exploring the definitions and the values-laden nature of sustainability. They were also introduced to young children in nature through Edward Wilson's notion of Biophilia (Wilson, 2012) and Richard Louv's (2008) nature-deficit disorder, exploring and discussing these ideas and what they mean for teachers of young children in relation to pedagogical approaches. Following their first practicum the students began studying the possibilities of young children engaging in sustainability practices, learning about Jensen and Schnack's (1997) action competence model with education in, about and for the environment (Barker & Rogers, 2004) in preparation for implementing their environmental projects during their second practicum. The students' practicum experiences were with children aged from under one to five year olds. There was discussion and brainstorming of a range of ideas appropriate for the age ranges and objectives of sustainability for young children, especially in relation to providing children with experiences in nature.

As the students were training to be early childhood teachers, and the importance of providing young children with experiences in nature in their early years, there was a focus toward this within class content. Therefore, toward the end of the

academic year sessions returned to sustainability in its more holistic sense, exploring the three pillars of sustainability: environment, social and economic.

The final sessions of the year focused on researching resources that early childhood teachers can access to support EfS in their centres and revisiting and reflecting on their learning in relation to their knowledge of sustainability issues and whether their values toward sustainability had changed over the course of the year.

The paper had three assessments that built on from each other. The first assessment was an introduction to the concepts outlined in the beginning sessions of the paper, where they were required to discuss children's environmental learning and the theories that underpin environmental teaching. The second assessment was an environmental project that the students implemented whilst on their second five week practicum, during term two. The assessment required students to plan and implement a project based on a sustainability issue relevant to the early childhood centre they had their practicum in. They were required to implement a minimum of five experiences with children, recording the children's learning through learning stories, and to write reflections on their own practice, for each experience. The third and final assessment, required students to analyse the children's environmental learning using the learning stories from assessment two, and analyse their own practice for supporting children's environmental learning. In the final term of the year the students made a short presentation, using MS Powerpoint, of their project to the rest of the class.

3.7 Research design

In order to address the two research sub-questions, this study had two phases.

The sub-question for phase one of the study was: What are pre-service early childhood teachers' perceptions of their preparedness to teach EfS at the end of their qualification?

The data collection method for this phase of the study was an anonymous questionnaire that the cohort of students who had completed EE3 were invited to participate on a voluntary basis (see Appendix A). The questionnaire was administered during the final class of EE3 by a colleague of mine and I was not

present in the room. There were 29 students in class on the day that the questionnaire was administered, and 21 chose to complete the questionnaire, however one was unable to be used as the written responses were unable to be read.

The questionnaire was divided into five sections and contained both closed and open-ended questions. The closed questions used five point rating scales, adapted to fit the context of the questions being asked, and included Likert scale and semantic differential questions. Rating scales are useful to researchers as they allow for flexibility in the response by the participant, while affording the researcher the ability to undertake quantitative analysis of the responses (Cohen et al., 2011). The questions were determined from the theoretical framework that emerged from the literature and are outlined in Table 3.2. The questionnaire was peer reviewed by my research supervisor and a colleague. It was then piloted with two past students who completed the paper in 2013. As a result of the piloting some questions were re-worded and the order of some questions was changed. The participant students were given 30 minutes to complete the questionnaire.

Table 3.2
Questionnaire questions derived from theoretical framework

Theoretical framework	**Questionnaire questions**
In order to effectively deliver education for sustainability in early childhood education centres, pre-service teachers need to gain an understanding of what sustainability is (Ferreira et al., 2007; Van Petegem et al., 2005)	How would you rate your personal understanding of sustainability? Very good / None Please explain what sustainability means to you How do you think EE3 has influenced your understanding of sustainability? In relation to sustainability, what does the term 'environment' mean to you?
Education for sustainability contains a values element, and therefore pre-service ECE teachers need to be aware of their own values and beliefs toward sustainability (Hart, 2003; Tilbury, 1995)	Have your values and beliefs toward sustainability changed during EE3? yes-no Why do you think this?
In order to effectively foster young children's connections to nature, pre-service teachers need to develop their own understanding of human connectedness to nature (Moseley et al., 2010)	Because we are human, we are not subject to the laws of nature as are other species/Despite our special abilities, humans are subject to the laws of nature like other species People should adapt to the environment whenever possible/The environment should be changed to meet people's needs People must learn to control nature in order to

	survive/People must learn to live in harmony with nature to survive Nature should be used to provide goods for people/Nature should be preserved for its own sake Now that you have completed this scale, what do you think should be the relationship between humans and nature?
Pre-service teachers need to develop an understanding of the role of the teacher in EfS in ECE including fostering young children's connections to nature and supporting young children to be active citizens (Duhn et al., 2010; Elliott & Davis, 2009)	Providing young children with experiences in nature Very important/Not important Why do you think this? Encouraging young children's sensitivity toward the natural environment Very important/Not important Why do you think this? Supporting young children to actively participate in sustainable practices Very important/Not important Why do you think this? Supporting children to actively make changes to their immediate and wider community Very important/Not important Why do you think this?
In order for pre-service teachers to teach EfS to young children, they need to develop content knowledge of sustainability issues and pedagogical approaches for teaching EfS (Cutter-Mackenzie & Edwards, 2006)	Having prior knowledge and experience of sustainability issues to teach young children Very important/Not important Why do you think this? Integrating sustainability issues across the curriculum Very important/not important Why do you think this? In your project for EE3 which teaching strategies did you find most effective for teaching Education for Sustainability? How would you rate your knowledge of: Growing things Excellent/Very poor Composting Excellent/Very poor Worm farming Excellent/Very poor
Pre-service teachers need to develop the confidence to teach EfS when they begin their teaching careers (Kennelly et al., 2008a)	How confident are you about including Education for Sustainability in your teaching? Very confident/ Not confident at all In your view what gives you this confidence or lack of confidence?
As EfS is non-mandatory, pre-service teachers need to develop a motivation to teach EfS when they begin their teaching careers (Kennelly et al., 2008a)	How motivated are you about including Education for Sustainability in your teaching? Very motivated/ Not motivated at all In your view what gives you this motivation or lack of motivation?

The sub-question for phase two of the study was: What are new graduate early childhood teachers' perceptions of their preparedness to teach EfS once they begin teaching?

Data was collected for this phase of the study through interviews with four participants (see Appendix B). The participants were beginning teachers who had completed EE3 in 2014, and had been working in an early childhood centre for 3-4 months. The four participants were purposefully selected by me. The parameters for selection were based on when they had started their teaching career, their work locality with respect to my home and my perception of their engagement in EE3.

Each interview was conducted at the early childhood centre the participant was teaching in, so the context of the environment could be observed. Two of the participants taught in centres that were corporate owned, one taught in a centre that was privately owned, and the fourth taught in a centre that was community-based.

The interview questions were formulated around the theoretical framework that emerged from the literature and are outlined in Table 3.3. The interview questions were peer reviewed by my research supervisor and a colleague. The interviews took approximately 25 minutes to complete.

Table 3.3
Interview questions derived from theoretical framework

Theoretical framework	**Interview questions**
In order to effectively deliver education for sustainability in early childhood education centres, pre-service teachers need to gain an understanding of what sustainability is (Ferreira et al., 2007; Van Petegem et al., 2005)	Tell me how EfS is supported in this centre (management, colleagues, practices such as recycling, worm farming, gardening, composting, pets)
Education for sustainability contains a values element, and therefore pre-service ECE teachers need to be aware of their own values and beliefs toward sustainability (Hart, 2003; Tilbury, 1995)	What do you recall were the best parts of EE3 and why? How has completing EE3 influenced what you think and what you do? Have your values and beliefs about sustainability been influenced by your experiences as a beginning teacher? Can you explain this?
Pre-service teachers need to develop an understanding of the role of the teacher in EfS in ECE including fostering young children's connections to nature and supporting young children to be active citizens (Duhn et al., 2010; Elliott & Davis, 2009)	Have you been able to foster young children's connections with nature? How? Have you been able to support young children to engage in sustainability practices? How?

In order for pre-service teachers to teach EfS to young children, they need to develop content knowledge of sustainability issues and pedagogical approaches for teaching EfS (Cutter-Mackenzie & Edwards, 2006)	Have you been able to integrate EfS into your teaching? Into the centre? How have you done this? What supports have you been given to do this? Would you have liked to have done more? What do you see as limitations/what frustrates your efforts? Do you feel you had enough content knowledge to teach EfS when you began teaching? Can you explain this Has anything influenced your teaching of EfS since you completed EE3? Thinking about EE3, what do you think were the best parts of this paper and why?
Pre-service teachers need to develop the confidence to teach EfS when they being their teaching careers (Kennelly et al., 2008)	Do you feel more or less confident to teach Education for Sustainability than you did when you graduated? Can you explain this?
As EfS is non-mandatory, pre-service teachers need to develop a motivation to teach EfS when they begin their teaching careers (Kennelly et al., 2008)	Do you feel more or less motivated to teach EfS than you did when you graduated? Can you explain this?

The interviews were semi-structured and allowed for further probing for clarification if required. They also allowed for the interviewee to ask questions, and seek clarification regarding questions being asked (Cohen et al., 2011).

3.8 Data analysis

As noted above, the questionnaire contained both quantitative and qualitative data. Analysis of the quantitative responses from the closed questions and four semantic differential statements was undertaken by assigning a value to each response and entering these into a Microsoft Excel spreadsheet to determine the spread of responses. As the sample size was small, analysis was based on the number of responses assigned to each value, then presented in a graphical format. The small sample size prevented any further statistical treatment of the data.

A thematic approach was used to analyse the qualitative data elicited from the open-ended questions, using themes that emerged from the literature and collected data. Each response was analysed individually and was read and re-read to determine common words/phrases, and then placed into a theme. When all responses had been coded into a theme, all themes were considered for their uniqueness and some themes that were similar were combined or re-phrased. All data within these altered themes were then re-analysed for their fit within the new thematic categories. Each final theme was coded using a manual colour coding

system and assigned a value that was entered into a Microsoft Excel spreadsheet. Most responses contained more than one theme, so the number of themes was larger than the sample size (n=20). Further analysis of the spreadsheet showed the commonality of the different themes within each response.

All closed questions were followed by an open-ended question that allowed respondents to explain why they had rated the question in the way they had. The themes that were identified from analysis of the open-ended questions were then triangulated with the closed question ratings to help determine trustworthiness of the responses.

The data collected from the interviews was audio-taped and transcribed. Notes and impressions of the interview and observations within the early childhood centre were written immediately after the interview to help explain the context of each interview setting. The interviews were transcribed and a copy of the transcribed interview was sent to each interviewee for verification that their responses had been captured with the correct intent. Once this was confirmed, the transcripts were read and re-read to become familiar with the story that each interviewee was telling. For each interview, the data was sorted into three general sections – background of the centre, affordances of the centre for EfS, and the graduates' perceptions of their readiness to teach EfS within that centre. This data was coded using themes that emerged from the interviews and which connected with the theoretical framework. The data from each interview was then written into four separate case stories. Finally, a summary of the four case stories was written that identified similarities and differences between the four graduates' stories.

3.9 Trustworthiness

A research study needs to be examined to ensure the reliability and validity of its results, but this type of positivist approach to addressing these elements is not applicable in a naturalistic study like this one. Rather a naturalistic approach seeks to determine the trustworthiness of the research. There are many different approaches to determining these (Cohen et al., 2011). Lincoln & Guba (1985) outline four aspects to be considered when determining the trustworthiness of research – credibility, transferability, dependability, and confirmability. They

contend that these aspects correspond to the positivist criteria of validity and reliability. Credibility and transferability address the validity of the research, while dependability addresses the reliability, while confirmability addresses objectivity.

Credibility refers to the believability of the findings. Mutch (2005) outlines triangulation and member checking as two approaches to determine credibility. In this study, triangulation was addressed in a small way with some of the questionnaire findings. Findings in some sections were triangulated with findings in other sections. Member checking occurred with the interviews as each transcript was sent to the interviewee to ensure that their responses were captured as they had intended. Peer review of the questionnaire and interview questions was carried out by my research supervisor and a colleague, and the questionnaire was piloted with two past graduates of the EE3 paper. Additionally, Shenton (2004) suggests that "tactics to help ensure honesty in informants when contributing data" (p. 66) should be employed. In this study, participants in both phases were given the opportunity to refuse to participate in the study.

The extent to which the findings can be applied to other situations is referred to as transferability (Castle, 2012). The extent to which this study is transferable will only be determined by those who read the thesis, however, I have provided as much detailed information as possible to allow readers to understand the context and the process within which this study was undertaken. Readers can then determine how applicable the findings of this study are to their context.

Dependability addresses the adequacy of the research procedures, the thoroughness of the data collection methods employed, and the interpretation and analysis of the findings (Castle, 2012). This thesis provides a detailed account of the methodological procedures employed during the research, allowing for future researchers to repeat the study, "if not to gain the same results" (Shenton, 2004, p. 71). Each interview followed a similar format, with each interviewee being asked questions in the same order, while also allowing for further questions and probing for clarification to occur by both researcher and interviewee.

Confirmability refers to the extent to which the findings are the result of the participant's responses, rather than the researcher's voice (Shenton, 2004).

Researcher bias can influence the validity of the findings, as their subjective views can influence the analysis of the data. One way to overcome this is through triangulation (Cohen et al., 2011). In this study, triangulation of the responses within the questionnaire with previous questions sought to reduce researcher bias as much as possible. In addition, Cohen et al. (2001) outline the influence that the researcher may have on the responses of the participants. It is acknowledged that in phase one of the study, I was also the students' lecturer, which may have influenced the responses given by the participants. In phase two of the study, I was the former lecturer of the interviewees and while reassurances were given prior to and during the interview that the participant should be honest within their responses, the previous relationship may still have influenced the responses that were given. There was also an element of potential bias if I was able to recognise the writing of the participant when they completed their questionnaire, or if an interviewee gave a response that could be identified as being consistent with a written response in the questionnaire.

3.10 Limitations

This was a small scale study that only had 20 respondents for the questionnaire and four interviewees. The respondents who completed the questionnaire were most likely more drawn to sustainability than those who chose not to complete it. As the questionnaire was anonymous there was no opportunity for triangulating the interview data with questionnaire responses. The interviewees were also chosen based on my perceptions of their level of engagement with the EE3 paper.

3.11 Ethical considerations

Ethical considerations are at the heart of a research study as they ensure that participants are treated well. Informed consent is a critical aspect of treating a participant well, as it provides the participants with the right to voluntarily participate in the study. It allows them to understand the nature of the research study and their role within it. Informed consent should also provide the participant with details of confidentiality and how their anonymity will be upheld (Webster, Lewis, & Brown, 2014).

Ethical approval for this study was granted by the University of Waikato in November 2014 to collect all data described in this thesis. The ethical approval memo is included in Appendix D. Subsequently, approval was granted by the Academic Manager of the college where the students were studying prior to administering the questionnaire for phase one. The letter of information and informed consent form is included in Appendix E. Approval was also granted by the Managers of the early childhood centres where the interviewees taught, prior to undertaking the interviews. The letter of information and informed consent form is included in Appendix F.

The questionnaire was anonymous and included an information letter that outlined the purpose of the study and provided the participants the freedom to choose to participate or not. The letter of information is included in Appendix G. In order to reduce the power imbalance between myself and the participants of the questionnaire, it was administered during the final class of EE3 by a colleague of mine, after all assessments had been completed. I left the room prior to administration of the questionnaire, and once completed, they were placed in a closed box that only I had access to.

Participants in the interview phase were provided with a letter of information outlining the purpose of the study, their role in the study should they choose to participate, the steps that would be taken to ensure their anonymity and confidentiality, and their right to withdraw from the study. The letter of information and consent form is included in Appendix H. Pseudonyms were given to each interview participant when reporting the case stories. To try and mitigate the power imbalance between myself and interviewee, reassurance was given prior to, and during, the interview that they were no longer a student and were free to share their thoughts without any judgement being made by myself.

3.12 Summary

This research study was designed in two phases and an interpretive approach was employed to analyse qualitative and quantitative data collected from questionnaire responses in phase one and interview responses in phase two. The questions for both the questionnaire and interview were underpinned by the theoretical framework that emerged from the review of literature.

Phase one data was collected from the 2014 cohort of EE3 students at the end of their qualification, while phase two data was collected from four new graduates of the 2014 cohort. An ethical stance was maintained throughout all phases of the study to protect the anonymity of the participants. The four elements of trustworthiness have been outlined with the intent that they will show how they contributed to the robustness of the study. The findings gained from the research design outlined in this chapter are discussed in the following chapter.

Chapter 4 Findings

4.1 Introduction

This chapter presents the findings of the research into pre-service early childhood education teacher preparedness for teaching EfS. The findings of the questionnaire undertaken by student teachers at the end of EE3 are presented in five sections, each relating to the sections from the questionnaire. The data was analysed using a thematic approach. The findings of the interviews of four beginning teachers who completed EE3 are presented in a series of mini case studies.

4.2 Understanding of sustainability and the environment

4.2.1 Student teachers' personal understanding of sustainability and the environment

This section outlines the early childhood student teachers' personal understanding of sustainability and the environment as determined from responses given in the questionnaire that was administered during the last class for EE3 prior to graduation. Students were initially asked to rate their personal understanding of sustainability on a five point scale of very good, good, reasonable, little, or none. All students rated their understanding as reasonable or above with more than half rating themselves as having a good understanding as shown in Figure 4.1.

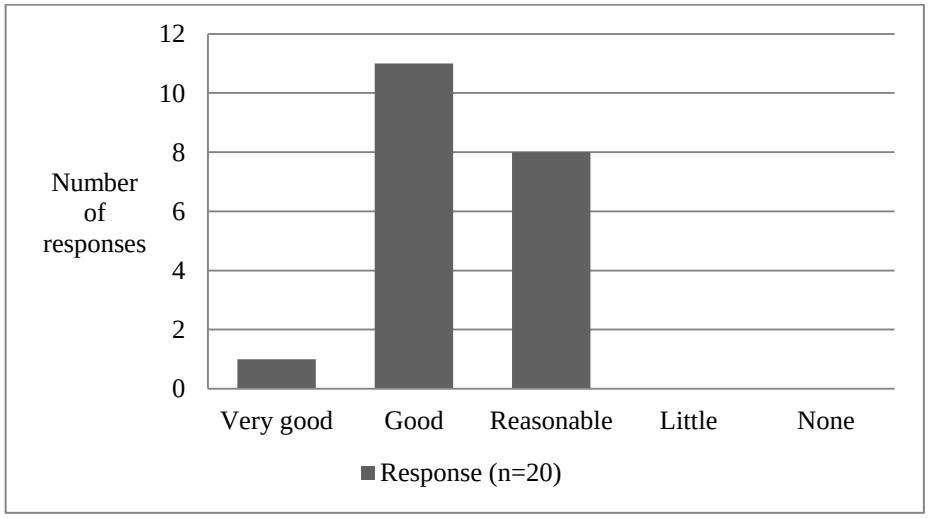

Figure.4.1 Students' rating of their personal understanding of sustainability

To further determine the students' personal conceptions of sustainability, respondents were asked to provide an explanation of what sustainability meant to them. The responses were read and reread to determine themes, which were manually colour coded. There was often more than one idea presented in each response so the responses coded were more than the sample size (n=50).

Summers et al. (2004) had identified seven central elements when determining understandings of sustainable development by pre-service science and geography teachers: purpose, nature, human focus, time scale, geography scale, controversy and aesthetic. Whilst this study asked respondents what sustainability meant to them, rather than sustainable development, the central elements from Summers et al. (2004) connected with the types of responses given. There were seven recurring themes that were coded into four of the central elements identified by Summers et al. (2004). These were purpose, nature, human focus, and time scale (see Table 4.1).

The purpose of sustainability identified respondents' views of how sustainability is enacted. These were coded as protection of the planet, recycle/reuse, and lifestyle choices. The nature of sustainability was used to code for the focus of sustainability, whether it be environmental, social, cultural or economic. Respondents in this study only identified environmental as their focus of sustainability. A human focus was coded to include specific reference to humans, either present or future generations. A time scale was coded for responses that held sustainability as future focused.

Table 4.1
Coded responses of what sustainability meant to participants

Main categories	**Sub-categories and examples of ideas from student teacher responses**	**Frequency** *n=50*	**Total**
Purpose	Protection of Planet How we look after the planet (ST5) Taking care of the earth (ST6) Protect and save our environment and the world (ST12) Ensuring the planet is taken care of (ST14)	17	
	Recycle/Reuse …is about reusing, recycling, waste management (ST2) Looking after the environment by recycling and not over using resources (ST13) …and reusing materials where possible (ST16)	8	28
	Lifestyle choices Decreasing my environmental footprint (ST1) Making good choices that will have a positive influence on the environment (ST7)	3	
Nature	Environmental …as well as things like gardening, care for animals, plants etc (ST6) …nature, animals, people etc (ST7)	6	6
Human Focus	Future generations Sustainability is also about what individuals and the world can do to protect it for future generations (ST2) It means saving what can be saved so that we don't run out of resources for future generations (ST9) So future generations can not only survive but benefit from all the earth has to offer (ST14)	5	10
	Education of others I am doing everything in my power to not just practice sustainability but also to teach others about sustainability (ST1) Teaching children about how and why we care for nature and our planet (ST10)	5	
Time Scale	The future Making the world a better place for the future (ST3) …saving what can be saved so that we don't run out of resources for the future (ST9)	6	6

Content taught in EE3 may have had some bearing on the students' conceptions of sustainability. As outlined earlier in this thesis, fostering young children's connections with nature is an important component of early childhood education (Chawla & Cushing, 2007; Elliott & Davis, 2009). In keeping with this component, EE3 had a focus on providing young children with experiences in nature, and thus issues in sustainability tended to have a leaning toward environmental protection.

Thus, the topics taught in EE3 may have had some bearing on why purpose, nature, human focus and time scale were evident in the responses given. On the other hand, the other elements that Summers et al. (2004) had identified, namely geography scale, controversy and aesthetic were absent from the data. This may reflect the fact that these elements had less teaching associated with them in EE3.

To gain an understanding of the students' personal understandings of the term environment, respondents, were asked to provide an explanation of what environment meant to them in relation to sustainability. Once again, there was often more than one idea presented in each response so the number of responses coded was more than the sample size (n=28). Responses were coded into themes. These were then examined further and grouped into main categories and sub-categories (see Table 4.2).

Table 4.2
Coded responses of what the term environment meant to participants' in relation to sustainability

Main categories	**Sub-categories and examples of ideas from student teacher responses**	**Frequency** *n=28*
Purpose	Where we live The world in which we live and are exposed to in everyday life and living (ST11) The thing around us and the place we live. Where we play and do things (ST12) The surroundings we live in and are in each day (ST18)	7
	Care and protection The environment needs to be healthy and have people taking care of it (ST3) Where we need to protect the planet that we live on (ST5) …It means protecting what we have now before it's gone (ST9)	6
Nature	Natural World The nature and area you can reach and touch (ST4) The natural world around us (ST20)	4
	Natural plus built Environment is everything that is around me, not just the earth but everything in it (ST1) …nature, animals, places, things, the wider world (ST7) …the sky, mountains, buildings, animals (ST15)	6
	Natural including humans The natural world around us, plants, animals, people (ST6) Everything around me, trees grass, dirt etc, including myself and others (ST8)	5

Once again, topics taught in EE3 may have had some bearing on the range of responses received in relation to conceptions of the environment in relation to sustainability. For example, topics that focused on care and protection of the planet may have influenced the responses coded in that sub-category. Furthermore, the leaning toward environmental sustainability may have influenced the responses that were categorised under nature. The relatively even spread of responses indicates a range of conceptions of the term environment. Those responses that were categorised into 'Purpose' indicated that to these students, the environment was a place that they lived in, or something to be protected. Meanwhile, those responses that were categorised under 'Nature', tended to indicate that nature was integral to their conception of the environment, whether it was nature alone, or nature and the built environment, or nature including humans.

4.2.2 Students' reported influence of EE3

To find out if engaging in a paper about EfS during their teacher education could have influenced their ratings of personal understanding, the open-ended question, 'How do you think EE3 has influenced your understanding of sustainability?' was asked of the students. All respondents indicated that their understanding, knowledge or awareness of sustainability had increased as a result of undertaking the paper.

Once again, there was often more than one idea contained within the responses, so the number of responses coded was more than the sample size (n=54). The responses indicated that through the increased knowledge and understanding of environmental issues and EfS, they had developed a sense of empowerment of self and others to address issues of sustainability.

A clear theme to emerge from the coding was the sense of empowerment respondents had gained to make a difference in their personal lives. For example, one stated:

> I think EE3 has greatly influenced my understanding, as I first thought I couldn't do anything to look after the planet on my own. Now I have learnt that one person can make a difference and

> simply informing others can make a huge difference for the future (ST4).

Linked to the theme of empowerment, respondents stated that they had gained an increased understanding of environmental degradation and they wanted to make changes in their lives to help look after the environment. One student wrote, "It has given me a better understanding as to what's really happening to our planet and how I can change to help slow down the impact" (ST9), while another wrote, "I have learnt to understand how much damage we are doing to the environment, in turn making me look at the way I live" (ST13).

While many responses identified empowerment within their personal lives, some also included a sense of responsibility to teach children about the environment and sustainability. For example, ST2 stated, "It has helped me develop my own understanding and what I can do to be more sustainable. How I can use the environment to teach and what I need to teach children about the environment and sustainability." Another student reiterated this viewpoint writing, "It has made me want to be proactive and teach and educate children however I can, to ensure they too have the knowledge" (ST16).

Students were also asked if their values and beliefs had changed during participation in the paper EE3. All respondents indicated some change. When asked to qualify their response, some gave more than one reason so the number of responses coded was larger than the sample size (n=23). Fifteen respondents cited an increase in knowledge as the reason why their values and beliefs have changed, as shown by ST11 "EE3 has made me become more aware and has opened new ideas and information." Another respondent made a connection between increased knowledge and a sense of place, "I think this is because I now know how to make a difference and save the places I played in and loved as a child" (ST4).

Three students indicated that participation in EE3 has made them reflect on their values, for example ST5 said, "It has made me think more about my values and beliefs," whereas five students cited that a change to their values and beliefs toward EfS had led to personal behavioural change. This was clearly characterised by ST13 who responded with, "Before I did not care about recycling or anything,

and would throw my rubbish out the window of my car, but now I see the impact on the world."

4.2.3 Summary

This section indicated that student teachers' personal conceptions of sustainability could be categorised into four of the seven central categories determined by Summers et al. (2004); purpose, nature, human focus and time scale. Respondents' personal understanding of the term environment in relation to sustainability found an even spread of responses that were focused on the planet and nature. They acknowledged that completing the paper EE3 had influenced their personal understanding of sustainability and their values and beliefs. They also reported an increased understanding of environmental degradation and a sense of empowerment to make change in their personal lives and toward teaching others.

4.3 The relationship between humans and nature

This section outlines respondents' views on the relationship between humans and nature. To determine how early childhood pre-service teachers view the relationship between humans and nature, four pairs of semantic differentials were selected from twelve pairs of semantic differentials that Yencken, Fein, & Sykes (2000) developed for young people to indicate their viewpoint on a range of topics in relation to the sustainability. The four pairs of semantic differentials were selected as they related directly to the relationship between humans and nature. Respondents were asked to place their view along the scale by circling a number between 1 and 5. 1 meant that they strongly agreed with the statement on the left, 3 meant their views were evenly balanced or were uncertain between the two statements, and 5 meant they strongly agreed with the statement on the right. Analysis was undertaken to determine if the students' views tended toward a sustainable focus, an unsustainable focus, or were evenly balanced or uncertain.

4.3.1 Conceptions of the laws of nature

Through the course of their evolution, human beings have always been a species that is connected and intertwined with other species on the planet, and thus subject

to the laws of nature (Elliott, 2015). Table 4.3 shows students' views on this concept.

Table 4.3
Student views on humans being subject to the laws of nature

Sustainable view			**Unsustainable view**	
Despite our special abilities, humans are subject to the laws of nature like other species			Because we are human, we are not subject to the laws of nature as are other species	
strongly agree	agree	evenly balanced/uncertain	agree	strongly agree
4	7	8	1	0
(total = 11)			(total = 1)	

Just over half of the students' (11/20) agreed or strongly agreed with the sustainable view that humans are subject to the laws of nature. EE3 provided teaching and discussion about human connections to nature, especially in relation to children, which may reflect why just over half of the students held this view. However, one student held an unsustainable view that humans are not subject to the laws of nature, indicating a viewpoint that humans are separate to nature. Similarly, there were eight respondents' that were evenly balanced in their view, which may indicate an uncertainty in the students' view of the position of human beings in relation to nature.

4.3.2 Conceptions of people and the environment

The environment is defined as the geographical make-up of the world, including the physical elements that make up the landscape that people live in (Heerwagen & Orians, 2002). Historically, humans and the environment were explicitly intertwined, drawing directly from the environment for their needs and being directly influenced by environmental conditions. However, as humans have become more technologically able, there has been a disconnection from the environment. Technology has enabled humans to believe that they can survive without being reliant on nature. This has contributed to less understanding of the influence of the environment on human lives and to a view that the environment is something that can be manipulated by humans (Kellert, 2012). Students' views of people and the environment are outlined in Table 4.4.

Table 4.4
Student views of people and the environment

Sustainable view			**Unsustainable view**	
People should adapt to the environment whenever possible			The environment should be changed to meet people's needs	
strongly agree	agree	evenly balanced/uncertain	agree	strongly agree
9	8	1	1	1
(total = 17)			(total = 2)	

Despite Kellert's (2012) concerns, nearly all students held the view that people should adapt to the environment, whenever possible, with 17 out of 20, agreeing or strongly agreeing. Again, this level of response may be in relation to learning that occurred during EE3 or a level of concern for the environment they have been exposed to through other sources. However, two students held an unsustainable view that the environment should be changed to meet the needs of humans, while one was evenly balanced or uncertain. It appears that these students held values regarding human relationships to the environment that were not affected by the teaching they experienced in EE3.

4.3.3 Conceptions of people and nature

Intertwined with the conception of people and the environment is the conception of people and nature. Nature is defined as the non-human world that exists alongside humans within the environment, that people have evolutionary innate connections to (Kellert, 2012). Students' conceptions of people and nature are shown in Table 4.5.

Table 4.5
Student conceptions of people and nature

Sustainable view			**Unsustainable view**	
People must learn to live in harmony with nature to survive			People must learn to control nature in order to survive	
strongly agree	agree	evenly balanced/uncertain	agree	strongly agree
15	1	1	1	2
(total = 16)			(total = 3)	

The majority of students' (16/20) held the sustainable view that people must learn to live in harmony with nature to survive, reinforcing the viewpoint outlined in Table 4.4 above. Although EE3 did include some teaching on the underlying assumption that connections to nature impact on survival, there was more emphasis on children's connections to nature, and this may be reflected in this response. Given the focus in EE3 on children's connectedness to nature, it is interesting to note that three students' held what could be considered an unsustainable view, and one student was evenly balanced in their response. This may have been due to a lack of understanding that providing connections to nature in young children is linked to survival. It is also noted that one student held a strongly unsustainable view for the statements related to people's connections to both nature and the environment (see 4.3.2). The second student who held a strongly unsustainable view for people's connection to nature held a strongly sustainable view for people's connection to the environment in 4.3.2. This may indicate that the idea of survival in this item created a different element in this student's thinking, as they may have interpreted a connection to nature as not absolutely necessary for their own survival.

4.3.4 Conceptions of the preservation of nature

Kellert (2012) contends that society values nature for its abundance of resources to uphold modern lifestyles, without fully understanding the true impact of the use of resources for sustaining the planet for future generations. Students' conceptions of the preservation of nature are outlined in Table 4.6.

Table 4.6
Student conceptions of the preservation of nature

Sustainable view			**Unsustainable view**	
Nature should be preserved for its own sake			Nature should be used to provide goods for people	
strongly agree	agree	evenly balanced/uncertain	agree	strongly agree
5	4	8	0	3
(total = 9)			(total = 3)	

Just below half (9/20) of the students' held the view that nature should be preserved for its own sake, whereas three students held an opposing view. Of interest is that eight of the students' were evenly balanced or uncertain in their

view. This may have been due to a view that nature sustains humans, while humans also need to ensure that nature is sustained for future generations, or as Kellert (2012) contends, that modern society's marketing of goods does not give a true picture of the natural origins of the goods. Of the three students' who held an unsustainable view, two had held sustainable views to the previous conceptions, making it difficult to determine why their view would be the opposite for this conception. However, it may indicate that they were struggling with the tension between preservation of nature and the environment, and the resources that the environment provides to meet human needs. This could be understandable as humans may position their own individual survival ahead of other species and in relation to the planet. The third respondent also held an unsustainable view for the previous conceptions (Table 4.5). The student who held an unsustainable view for the previous three conceptions was evenly balanced in response to this conception. This may indicate that this student was uncertain in her view for this statement.

4.3.5 Student thoughts on the relationship between humans and nature

After responding to the four semantic differentials, respondents were asked to articulate their thoughts on the relationship between humans and nature. It is interesting to note that while some students held an unsustainable view, or were evenly balanced or uncertain when rating the differentials, this view did not emerge when students wrote their thoughts. In triangulating the data between the quantitative and qualitative responses, it was found that the data provided by the student who responded to the first three differentials with an unsustainable view and the fourth differential as uncertain was unreliable, as her qualitative response contradicted her responses to the semantic differentials. All students provided a response and two themes emerged. Two responses were categorised into both themes so the number of responses coded was greater than the sample size (n=22).

The strongest theme to emerge, with 14 responses, was the view that *humans and nature need to live in harmony*. This was portrayed by one student who wrote, "I think humans should be one with nature. Eat the food it provides but also provide more plants to sustain nature. I think we can use nature but always need to give back to nature" (ST4). This view corresponds with the student's response in Table

4.6, as she was evenly balanced in her conception of the preservation of nature. Her view was also reiterated by other students, such as ST9 who wrote, "We need to look at nature as a part of us instead of two separate things, as without it we wouldn't be here," and "An equal relationship. Nature should provide us with goods but humans also need to provide nature with the respect it needs" (ST3).

The second theme to emerge, with eight responses, was that of *nature being sacred*. When writing about an environment/society disconnect, Barry (2009) identified the "Sacred concept of environment" (p. 124) as one of four concepts that he believes is prevalent in Western society, and is fuelling a disconnect between humans and the natural environment. The view that nature is sacred was characterised by one student who wrote, "We should respect it. We are visitors here for a short time in relation to how old the earth is. Why do we think we can destroy something that was here long before us?" (ST10), and another student who wrote, "Nature was created first, therefore we as humans need to protect it" (ST7).

4.3.6 Summary

The responses to the semantic differentials showed that most students held a sustainable view of the relationship between humans and nature. Some students were evenly balanced or uncertain in their views, whilst a small number held some unsustainable views to the differentials. The qualitative question showed that all respondents held a conception of the relationship between humans and nature as either harmonious or nature as sacred.

4.4 The role of the teacher when teaching EfS

This section outlines student teachers' views on the role of the teacher when teaching EfS. Respondents were asked four questions about the importance of teachers providing young children with experiences in nature, encouraging their sensitivity toward the natural environment, supporting young children to actively participate in sustainable practices, and supporting young children to actively make changes to their immediate and wider community. They were first asked to rate importance using a five point scale where 1 was very important and 5 was not important and then explain their rating.

4.4.1 Children and the natural environment

The first two questions in this section asked students to rate the importance of teachers providing young children with experiences in nature, and the importance of teachers encouraging young children's sensitivity toward the natural environment. On analysing the data, the qualitative responses to these two questions were very similar, with similar themes emerging. These two questions are addressed together within this section. All students gave both questions a rating of 1 or 2, indicating that they believe these two concepts to be important or very important as outlined in Figure 4.2.

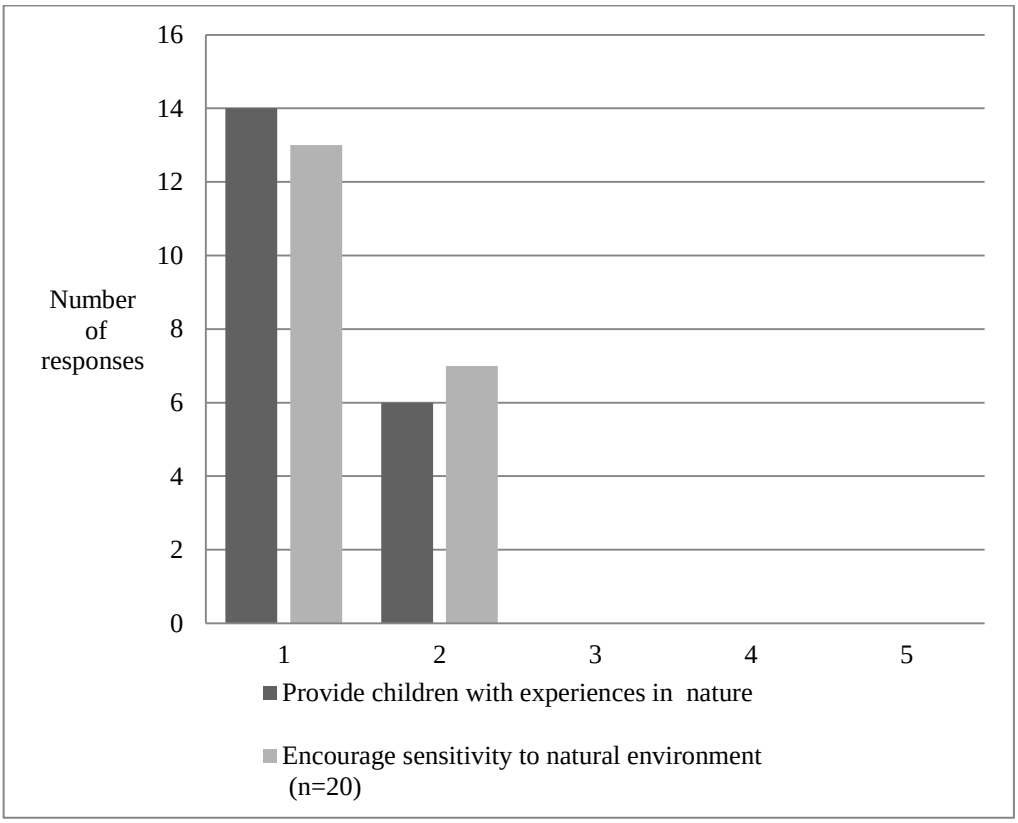

Figure 4.2 Students' ratings of the importance of teachers providing young children with experiences in nature and encouraging sensitivity toward the natural environment

The majority of respondents indicated that they felt that providing young children with experiences in nature was very important (14/20). Similarly, the majority of respondents' felt that it was very important for teachers to encourage young children's sensitivity toward the natural environment (13/20). Analysis of the qualitative responses to these two questions showed that some students provided

more than one reason within their response (n=51). Elliott (2015) discusses how giving young children experiences in nature *will support them to develop a connection to it*. This emerged as a theme across both questions with a total of 11 responses categorised into this theme. This was highlighted by one student who wrote, "Children need to experience nature so they can relate themselves to where they are in the world" for providing children with experiences in nature, and "Children can develop a love for it when given opportunities to explore and be educated" (ST10) for encouraging sensitivity toward the natural environment. This idea was reiterated by another student who wrote, "Building a positive connection with nature at a young age is a positive experience for children" (ST8) for the importance of providing children with experiences in nature.

When children develop positive connections with nature, there can be a developing tendency to want to care for it (Phenice & Griffore, 2003). *Supporting children to care for nature* was another theme that emerged from both questions, with 16 responses categorised into this theme. One student highlighted this by writing, "If this is taught, children will learn to have positive relationships with their environment and will be more likely to care and respect it now and later in life" (ST7) for the importance of providing children with experiences in nature. Another student stated that "Children need to understand nature to be able to have knowledge of how to care for it" (ST1) in response to the importance of teachers encouraging sensitivity toward the natural environment.

The two themes just discussed emerged as the most common with just over half of the total responses (27/51) focussed on the importance of teachers supporting young children's developing connections with nature or supporting them to learn how to care for nature, with some responses falling into both themes (4/27).

While it is widely acknowledged that connections to, and caring for, nature are very important, there is growing concern about what may happen if children do not develop connections to nature (Louv, 2008; Wilson, 2012). Wilson (2012) outlines that when children are not regularly exposed to nature, they may develop physical and emotional difficulties, or "unfounded fears of the natural world" (p. 86). Students identified the importance of children being exposed to nature in relation to learning about and developing confidence in nature (13/17), and

children's development (4/17). Exposure in relation to children *learning about, and developing confidence in nature* was outlined by ST19 who, for the importance of providing children with experiences in nature wrote, "Because children need to understand the different properties of the world around them," and for encouraging sensitivity toward the natural environment wrote, "So they can learn to trust and feel confident to explore the environment." Another student wrote, "So they don't become afraid of nature, and so they can develop a love for it in many different ways" (ST14) in response to the importance of encouraging young children's sensitivity to the natural environment. Meanwhile, exposure to nature in relation *to children's development* was highlighted by a student, who for the question related to providing children with experiences in nature, wrote, "To give children's mental and physical development every positive opportunity to develop and to enhance their learning" (ST16), while another student wrote, "Children need to experience nature through their senses…where children learn about the physical, social and emotional world" (ST17) in response to encouraging young children's sensitivity toward the natural environment.

The final theme to emerge from these two questions, with 7/51 responses, had a *future focus*. Students responded that it was important for teachers to provide young children with experiences in nature and for teachers to encourage young children's sensitivity toward the natural environment so they learn how to protect it for the future. This was highlighted by one student who wrote, "So children can gain a love for nature and learn how to look after it for their own future" (ST14) in relation to providing experiences in nature. This sentiment was reiterated by another student who wrote, "We must educate this new generation coming through in order for nature to survive generations to come" (ST15) in response to the importance of encouraging young children's sensitivity toward the natural environment. These beliefs correspond with these two students' responses of a future focus when asked what sustainability meant to them, outlined in section 4.2.1.

4.4.2 Children's participation in sustainable practices

Young children have an important role to play in addressing sustainability issues. Through practical engagement in sustainability practices in early childhood,

children will develop knowledge and understanding that may influence their future behaviour toward sustainability issues (Pramling Samuelsson, 2011).

As such, the ECE student teachers' were asked to rate the importance of teachers supporting young children to actively participate in sustainable practices. All students responded with a 1 or 2 for this question, with the majority (17/20) giving a rating of 1, as shown in Figure 4.3. This indicates the student teachers felt it was very important or important for teachers to support young children to actively participate in sustainable practices.

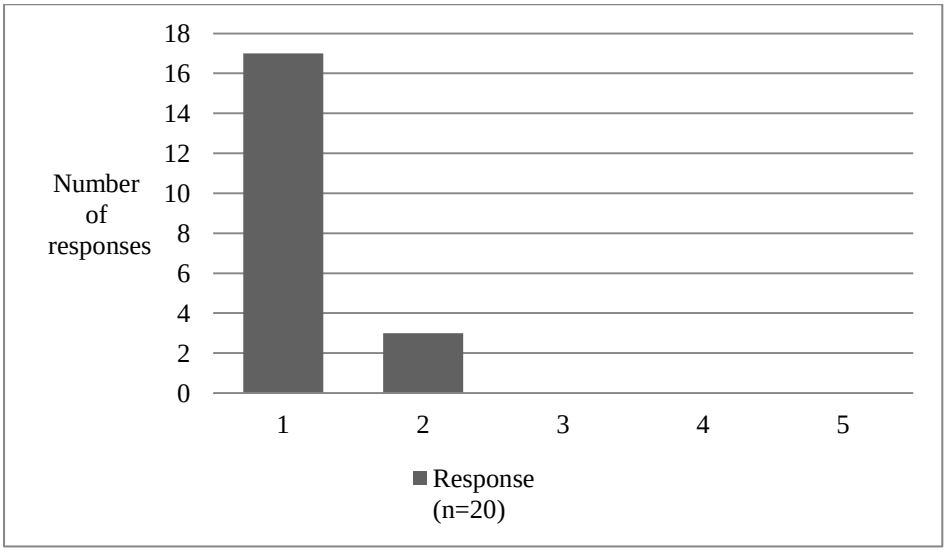

Figure 4.3 Students' ratings of the importance of teachers supporting young children to actively participate in sustainable practices

There were four themes that emerged in response to the qualitative explanation for this question. One respondent chose not to answer and one response was unable to be categorised. Three responses were coded in two themes (n=20).

The theme that was coded with the most responses (8/20) was supporting children to *acquire knowledge* in relation to sustainability and sustainability issues, as outlined by ST4, "If children aren't fully immersed in sustainable practices they may never understand the full importance and meaning of it." Another student held the same view, "They learn through imitating and doing what they see. We need to explain how and why we do sustainable things" (ST10). These responses endorse the view that early childhood is where these issues can be introduced to children in ways that support them to engage and understand (Davis, 2015).

Early childhood also plays a key role in supporting ecological sustainability and developing children's environmental dispositions (Duhn, 2012; Elliott, 2010). This notion emerged as the second theme (5/20), focusing on children *learning and being willing to care* for the planet when they are active participants in sustainable practices. This was highlighted by one student who wrote, "Every child should be encouraged to participate in sustainable practices as it will allow them to grow with new ideas around caring for the planet" (ST5). Another student outlined, "I believe that starting this at a young age and stating the importance of it will bring up a generation more willing to work alongside nature and care for it" (ST8).

The third theme (4/20) to emerge also held an element of care toward the planet, however was about the importance of teachers actively supporting young children to participate in sustainable practices so that they could be *equipped to bring about change*. One student outlined this by writing, "Gaining the skills, knowledge and experiences so they have a voice to be able to advocate for change" (ST1). Another student was more specific in regard to where children would be able to make change, "So they gain knowledge of how they can help the environment and being able to take some of these practices and use them at home and in the community" (ST14).

The final theme (3/20) to emerge had a *future focus*. Students explained that they believed the importance of actively supporting children to engage in sustainable practices would equip them to help future generations, as outlined by ST15, "This must be done in order for Earth to survive for generations to come."

The themes that emerged from this question endorse the view that children's lives are influenced by issues of sustainability and that early childhood is where these issues can be introduced to children in ways that support them to engage and understand (Davis, 2015; Duhn, 2012; Mackey & Vaealiki, 2011).

4.4.3 Children making change

The students were asked for their views on the importance of teachers actively supporting children to make changes in their immediate and wider community. They were asked to rate the level of importance, followed by a qualitative

response to explain their rating. The majority of students placed a rating of one or two, indicating that they felt it was very important or important to support children to make change. Four students placed a rating of three indicating that they did not feel this was as important as previous questions in this section. The results are shown in Figure 4.4.

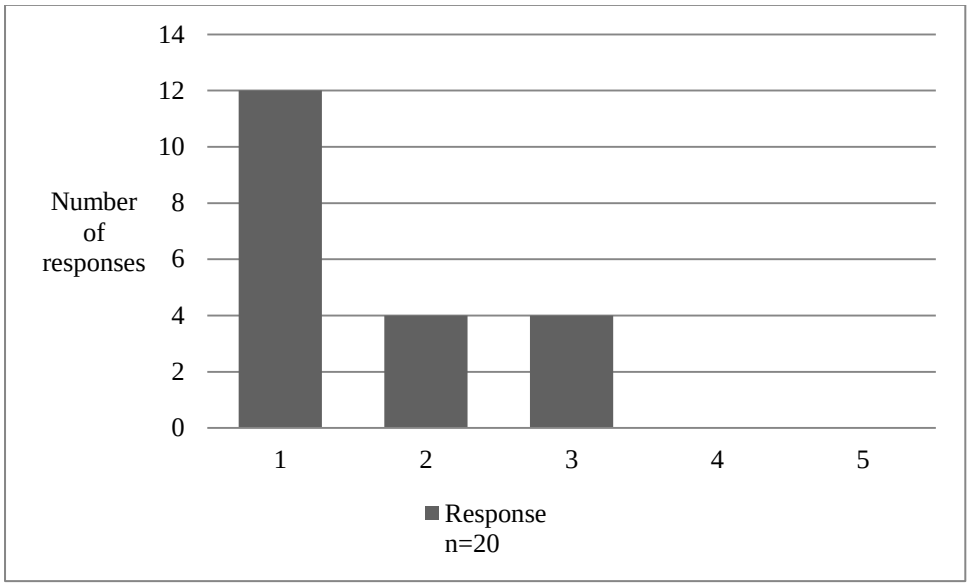

Figure 4.4 Students' ratings of the importance of teachers supporting young children to actively make change to their immediate or wider community

When asked to provide a qualitative response to explain their rating, two chose not to respond and two responses were unable to be categorised. Sixteen responses were categorised into two themes, *agency* and a *focus on the future*.

Research has shown that children in early childhood can demonstrate an ability to make change within their immediate and wider communities (Duhn et al., 2010; Ritchie, 2010; Vaealiki & Mackey, 2008), and 13 of the responses supported this position. These responses were categorised into the theme of *agency*. Students highlighted the importance of young children being equipped to make change themselves, as outlined by one student who wrote, "So they can understand and gain knowledge on what they can do and how they can make a difference" (ST14). Another student took this sentiment further and included the influence children can have on their families, stating, "A small change can go a long way. Children can make a difference and this affects their families and grows off this" (ST8). Another student included the community within their statement, "If

children start changing their practices as young as possible they will be able to better their community and make a bigger difference" (ST4).

It is interesting to note that the responses of the four students who rated the importance of teachers supporting young children to actively make change to their immediate or wider community as 3 (neither important nor unimportant or uncertain) were categorised into the theme of agency, however they appeared to have some reservation over how much change children can make. This was highlighted by one student who wrote, "I have put this in the middle because in some communities children won't be able to go out and do this. However, small changes can be made in the centre and at home (little steps)" (ST15).

The second theme, with three responses, was also about making change, however they had a *focus on the future*. This was highlighted by one student who wrote, "To protect the environment for the future" (ST12).

4.4.4 Summary

This section has outlined how the majority of the student teachers believed in the importance of the role of the teacher to support young children to develop a connection to, and sensitivity toward, nature. They reasoned that when teachers do this, young children would develop a connection to nature, and have a tendency to want to care for it, now and in the future. The majority of students also felt that it was very important for teachers to support young children to actively participate in sustainable practices, in order for them to acquire knowledge, learn and be willing to care for the planet, and be equipped to bring about change, with a focus toward the future. Finally, this section outlined how the majority of the students felt it was very important for teachers to actively support young children to make change in their immediate or wider community, as this would support agency in the children to make change and develop their focus on the future.

4.5 Teaching and learning in education for sustainability

This section outlines the student teachers' beliefs about the importance of early childhood teachers having prior knowledge and experience of sustainability issues in order to teach young children, and the importance of integrating sustainability issues across the curriculum. Students were asked to rate their beliefs on a five

point scale, where 1 was very important and 5 was not important, then provide a comment to qualify their rating.

This section also outlines the teaching strategies that the student teachers found effective for engaging young children in sustainability practices during the paper EE3, and their self-rated knowledge of three sustainability practices that can be implemented in early childhood education.

4.5.1 Teachers' knowledge and experience of sustainability issues

Student teachers were asked to rate how important they believed it was for early childhood teachers to have prior knowledge and experience of sustainability issues to teach young children. The majority of students' (16/20) placed a rating of 1 or 2, indicating they believed knowledge and experience of sustainability issues was very important or important, while four students provided a rating of 3, indicating they felt it was neither important or not important, or were uncertain, as shown in Figure 4.5.

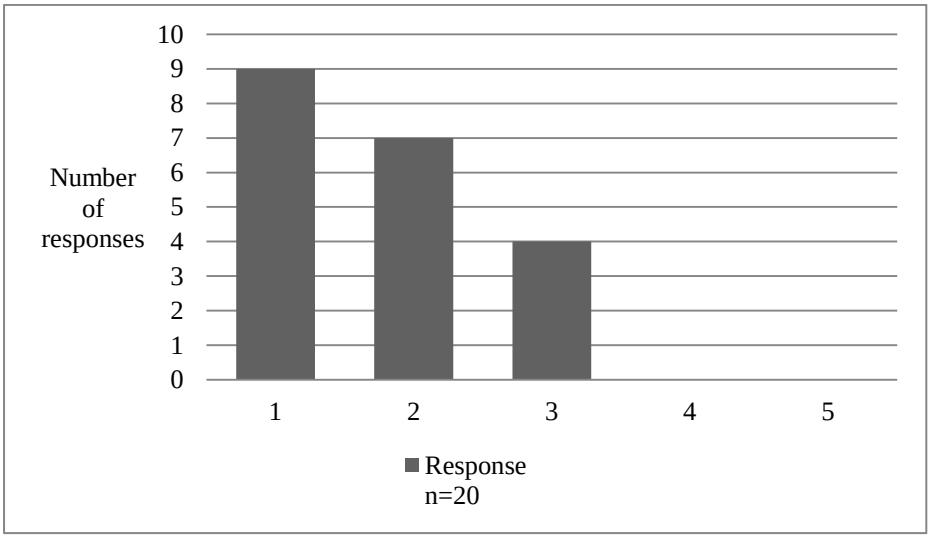

Figure 4.5 Students' ratings of the importance of teachers having prior knowledge and experience of sustainability issues to teach young children

All students provided a qualitative response to justify their rating. Three students provided more than one idea within their response, while one response was unable to be categorised (n=22). Cutter-Mackenzie & Edwards (2006) contend that "there are issues associated with the overlap between content knowledge, pedagogical approach and contextual experience" (p. 17). This emerged within two themes

that were identified in the responses students gave to this question; *having prior knowledge so teachers know what to teach children*, and *co-constructing knowledge with children*. The third theme to emerge related to students' *confidence to teach about sustainability issues*.

The theme that represented the majority of responses (13/22) emerged from students who felt it was important for early childhood teachers to have prior knowledge and experience of sustainability issues in order to teach young children (i.e. they responded '1' or '2'). This theme focused on the belief that teachers should have prior knowledge and experience of sustainability issues *so they know what to teach children*. This was highlighted by ST1 who provided a question as her response, "How can we teach young children if we have no knowledge ourselves?" Her response was echoed by others, such as ST9 who wrote, "We need to know what we are teaching and how that will benefit future generations." Another student also considered knowledge important for being able to role-model change, stating that teachers "need to have knowledge to get started and role-model changes" (ST6).

The second theme to emerge related to teachers *co-constructing knowledge with children* (6/22). It is interesting to note that the four students who provided a rating of '3' (neither important nor unimportant or uncertain) fell into this category, with one writing, "I have put this in the middle as even without prior knowledge change can be made. Either way you can learn with the children about sustainability or you can show the children what you already know and build further" (ST8). This student appears to focus on learning with the children rather than drawing on content knowledge to inform the teaching and learning process. The two other responses within this theme were students who provided a rating of '2'. One of these student's wrote, "Teachers can learn alongside children, but both must be willing to learn and take an interest. Knowledge and experience will help the experience but is not essential" (ST2).

The final theme to emerge, with three responses, was that having prior knowledge and experience of sustainability issues would give *confidence to teach young children*. This was highlighted by ST5 who stated, "Because it allows us to have more confidence to teach."

In general, most of the students' believed in the importance of early childhood teachers having prior knowledge and experience of sustainability issues to teach young children. However, some felt that prior knowledge was less important as they would learn alongside children. These ideas appear to reflect the social constructivist nature of *Te Whāriki* and the approach to teaching and learning EfS, where learners are active in their knowledge construction, with their teachers acting as facilitators and guides (Cutter-Mackenzie & Edwards, 2006; Meyers, 2006; Ministry of Education, 1996).

4.5.2 Integrating sustainability issues across the curriculum

UNESCO (2005b) outlined that education for sustainability should be, among other things, interdisciplinary and holistic in its approach. Research in the early childhood sector has shown that by integrating EfS across the curriculum, children become engaged in sustainability issues, which can lead to wider community change (Davis, 2005; Vaealiki & Mackey, 2008). As such, the students were asked to rate their belief in the importance of teachers integrating sustainability issues across the curriculum, and to provide an explanation to qualify their rating. The majority of students (17/20) provided a rating of '1' or '2' indicating that they felt this was very important or important. One student provided a rating of '4' indicating that she felt it was not important, while two students were in the middle, giving a rating of '3'. These results are shown in Figure 4.6.

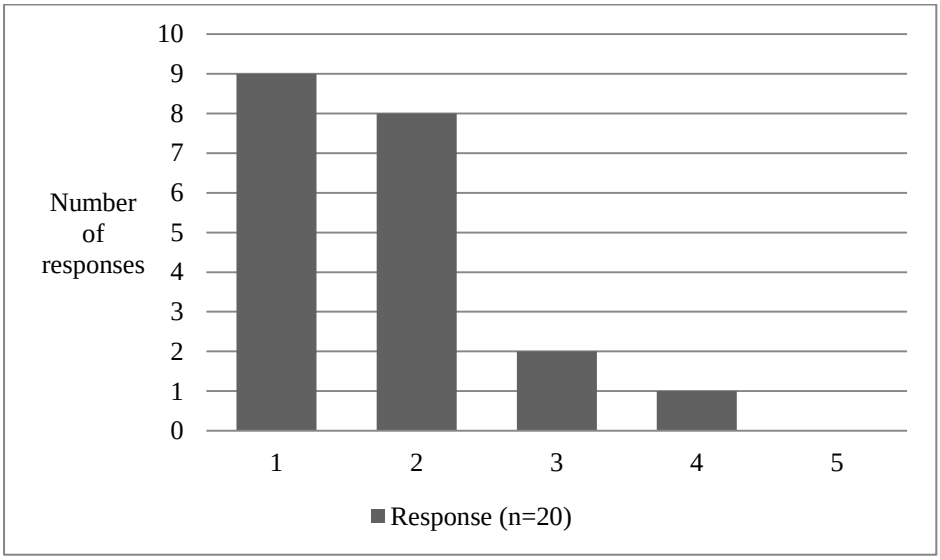

Figure 4.6 Students' ratings of the importance of teachers integrating sustainability issues across the curriculum

When students were asked to qualify their ratings, responses were categorised into three themes. Two responses were unable to be categorised and two respondents chose not to answer.

When analysing the responses, a theme that emerged from the students (7/17) who provided a rating of '1' or '2' was that *sustainability is a holistic topic* that can be integrated across the curriculum. One student highlighted this by writing, "Sustainability is not its own topic and can be integrated into all curriculum areas for deeper and meaningful experiences" (ST2). Similarly, another student wrote, "The more you integrate it, the more chances children have to learn about it" (ST8). Another student took this idea further, considering the transferability of learning that may occur, "…an integrated part of their everyday learning which they can implement in any situation through life" (ST19). These students appear to believe that sustainability is not a discrete topic, rather it is something that can be integrated into curriculum experiences to deepen young children's learning.

In contrast to the idea that sustainable issues should be integrated across the curriculum, the respondents (2/20) who gave a rating of '3' believed that sustainability is a *separate area of focus*. This was highlighted by ST11 who wrote, "Because it is another learning area for children to be involved in." These students appear to see sustainability as another curriculum area that they would be teaching. Meanwhile, the student who gave a rating of '4' on the Likert scale indicated that they felt "There are appropriate times. I don't think it needs to take over the whole curriculum" (ST6). This student appears to misunderstand the meaning of term 'integrate', thinking that integration of EfS may substitute other learning opportunities.

The third theme to emerge from the respondents (5/17) who gave a rating of '1' or '2' was that of *raising awareness of sustainability issues in others*. This was outlined by one student who wrote, "If sustainability is in the curriculum, more people will have to learn about sustaining the environments and we will all be able to make a huge difference to the Earth, world and life" (ST4). These students appear to be thinking beyond teaching young children and considering a wider circle of influence, as shown by ST10, "It encourages other adults to think about, and make changes to be sustainable."

In general, the majority of students felt sustainability was a holistic topic that was important to integrate across the curriculum, which some felt would help to raise awareness of sustainability issues in others. Meanwhile, a minority of respondents felt that sustainability was a separate topic to be taught.

4.5.3 Pedagogical approaches to teach EfS

EE3 students were required to implement an environmental project with children on their second practicum, which was five weeks long. The project required the students to implement five experiences that built on from each other with infants, toddlers, or young children. The questionnaire asked students to identify which teaching strategies they felt were the most effective when working with the children on their project. Arthur, Beecher, Death, Dockett, & Farmer (2012) have developed a continuum of teaching strategies (p. 345) that outlines a range of teacher interaction strategies to support children's learning. Low interaction strategies provide for more child-led learning, with the teacher modelling and facilitating, while the child constructs their own meaning. In the mediating range of strategies teachers are more involved in the child's learning, through supporting, co-construction and scaffolding. The high interaction strategies, such as demonstrating, are when teachers are more explicit in their teaching.

Student responses were categorised using the continuum of teaching strategies as outlined in Figure 4.7. Students provided more than one strategy and so the number of strategies is greater than the sample size (n=38). Two students provided no response.

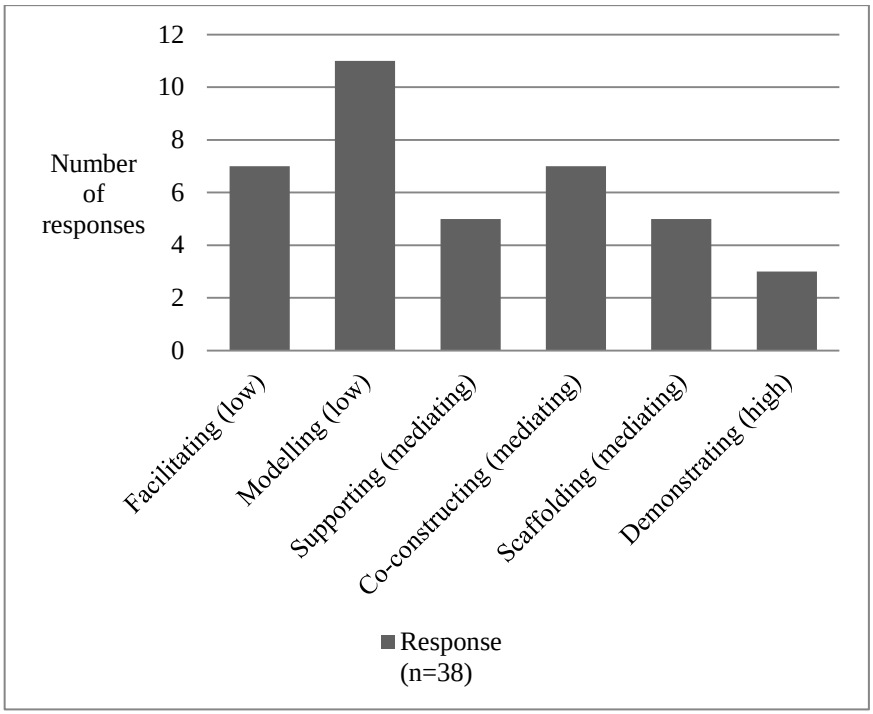

Figure 4.7 Teaching strategies that students' found most effective for teaching EfS

Figure 4.7 shows that 18 students felt that using low interaction strategies were effective for teaching EfS. Mediating strategies were found to be effective by 17 students, while three felt that high interaction strategies were effective. When analysing the responses further it was found that while more students felt low interaction strategies effective, they also listed mediating strategies as well. Similarly, the three students who felt the high interaction strategy was effective also listed mediating strategies. This indicates that students used a range of strategies across the continuum when implementing their projects with children, thus reflecting the suggestion by Arthur et al. (2012), that in order to support children's learning from a social constructivist approach teachers need to use a range of strategies that allow them to move between low, mediating and high interactions as "no one set of pedagogical practices is suitable for all children or all learning contexts" (p. 344). Furthermore, the social constructivist nature of these types of strategies is beneficial when engaging in experiential and inquiry-based pedagogical approaches. Such approaches have been suggested as effective when engaging children in issues of sustainability (Barker & Rogers, 2004; Elliott, 2010).

4.5.4 Student teachers' knowledge of sustainable practices

Many early childhood centres engage in sustainability practices, such as growing things, composting and worm farming (Elliott, 2010). Students were asked to rate their knowledge of these three practices, using a five point scale of excellent, good, average, poor or very poor. The ratings are shown in Figure 4.8.

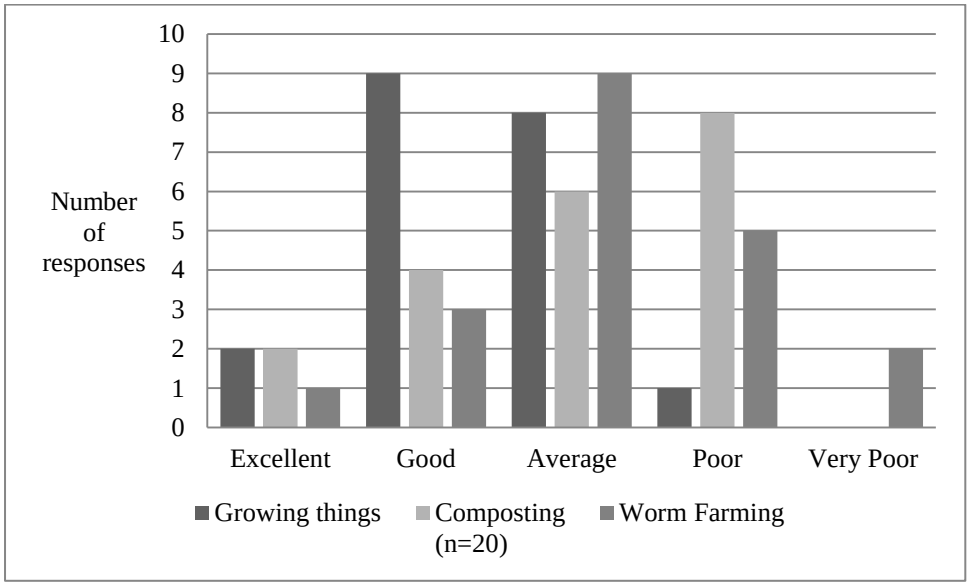

Figure 4.8 Students' ratings of their knowledge of growing things, composting and worm farming

During the course of EE3 these three practices were discussed and some students were involved in these with their environmental projects, or when on practicum in early childhood centres. Just over half (11/20) of the students rated their knowledge of growing things as excellent or good, while eight students rated their knowledge as average, and one rated her knowledge as poor. This may reflect students who had practicums in centres that had gardens, or who chose to grow seeds with children when they undertook their environmental project. It may also reflect students' engagement in sustainable practices at home or exposure to sustainability when they were at school.

Meanwhile, students' knowledge of composting was less than that of growing things or worm farming. Six students rated their knowledge of composting as either excellent or good, and six rated their knowledge as average, however, eight rated their knowledge as poor. This may be due to a lack of depth in teaching during EE3 about composting practices, students not having practicums in centres

that undertake composting practices with children, or no engagement with composting at home.

Interestingly, the number of students who rated their knowledge as good or excellent for worm farming was less than composting, however, more rated their knowledge as average, which was higher than both growing things and composting. This may be due to exposure to worm farming in centres, discussion held in class about how to care for worms in worm farms, or having worm farms at home.

All students who rated their knowledge of growing things, composting or worm farms as poor or very poor had rated their knowledge of at least one of these three practices as average or higher. This indicates that students finished EE3 feeling that they had at least some knowledge of one or more of these three practices.

Growing things, composting and worm farming are three practices often found in early childhood centres as part of their curriculum experiences for ecological sustainability (Davis, 2005; Elliott, 2010; Vaealiki & Mackey, 2008). Therefore, having some knowledge of these practices would be beneficial for beginning teachers. These results indicate that more focus on these practices needs to be considered in the EE3 paper.

4.5.5 Summary

This section indicated that the majority of student teachers felt it was very important or important for teachers to have prior knowledge and experience in sustainability issues so they had confidence to know what to teach. Students who felt it was less important to have prior knowledge and experience felt that they could co-construct knowledge with the children. The majority of students also felt that sustainability was a holistic topic that could be integrated across the curriculum, with some feeling that in doing so, awareness of sustainability issues would be raised in others. In contrast, some students saw sustainability as a separate topic that could not be integrated across the curriculum. This section also indicated that the student teachers utilised a range of low, mediating and high interaction teaching strategies when implementing their environmental projects with infants, toddlers or young children. Finally, this section outlined the students'

knowledge of growing things, composting and worm farming. They indicated a range of knowledge for each practice, with each student reporting an excellent, good or average knowledge of at least one practice when they graduated.

4.6 Confidence and motivation to teach EfS

This section outlines respondents' confidence and motivation to teach EfS. As EfS is non-mandatory in ECE in Aotearoa New Zealand, it falls on those teachers who are confident and motivated to include it in their teaching. Respondents were asked two questions regarding their confidence and motivation to include EfS in their teaching.

4.6.1 Confidence to teach EfS

Beginning teachers are more likely to teach EfS if they feel well prepared and confident to engage children in learning about sustainability (Ärlemalm-Hagsér and Sandberg, 2011; Kennelly et al., 2012). Therefore, respondents were asked to rate their confidence about including EfS in their teaching on a five point scale of very confident, confident, medium, not very confident, not confident at all. No respondent rated themselves as very confident, however just over half (11/20) rated themselves as confident and just under half (9/20) rated themselves as medium. The results are shown in Figure 4.9.

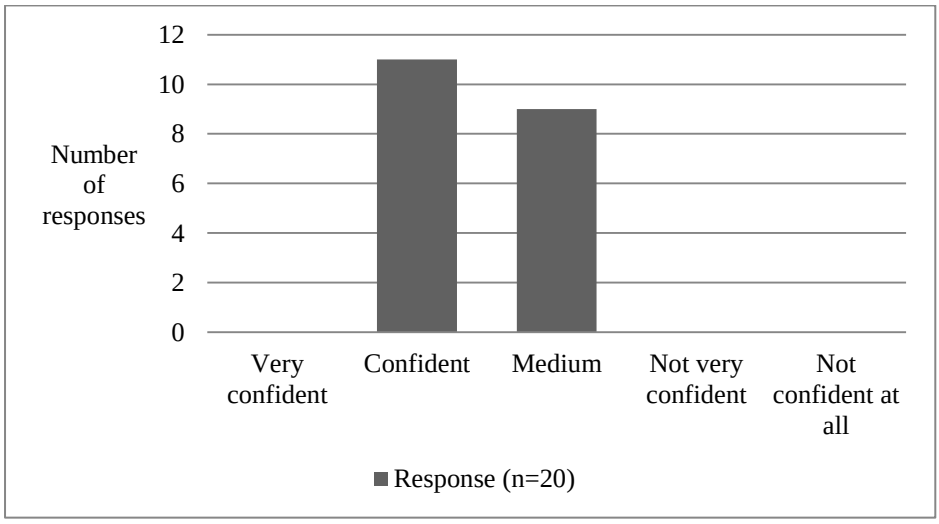

Figure 4.9 Students' ratings of their confidence to include EfS in their teaching

After rating their level of confidence, students were asked to explain what gives them their confidence or lack of confidence. On analysing the responses of those

students who rated themselves as confident, *knowledge of EfS* was the most common reason given (6/11). This was outlined by one student who wrote, "I have the confidence and knowledge of why it's important to address and include sustainability among my practices" (ST17). Another student outlined a similar sentiment, "Knowing what to teach and why. It's important to show and tell children about EfS" (ST12). These students may feel this way due to the content knowledge they received in EE3, experience through implementing their environment project, or possibly due to having practicums in centres who engage in sustainable practices.

Of the remaining students who rated themselves as confident to teach EfS, four out of 11 felt their confidence was due to the *teaching they had received during EE3*. This was articulated by ST7 who wrote, "This year in EE3 I have learnt a variety of teaching experiences that will allow me to incorporate into my practice. The content taught in this class has been very effective and helped me heaps." These responses indicate that students felt that the content taught in EE3 had an influence on their teaching practice.

The fifth student felt that having support of other teachers gave them confidence to teach EfS, "It gives me the confidence through having other teachers' support and them being on board" (ST11). It is probable that this student experienced practicums where sustainable practices are part of the curriculum.

On analysing the responses from the nine students who rated themselves with a medium level of confidence to include EfS in their teaching, the most common theme was the *need for more knowledge* (5/9). One student outlined this by saying, "I now know more so I can teach it, but I also feel I need to grasp a better knowledge before I am fully confident in this area" (ST8). Another student stated, "I need more education on sustainable practices and how to teach these" (ST20). These responses indicate that EE3 may not have contained enough content on sustainable issues. Four of these five students also rated their knowledge of at least one sustainable practice as poor in section 4.5.4.

Of the remaining four respondents who rated their level of confidence as medium, one chose not to provide a reason. Two of the students indicated it was their own disposition that influenced their confidence, with one of them stating, "I talk about

ideas and things I can change, but don't always follow through" (ST6). This student rated her knowledge of sustainable practices from average to very poor in section 4.5.4, and also rated the importance of integrating sustainability issues across the curriculum as 4 in section 4.5.2. This may indicate that this student had a low level of commitment to EfS at that point.

The remaining student who rated their level of confidence to include EfS into their teaching as medium identified that her confidence would come from "having support from other teachers in the centre. Motivation from teachers and children" (ST14). It appears that this student feels her confidence could grow if she is in a centre that supports sustainable practices.

4.6.2 Motivation to teach EfS

In an early childhood environment where EfS is not mandated to be taught, motivation is a key factor for beginning teachers to engage with EfS (Duhn, 2012; Kennelly et al., 2012). Therefore, the final question the ECE student teachers were asked in the questionnaire was in regard to their motivation to include EfS into their teaching. They were asked to rate their level of motivation on a five point scale of very motivated, motivated, medium, not very motivated, not motivated at all. The majority of respondents gave a rating of motivated (14/20), with four giving a rating of very motivated and two giving a rating of medium. The results are shown in Figure 4.10.

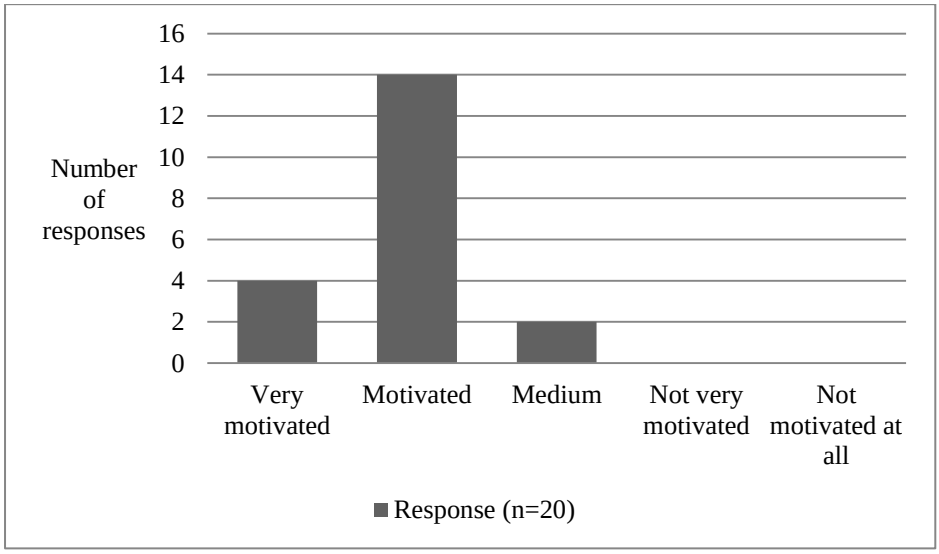

Figure 4.10 Students' ratings of their motivation to include EfS in their teaching

After rating their level of motivation, students were asked to explain what they felt led to their motivation or lack of motivation to include EfS in their teaching. On analysing the responses of the four students who indicated they were very motivated to teach EfS, three identified a *focus on the future*, as highlighted by ST8 who wrote, "I believe children and their families need to learn more about how to help the planet and what simple things they can do at preschool and home. This gives us a better chance at a better future." These three students' responses correspond with their explanation of what sustainability meant to them outlined in section 4.2.1. The fourth student indicated her motivation was going to result in her on-going professional development to encourage children, "I will educate myself more and continually use my information to improve my own learning. Therefore, always encouraging the children to share knowledge and excitement with others around them" (ST16). Interestingly, this student rated her confidence to teach EfS as medium, citing that she did "not always understand specifics or details about the topic." This provides insight into her statement about educating herself further, as she also felt that it was important to have prior knowledge and experience of sustainability issues to teach young children in section 4.5.1. This student's response indicates that while a student might be highly motivated, they do not always have a corresponding level of confidence due to their level of knowledge.

On analysis of the 14 respondents who indicated they were motivated to include EfS in their teaching, three clear themes emerged, *passion for sustainability*, a *future focus*, and *prior experience*. Two responses could not be categorised into a theme and one chose not to respond.

Passion for sustainability (4/14) was identified as a reason for being motivated to teach EfS. This was highlighted by one student who wrote, "My own passion for teaching children about sustainability" (ST1). These four students may have already had a passion for sustainability before undertaking EE3, or had this developed during the paper, as one student wrote, "I have learnt something exciting that I can be passionate about" (ST19).

A second theme given as motivation to teach EfS was *future focus* (4/14). This was articulated by a student who wrote, "Having the knowledge and

understanding around education for sustainability and wanting to make a difference for future generations" (ST14). Another student stated, "I am motivated as I believe we need to change the way we are living if we want a world for our children and grandchildren" (ST13). These students' responses correspond to their responses given in section 4.2.1 where they indicated a concern for the planet and future generations when they wrote about what sustainability meant to them.

Prior experience was also given as a reason for being motivated to teach EfS (3/14). These responses indicate that undertaking the environmental project in EE3 helped them to develop a motivation to include EfS in their teaching. This was outlined by ST7 who wrote, "I have seen the positive outcomes from my practices that have allowed me to see how one person can influence children and teachers."

One of the other two responses that indicated that the student was motivated to teach EfS showed that they wanted to learn more about EfS, "I enjoyed this class and learnt a lot. I would like to learn more on how to implement my ideas" (ST2). The second of the other two responses articulated that she felt she needed the support of future colleagues, "I feel that once I have more staff that are able to support me we can make a difference in children's thinking and lives" (ST4). These two responses indicate that while they are motivated, they feel they need more knowledge on how to teach EfS and the support of their colleagues.

The analysis of the two respondents who indicated a medium level of motivation to include EfS in their teaching showed that both students felt that a lack of time may be a factor. This was highlighted by ST6 who wrote, "We only have one Earth and we need to protect it, however, it can also take a lot of work and extra planning which I may not have time for." While these two students indicated a medium level of motivation, they may feel that the pressures of being a new teacher will impact on their time, thus they may not be able to include EfS into their teaching.

4.6.3 Summary

This section indicates that just over half of the student teachers felt confident, and just under half had a medium level of confidence to include EfS into their

teaching. Of the students who felt confident, the common reasons given were having knowledge and the influence of EE3. The students who had a medium level of confidence indicated that they needed more knowledge of sustainability issues.

In general the students felt motivated to teach EfS. The common reason for this motivation was a focus on the future. Passion for sustainability and prior knowledge and experience were also reasons for students to feel motivated to teach EfS. The two students who were less motivated identified a perceived lack of time for including EfS into their teaching as a factor for them.

4.7 Case stories

Four months after beginning their teaching careers, four graduates who had been part of the cohort for phase 1 were interviewed to find out how prepared they felt to teach EfS, and how they had been able to integrate it into their teaching. This section outlines their stories as new early childhood teachers. To maintain the anonymity of the interviewees, pseudonyms have been used. The interviewees were teaching in a range of centres. Two were teaching in centres that were corporate-owned, where the corporation own many centres throughout Aotearoa New Zealand. One was teaching in a privately owned centre, with the owner having just that centre, and one was teaching in a community-based centre. This centre was a not-for-profit centre designed to meet the needs of the community it is located in.

4.7.1 Julia

Julia works in a semi-rural corporate centre in Canterbury. The centre has recently undergone a change in ownership. The centre is licenced for 75 children, with 50 aged over two and 25 aged under two, grouped as over 2½ years and under 2½ years. Julia teaches in the under 2½ year area of the centre, which is divided into two rooms; a nursery for children aged four months to 18 months, and a toddler room from 18 months to 2½ years. Julia had been working in the centre for four months and spent her first two months working in the toddler room. Due to recent staffing changes, she had transferred to the nursery. The ratio of teachers to children in the nursery is one to four. The toddler and nursery children have

access to a shared outdoor area. The entire centre engages in some sustainability practices, such as recycling and reusing. In the outdoor area of the nursery there is a mix of artificial and real grass, a large sandpit, a barked garden with shrubs and trees, and a small herb garden. There are a variety of natural and man-made resources for the children to explore, both inside and outside. The over 2½ year area has more gardens and a worm farm.

Julia reported that she had not been able to engage in EfS "as much as I would've liked." She said that her head teacher had been a support for her. However, one of the reasons she had not been able to implement as much EfS as she would have preferred to was a lack of time due to staffing changes. She said:

> Just…I guess the time. Because with the kind of staffing changes going on at the moment I haven't had much time off the floor, so it's all been outside of work. So it makes it a little bit hard.

A further frustration for Julia had been a perceived lack of understanding of the value of EfS from the Centre owners. She reported:

> I guess…just…the lack of understanding by people higher up, and the need for EfS, the understanding for how important it is for the children's learning to have it. So they don't place a greater emphasis on it than what they should.

This perception also appears to impact on budgeting for resources as well, as Julia noted that she had obtained resources for teaching EfS "but it also comes out of my own cost as well. We've got a resource list in place, but that's still being processed higher up."

Julia had not engaged the children she works with in sustainability practices due to their young age. She said, "No. Not down this end. To be honest I wouldn't…due to the ages". It appears that Julia may be thinking that conceptually the under two children would not be able to engage in learning for sustainability, seeing it as too cognitively challenging rather than considering their psychomotor learning through her role modelling. However, she felt she had able to foster the children's connections with nature. She reported:

> I try to get them outside as often as I can… I caught a praying mantis at home and brought it into the centre. The children absolutely loved it….we put 'him' outside on the real grass and 'he' stayed around for ages. Two children were just absolutely fascinated by it.

Julia reported that she felt more motivated and confident to teach EfS than she had when she graduated. She said that she was more motivated because:

> Now you're in a centre you can see the benefits, more than just reading about it and talking about it. You're actually able to see it in practice and see the learning that takes place from the children. So it motivates you to kind of continue that.

Julia said that her increased confidence came "from doing the paper [EE3]," which has led to her wanting to do more and inform her colleagues. She said:

> I kind of want to implement it more into my practice and help other teachers kind of understand the importance as well. Maybe by printing out some readings and putting them in the staffroom for them to just read when they can. Like not force it on them, but give them the opportunity to do it that way.

While she appears tentative in wanting to inform her colleagues, she is clear in her acknowledgement that EfS is not something that can be forced upon others (Tilbury, 1995).

Julia reported that EE3 had prepared her with enough content knowledge to engage in EfS when she began teaching as "it was quite detailed and gave you a whole lot of information." She felt that the parts of the EE3 paper that were most beneficial to her learning were:

> All the extra readings and videos around it. Because it just strengthened what you [lecturer] were saying and it kind of gave you a different perspective as well. I guess you always grow up with this one perspective and then that's the only perspective you

know, then when you're given a different perspective, then that's when it kind of makes you think.

It appeared that EE3 had challenged Julia's perspectives toward EfS, and encouraged her to critically reflect on her previous beliefs. Such critical thinking underpins EfS and helps to shape the decisions and actions that an individual chooses to make (Tilbury, 1995). This appeared to be the case with Julia as she felt that EE3 had influenced her personal life by making her more aware of recycling and reusing. She reported:

> I never thought that …it could be so harmful on the environment to just throw something away so simply. But it's that whole throwaway society. Like I've become more of a…a keeper (laughs). I try and reuse things as much as I can instead of just throwing it away.

4.7.2 Helen

Helen works in a corporate early childhood centre in urban Canterbury. The centre is licenced for 100 children, including 20 children aged under two. The centre has four classrooms for grouping children by age. Helen has worked for the company for four months, however had only been at this centre for five weeks. She teaches the 3½ to 4½ year old age group. There are between 18 and 24 children per day in her classroom, with a teacher to child ratio of one to eight. The centre is undergoing some changes within the management team and "everything's getting reviewed and renewed at the moment." There are some sustainability practices occurring, such as recycling and a small garden, however, it does not appear to be a major priority of the centre at the present time. The outdoor environment is astroturf with a mix of fixed and moveable play structures, and hedging around the fence line. The children have access to some natural materials inside and outside.

Helen had not been able to integrate as much EfS into her teaching as she expected to when she graduated, due, as she saw it, to the realities of being a beginning teacher. She reported:

> I actually found it really hard initially…it's different. You're on the floor. You're in ratio. And I actually found that I got busy with just the day to day routines. And I actually found it hard to implement

> just the day to day activities. I'd put something on the table then rush off to do something else, or an injury would happen.

Furthermore, she had found that as EfS is not a mandatory requirement in ECE, she had not been required by centre management to engage in sustainability within her practice. She said:

> I technically don't have to do it, because at the end of the day, say if the centre director came up to me and said, "What have you done today?" I can say, "This and this." She won't ask about that because it's not something I have to do.

The EfS that Helen had engaged children in had been limited to using recycled materials in art, "I had some finger painting out the other day and it was all recycled cardboard that they were using…but, um, I haven't managed to do anything more." However, Helen had found that since she had moved to this centre, she had been reflecting more on her planning and teaching and thinking about EfS. "It wasn't until I left where I was at previously that I realised how much I hadn't done…I need to look at my teaching and make sure I'm covering all aspects, including sustainability." It appeared that changing centres had stimulated Helen to reflect on her teaching as she was exposed to the different ways that centres operate, and new ideas and ways of planning to support children's learning.

Helen had also found it hard to foster young children's connections with nature due to her perception of the outdoor environment. She reported:

> I find that really, really hard here. It's just a lot of our playground is plastic fantastic…We're sort of quite limited in how we do introduce, or have them around the natural environment, because of how constricted our environment actually is.

However, whilst Helen felt constricted by the environment, she was able to reflect on how she was including the natural environment in children's learning, by bringing natural resources inside and planting in the small garden they have outside. Helen also reported that she does let the children play amongst the

hedging and garden around the fence line, only stopping them if they are being destructive of the plants:

> We do have gardens right along the fence line as well. And the children do love getting in and hiding in there. And I don't stop them, um, I let them. Unless they're destroying, you know, that's when I'll stop that.

Helen reported that she now felt confident to start including EfS into her practice by "beginning small and building up from there." She was working with the children to "plan for something to go in there [garden] for the winter time…what we can plant and what we can't." She does feel that her motivation slipped when she began teaching, "I did go into a room where they were pretty relaxed, and sometimes unmotivated to do things." However, her motivation has now increased, "Whereas I feel here I can make a difference….I'm grateful for the few months where I was, but I feel like here I can restart over again."

Helen believes that she had enough content knowledge to teach EfS when she began her teaching and that the most beneficial part of EE3 for her was doing the environment project. This gave her the opportunity to see what was possible when working with young children. She reported:

> My project. I didn't think they'd be interested in completing it or doing it. And initially I thought, 'Why do we have to do this?' But everyone got on board, and the children really, really enjoyed it. They enjoyed all aspects of it.

She found that most classes of EE3 engaged her and that "we actually walked away going, 'Oh wow'…or learnt something that we could actually do in the classroom."

Helen also reported that EE3 has influenced her personal life and has changed some aspects of her lifestyle, "I wouldn't put recyclables in the recycle bin…things just got dumped. It made me stop…now we buy our fruit and veges [locally], and [meat] from the butcher." She has also encouraged her mother to make changes, and feels she can take her influence further, "If I could change me at home, then I could spread it further."

4.7.3 Catrina

Catrina works in a large community-based urban early childhood centre that is licenced for 147 children including 40 children aged under two. The centre has children grouped as over two's and under two's, with two classrooms for each age group. Catrina had worked at the centre for four months, teaching in one of the classrooms for children aged two to five years of age where the ratio of teacher to children is one to eight. Overall the centre engages in some sustainability practices including recycling, gardening and worm farming. The classroom that Catrina teaches in does worm farming and gardening, however, they do not do any recycling. The outdoor environment is large and includes natural play spaces with trees and logs, fixed and moveable equipment, sandpits and a mix of real and fake grass. The centre provides a combination of natural and man-made resources both inside and outside.

Catrina has not integrated EfS into her teaching, and admits that "I haven't, but I probably could." She spoke about bringing recycling into the room she teaches in, as that was the focus of her environmental project in EE3, and feels it is something she could achieve, however, her perception is that the children would not engage in it. She said:

> So I'd like to do, um recycling, because that was my project last year. I'd like to bring that in, but I feel the children would just not care about it, and they'll just put it all in the rubbish.

Catrina felt that she had not been able to integrate EfS into her teaching because of the number of children in her classroom, and felt frustration in having to deal with children who have behavioural issues. She reported:

> Probably the amount of children. I find the children have quite a few behaviour issues, so it's hard to implement those sorts of activities that are slightly different. They'll just…if I bring out an activity or something they'll just destroy it, as such.

While research is starting to show the positive impacts of EfS and natural play experiences on young children's behaviour (Elliott, 2015; Louv, 2008; Wilson,

2012), perhaps, as a new graduate, Catrina may lack the experience to try different practices with the children in her room.

Despite not having been able to integrate sustainability issues into her teaching, Catrina had been able to support the fostering of some connections with nature. She used natural resources with the children, and the children have a lot of opportunity to be outside working in the garden or climbing trees, and feeding the food scraps to the worms. She reported:

> We have a lot of natural things at the centre, like rakau sticks…from the flax, and so we use them quite a bit with children. Um, outside we've got the gardens. We have got a tomato plant that they like watering and they enjoy the worm farm. They bring out the food scraps…Definitely lots of trees around that they climb and enjoy.

Catrina felt that her confidence and motivation to teach EfS had not changed from when she graduated, stating, "Probably the same." Despite feeling this way, Catrina would like to implement recycling into the classroom, with her colleagues, as she has prior experience from her EE3 project. She said, "With doing the recycling last year…I've got different ways that I can do different activities rather than just putting it in the recycling bin, different ways to use things."

Even though Catrina had not integrated EfS into her teaching, she felt that she had enough content knowledge to teach EfS when she began teaching, having gained this through EE3 stating, "Yes, because of all the knowledge you gave us, and how to do it, and why it's important." She could not recall any aspects of EE3 that did not interest her, and felt that implementing the environmental project while on practicum was the best aspect of the EE3 paper. She said:

> I actually thought the best part was implementing the project, being able to implement it into the centre. Umm having the experience…Without the experience I don't think I would feel as confident doing it in a centre…I did enjoy doing it with the children.

While Catrina has always engaged in recycling in her personal life, she feels that EE3 brought the issues of sustainability to the forefront of her thinking and reinforced the importance of it, stating, "I always recycled and stuff, but it's made it more at the forefront of my mind… I am more aware of doing it and why it's important."

4.7.4 Rachel

Rachel works in a private early childhood centre in rural Canterbury. The centre is licenced for 88 children, including 12 under two year olds. There is an under two area (nursery), a two to four year old area and a four to six year old area. Rachel had worked at the centre for four months, first as a reliever for two months, then as a permanent nursery teacher. The teacher to child ratio in the nursery is one to four. The centre has some emphasis toward sustainability practices. It engages in recycling and reusing, gardening, worm farms, and has pets. Each classroom has a large outdoor area that is grassed, with gardens and trees. The majority of the play equipment is moveable and the children have access to natural materials, both inside and outside.

Rachel had been able to integrate some EfS into her teaching, however, she felt she would like to do more. The nursery had a 'hands on' approach to engaging the young children in sustainability practices and Rachel believed that if the children learnt how to do these things at a young age, their understanding would grow. She said:

> With the nursery children, we mainly just teach them by doing…Just getting the idea of doing some things like, um the scraps. They might not know why, and the outcome of everything…if they keep doing it throughout the centre, one day they will realise the impact it does have.

Rachel had found the centre supportive, saying that if she asks the centre manager "she's pretty good at getting…especially outdoor things." Relationships between the teachers have also been supportive, with the nursery and 2-4 year old room working closely together. Rachel reported:

> Yeah, we are all very supportive of one another. And even between rooms…we have a rabbit in the nursery, and they saw that we started saving apple cores, so they also started saving them...Once word gets around we all help each other out.

Despite having these supports, Rachel felt that the reality of being a new teacher had impacted on her ability to integrate more EfS into her teaching, stating, "just getting my head around everything, being at the start of a job…I'll definitely do more in the future."

Rachel was planning on bringing more waste management into the nursery at kai (food) times, feeling that this would support the children when they transition into the next room. She said:

> At lunch time and morning tea they have a rubbish bin and a bin just for food scraps…We don't do that in the nursery but I would love to introduce that… that would be good for transitioning purposes so they know that everything doesn't go in one place.

Rachel had also fostered young children's connections with nature and whenever she "sees an opportunity I will do it." She had been influenced by observing the children in nature, stating, "Seeing the children outside and just their love of it…They just have such a different attitude when they're outside to when they're inside." Rachel listed a range of things she has done to ensure that the nursery children are connecting with nature:

> I always encourage taking the shoes off in the sandpit, feeling the grass under their feet….we've been making leaf piles and they love jumping in those…use the rabbit to settle some children. We've got a cat as well…just really teaching children to be calm and to be gentle.

Rachel felt that her confidence to teach EfS had developed since she graduated as she now felt more confident to ask for help, "…even better because I do know the families and community better that I can ask for help…If I need resources I feel more confident to ask." However, she felt that her motivation is, "probably the same, just once again getting my head

around everything that's new in a centre. But I think in the next few months I would be motivated to do more."

Rachel felt that while she had enough EfS content knowledge to start teaching, there was room to have more knowledge, stating "I definitely did. You can always know more, but I definitely knew enough to teach children starting points". She also said that knowing "where to find ideas" for things to do with young children would be helpful. "I look back on some of the things we did in EE3 and it jogs my memory, but sometimes I just need a bit more."

Rachel could not recall any aspects of EE3 that did not interest her, and felt that doing the project on practicum was the best aspect. She stated:

> I would have to say the project we got to do on placement. Especially as I am a hands-on learner, and to hear it all was good, but it seemed daunting at the time when you told us what we had to do. It was just amazing to see the things that you could come up with, and things the children came up with as well that you wouldn't have even thought about yourself.

Rachel has found that EE3 has also influenced her personal life by improving the recycling she does, and her attitude towards rubbish. She reported that:

> I wash things out properly and I think, "sweet, it can go in the recycling now"…I've never liked littering, but if I see someone else's rubbish on the road now, if I'm walking, I'll pick it up. I used to think, "It's annoying but that's not my rubbish." But now I think, "That's annoying but I can still do something about it."

4.7.5 Summary of the case stories

All of the beginning teachers worked in centres that engaged in some sustainability practices. Julia and Catrina had not integrated EfS into their teaching, while Helen and Rachel had done so, to varying degrees. All four admitted that they could have done more. It is interesting to note that of the four, Rachel, who had integrated the most EfS into her practice, was also in a centre that

had the greatest focus toward sustainability. Her centre also had the most supports in place, from the centre owner to her teaching colleagues.

Helen and Rachel felt that the limitations towards engaging in more EfS in their practice were generally to do with the realities of being a new teacher and learning how being in ratio influences the day to day practices of teachers. Helen also took this further, commenting that because EfS is not mandatory, it is not something that her centre expects her to do on a daily basis. Julia felt that a limitation to her engagement in EfS was due to a lack of time because of staffing changes. This had resulted in her not being able to "get time off the floor" to plan and prepare resources. Julia also felt that a lack of understanding of the importance of EfS by management was impacting on her ability to provide resources through budgeting constraints. Meanwhile, Catrina felt that her limitations were due to the number of children and behavioural issues that she had to manage within her classroom.

However, all four beginning teachers had been able to foster children's connections with nature to varying degrees. While frustrated with having to work within the constraints of a limited natural outdoor environment, Helen provided an explanation of how she was trying to still foster connections through gardening and bringing natural resources inside. Meanwhile, Rachel identified a range of ways she was fostering connections to nature from taking shoes off outside to using the centre cat and rabbit to help calm and settle children. Julia had also fostered connections to nature with young children, taking them outside as much as possible and gave an example of how she had used a praying mantis to foster children's interest in the natural world. Likewise, Catrina encouraged lots of outside play, climbing trees, using natural resources and feeding the worms in the centre worm farm.

The four interviewees felt that EE3 had given them enough content knowledge to teach EfS, with three of them stating that undertaking the environmental project on practicum was the best aspect of the paper. Helen, Catrina and Rachel all reported that while the project had challenged them, implementing it had given them more confidence in their ability to teach EfS, while also learning how much children gained from being involved. Meanwhile, Julia felt that the best aspects were the

readings and videos that built on what she was learning and challenged her perspective of sustainability.

Whilst Julia felt that she was more motivated and confident to teach EfS since she graduated, the other three felt their confidence and motivation was either the same or slightly more. Catrina would like to implement recycling with the support of her colleagues. Helen and Rachel both felt that once they were more settled as a teacher they would have more motivation.

All four interviewees reported that EE3 had an impact on their personal lives. For both Catrina and Rachel, EE3 reinforced their thinking and daily practices, especially in regard to rubbish and recycling. However, for both Julia and Helen, EE3 challenged what they were doing in their daily lives, resulting in them making changes to their lifestyles. Julia began to reuse as much as possible instead of throwing it away, while Helen started reusing, recycling and buying her produce locally. For Helen, EE3 also inspired her to encourage others to make changes to their lifestyles too.

4.8 Chapter summary

The findings presented in this chapter show that ECE early childhood student teachers who had completed the EE3 paper felt that it had influenced their personal understanding of sustainability and their values and beliefs toward sustainability. All of the students felt that they had a reasonable or good understanding of sustainability after the completing the paper and they outlined a range of conceptions of sustainability. These related to a purpose for making change, a focus on nature, an inclusion of the human element toward making change, and a focus on ensuring that future generations have the resources to sustain them. The majority of students (14/20) also held a conception that humans and nature should live in harmony, while the remainder held a view that nature should be held as sacred by humans.

When the role of early childhood teachers was considered, the majority of the student teachers believed that it was very important for early childhood teachers to support young children to develop a connection to, and sensitivity toward, nature. They felt that this would encourage children to care for the planet and make

changes in the future. As such, the majority also felt that it was important to engage young children in sustainable practices, and actively support agency in the children to make changes. The majority of student teachers (16/20) also felt that it was important for teachers to have prior knowledge and experience of sustainability issues, whilst those who felt it was less important believed they could learn alongside the children. When considering their knowledge of growing things, composting or worm farming, the students indicated they had at least an average knowledge of at least one of these practices. This suggests that the content of EE3 may need to be reconsidered in light of these results in order to further develop this knowledge in future student intakes.

With regard to their pedagogical approach to implementing their environmental projects while on practicum, the students identified a combination of low, mediating and high teaching strategies as effective for teaching children about sustainability practices.

On completion of EE3, the students indicated they felt medium to confident to incorporate EfS into their teaching, while the majority of students (18/20) felt motivated or very motivated to incorporate EfS in their teaching, with the remaining two indicating a medium level of motivation.

More knowledge of sustainability issues was a factor in those feeling a medium level of confidence, which also suggests that the content of EE3 may need to be reviewed.

The findings of the interviews of four new teachers who had been teaching for four months indicated that two teachers had not integrated EfS into their teaching, while two had integrated some to varying degrees. However, all had fostered children's connections to nature, and acknowledged that they wanted to incorporate more EfS into their teaching. The realities of being a new teacher was a factor in not engaging (or limited engagement) in EfS. Three of the four interviewees indicated that their confidence and motivation to teach was the same or slightly more than it was when they graduated, with two indicating that they felt their motivation would increase once they felt more settled into their role as a teacher. This suggests that preparation for beginning teachers may need to be addressed in more depth.

Three of the beginning teachers felt that undertaking the environmental project in EE3 was the most beneficial part of the paper as it gave them an insight into what is possible with children, suggesting that the practical component in initial teacher education may have a bearing on teacher confidence. All of the beginning teachers also reported that EE3 had made an impact on their personal lives.

These findings are discussed in more detail in the next chapter.

Chapter 5 Discussion and Conclusion

5.1 Introduction

This chapter provides a discussion of the main findings that were outlined in chapter four. The discussion is divided into two sections, addressing the two sub-questions in relation to the literature. The first sub-question is addressed in relation to the findings in section 5.2. Section 5.3 addresses the findings in relation to the second sub-question. Conclusions are then discussed in section 5.4 in response to the overall research question. Finally, the implications and recommendations that have emerged as a result of this study are addressed.

5.2 Influence of the paper EE3 on pre-service early childhood teachers

This section discusses the findings of phase one of this study in relation to the sub-question:

What are pre-service early childhood teachers' perceptions of their preparedness to teach EfS at the end of their teaching qualification?

5.2.1 Personal understanding of sustainability and the environment

The findings showed that the student teachers' in this study had a reasonable to good understanding of sustainability at the conclusion of the EE3 paper. Their understanding was largely focused on the purpose of sustainability, which was underpinned by environmental concern in relation to protection of the planet, recycling and reusing, and lifestyle choices to reduce their impact on the environment. This is consistent with other studies that have found student teachers conceptions of sustainability tend to have an environment-related focus (Birdsall, 2013; Summers et al., 2004). A human focus also emerged as a conception of sustainability from half of the students' (10/20), in relation to both current and future generations. Other students' conceptions covered time scale, in relation to the future of the planet, or the natural environment. However, other conceptions that have been identified by other researchers, such as economic, social, geography scale, controversy and aesthetic (Summers et al., 2004) were absent from the reported personal understandings of this group of student teachers. The

content taught in EE3 had a stronger environmental focus and this may be why these conceptions were not identified by this cohort.

The findings appear to indicate that EE3 also caused a change in the student teachers' values and beliefs toward sustainability. Values and beliefs underpin teacher identity, and influence the curriculum decisions they make (Hart, 2003). Other research that has found that values and a positive attitude mean that it is more likely the teacher will engage children in environmental and sustainability learning (Burmeister & Eilks, 2013; Kennelly et al., 2008a). O'Gorman and Davis (2013) also found that an awareness of their ecological footprint led student teachers to make lifestyle changes to reduce their impact on the planet and influence others. Likewise, it would seem that the paper, EE3, not only altered the students' values and beliefs, it also influenced some of this cohort to reflect on their environmental stance and to indicate that they have been empowered to make change to their own lifestyles and developed a sense of responsibility to educate others.

In order to teach young children about sustainability and the environment, teachers need to understand the relationship between humans and nature. In the Western world there is growing concern about the disconnect between humans and nature (Barry, 2009; Kellert, 2012; Phenice & Griffore, 2003). Moseley et al. (2010) found that early childhood student teachers' who had no environmental education training did not recognise the interconnectedness between humans and the environment, while Taylor et al. (2006) found that after a 14-week unit in EfS, most students still held an objectified conception of the environment. However, the view held by the majority of students in this study was that humans and nature are connected, recognising that nature sustains humans, and in turn humans need to care for nature, while a minority felt that nature is something sacred and that humans need to protect it. This would suggest that engaging in a course of study that had an environmental focus, may have raised student awareness of the relationship between humans and nature.

5.2.2 The role of the teacher

Wilson (2012) outlines how the early childhood years are fundamental in developing "environmental attitudes and a commitment to caring for the Earth"

(p. 87). Correspondingly, Elliott (2015) contends that early childhood provides the opportunity for teachers to support children to form connections with nature. It was evident that these sentiments were supported by the students in this study, as all indicated that it was important for teachers to provide young children with experiences in nature, and to encourage their sensitivity toward the natural environment. Most students felt it was the role of the teacher to ensure that children spend time in nature in order to develop a connection to it, and to support children to learn how to care for it. Others felt that the role of the teacher was to support children to learn about nature, or support children to develop their confidence in nature. This is heartening given the concern that is growing in the Western world that children's access and time spent in nature is being eroded (Elliott, 2015; Louv, 2008; Phenice & Griffore, 2003; Wilson, 2012).

The student teachers also felt it was important for early childhood teachers to support young children to actively participate in sustainable practices, with some giving awareness of environmental sustainability as their reason. These students believed that children need to be active participants in learning about and being willing to care for the environment, or felt that if teachers engaged children in sustainable practices they would help equip them with skills to protect the planet for future generations. It appears that these students' thinking aligns with research that reports adults with pro-environmental tendencies had experiences in nature with responsive adults during their childhoods, and in their teens, who supported their interest and shared their attention to nature (Chawla, 2007; Chawla & Cushing, 2007).

Meanwhile, other students felt that if teachers involved children in sustainability practices it would equip them with knowledge about why it is important to live sustainably. These ideas are consistent with the view that engaging young children in experiences that are "central in a sustainable environment for social life and economy" (Pramling Samuelsson, 2011, p. 110) are the foundations of developing children's competence in sustainability issues. Finally, some students felt that if children were engaged in sustainable practices they would be equipped with skills to bring about change at home and in their community. Studies undertaken in early childhood services have shown that the ideas of the students in this study are

possible to achieve with the support of passionate and willing teachers (Davis, 2005; Duhn et al., 2010; Ritchie, 2010; Vaealiki & Mackey, 2008).

5.2.3 Teaching and learning

An effective way for early childhood teachers to incorporate sustainability into their centres is by integrating it across the curriculum (Davis, 2005; Duhn et al., 2010; Ritchie, 2010; Vaealiki & Mackey, 2008). Findings suggest that the majority of students in this study also felt it was important to integrate sustainability across the curriculum, seeing it as a holistic topic for children to engage in to deepen their learning. Some students also felt that by integrating sustainability across the curriculum, it would become more visible to others as well, encouraging change beyond children and the early childhood setting. It appears these students see sustainability as a vehicle for teaching different curriculum areas, while also supporting children (and others) to learn how to live their lives in a more sustainable way. This would imply that content knowledge about sustainability would be essential for such teaching to be undertaken.

However, content knowledge is contestable in early childhood. Traditional early childhood practices hold that by providing children with opportunities and resources to engage in within their play will support their learning. However, recognition has grown that this is not enough for children to develop conceptions of the environment and sustainability (Cutter-Mackenzie et al., 2014). Some teachers view their pedagogical approach, content knowledge, and context as complementary, while others believe that a pedagogical approach that allows them to learn alongside children puts the role of content knowledge secondary to their teaching approach (Cutter-Mackenzie & Edwards, 2006). The findings in this study also situated content knowledge about sustainable practices in these two positions.

The majority of the students felt that it was important for early childhood teachers to have prior knowledge and experience of sustainability issues. These students' indicated they needed content knowledge in order to know what to teach children, a sentiment shared with the beginning teachers in the study by Kennelly et al. (2012). In addition, three of the students' also felt that having content knowledge would give them the confidence to teach children about sustainability. Similarly,

Miles et al. (2006) found there was a relationship between content knowledge of environmental education and preparedness to teach in their study of pre-service teachers.

The sentiments of the students in this study who felt prior knowledge and experience was important indicates that they may become teachers who engage in intentional teaching that supports young children to develop conceptions about sustainability and the environment, if they feel they have enough content knowledge to do so. As all students indicated they had some knowledge of at least one of three environmentally-friendly practices that commonly occur in ECE centres (growing things, composting or worm farming), there is a possibility that this may occur.

Meanwhile, those students who felt that prior knowledge and experience was less important felt they would be able to construct their knowledge alongside the children. Thus, implying that like the teachers in the study by Cutter-Mackenzie (2003, as cited in Cutter-Mackenzie & Edwards, 2006), these student teachers felt that the pedagogical approach employed to co-construct their knowledge of sustainability with the children would be sufficient. While some of these students indicated that some prior knowledge would be beneficial, their feeling was that it was not essential.

The experiential and inquiry-based approaches to teaching and learning have been suggested as a beneficial way to engage children with EfS (Barker & Rogers, 2004). Social constructivist teaching strategies underpin such approaches and are everyday occurrences in early childhood. Elliot (2010) suggests that this gives early childhood teachers a "pedagogical advantage" (p. 35) to engage with EfS. As all students indicated that the most effective pedagogical approach they used when implementing their environmental projects involved a combination of social constructivist strategies that allowed children to be active participants in their own learning, while they supported, scaffolded and co-constructed knowledge with them, may have significance for students to think about how they can use experiential and inquiry-based approaches to engage with EfS when they begin teaching. Experience from using a range of strategies in their environmental projects may have influenced the feelings of students in response to the

importance of prior knowledge and experience for teaching EfS. Those who felt it was important to have prior knowledge, may have experienced the benefits of this in their projects, while those who felt prior knowledge was less important, may have had positive results from co-constructing knowledge with children.

5.2.4 Confidence and motivation to teach EfS

Whether or not students feel that prior knowledge is important for teaching EfS, they require the confidence in their ability to do so. At the conclusion of their qualification just over half of the student teachers felt confident, and just under half felt a medium level of confidence to teach EfS. The majority of those who felt confident, stated that it was due to their knowledge of sustainability, knowledge of what they could teach, and why it was important. Furthermore, some stated that the teaching they had received in EE3 had led to their confidence, due to the knowledge and experience they had gained. These findings are consistent with other research that has shown that pre-service teachers have more confidence to engage with EfS if they have had some training in their teacher education programme (Effeney & Davis, 2013; Evans et al., 2012; Kennelly & Taylor, 2007; Kennelly et al., 2008a; Miles et al., 2006).

On the other hand, those who stated they had a medium level of confidence acknowledged the understanding they had gained, however, felt they needed more knowledge in order to feel confident to engage with EfS when they begin teaching. This is consistent with students in the study by Miles et al. (2006), who felt unprepared to teach environmental education as they felt they had a lack of knowledge. As outlined previously in section 5.2.3, the majority of students felt that prior knowledge and experience was important for engaging with EfS, therefore, the feeling that they do not have enough knowledge may influence whether these students will engage with EfS, and if they do, to what extent, when they begin their teaching careers.

However, motivation is also a factor for whether these student teachers' are willing to engage with EfS when they begin teaching. As outlined previously in section 2.3.2, EfS is non-mandatory in the education sector in Aotearoa New Zealand (Duhn, 2012). Therefore, teachers in the early childhood sector need to be motivated to incorporate EfS into their teaching. The majority of students in this

study indicated that they were motivated, with four indicating they were very motivated, while two indicated a medium level of motivation. For many of the students, concern for the planet and future generations influenced their motivation, while others cited passion for sustainability or experience gained, possibly through their EE3 project. These results are consistent with a cohort of primary pre-service students who had a strong or very strong desire to teach environmental education when they began teaching at the completion of an EfS paper (Kennelly et al., 2008b).

These findings regarding motivation, when coupled with confidence to teach EfS, suggest that some of these students may indeed engage with EfS when they begin teaching. However, a factor that might influence their motivation and confidence is the extent to which the early childhood services they teach in engage with EfS. Two students identified that either their confidence and/or motivation would be influenced by the support of their colleagues. As EfS is not widespread throughout the early childhood sector in Aotearoa New Zealand (Duhn, 2012; Vaealiki & Mackey, 2008), it is possible that some of these students will teach in centres that do not uphold EfS as a core value, or engage in any sustainability practices, which may impact on their motivation and confidence to include sustainability in their teaching.

5.3 EfS and new graduate teachers

This section discusses phase two of the study in relation to the sub-question:

What are new graduate early childhood teachers' perceptions of their preparedness to teach EfS once they begin teaching?

5.3.1 Engagement with EfS

The findings showed that the level of engagement with EfS by the four new graduates ranged from no engagement to some engagement with sustainability practices, however, all had supported children with experiences in nature. Whilst the reasons provided by the graduates differed regarding why they had or had not engaged in EfS, there did appear to be a correspondence between the centres' engagement with sustainability and the graduates' level of engagement. Rachel, who was in the centre with the most sustainability support and practices, was the

one who had engaged in EfS the most. She had support from her centre manager, colleagues and centre parents to engage with sustainable practices with children. Meanwhile, two graduates who admitted to having no engagement were in centres that undertook some sustainability practices, however, it was not a key focus. Julia, in particular, felt most frustrated by the perceived lack of understanding from centre management about the importance of sustainability for young children. However, Helen, who noted that EfS was not something that she was required to do, had found that when she changed employment between centres she felt more supported to engage with EfS, as her new centre provided her with more motivation to plan and implement experiences for children. The range of experiences the new graduates in this study have found in relation to centre support is not surprising given sustainability is non-mandatory and there are wide levels of commitment to sustainability within the early childhood sector in Aotearoa New Zealand (Duhn et al., 2010; Vaealiki & Mackey, 2008).

The realities of being a beginning teacher also appeared to be a major contributing factor to the level of engagement that these graduates had with EfS. These realities included learning what it meant to be a teacher in ratio (as a student they were above ratio while on their practicums), staffing changes, management changes, and guiding behaviour. Mahmood (2013) has described such experiences as "reality shock" (p. 154) in a study of New Zealand early childhood beginning teachers. She suggests that college-based student teachers should be made aware of such realities within their teacher education training. This would indicate that the realities of being a teacher should also be included in the preparation of students to engage with EfS when they begin teaching.

When asked about whether they felt they had enough content knowledge to engage with EfS, all of the new graduates confirmed that they did, although Rachel indicated that she would like to know more. They felt EE3 had given them a good understanding of what they could teach and why it was important. Despite the levels of engagement with EfS at the time of the interviews, all acknowledged that they wanted to do more and reported they had the confidence and motivation to do so, with Julia and Rachel stating they were more confident now that they were working in a centre than when they graduated. This finding is consistent with research in pre-service primary training that found when pre-service teachers

undertake a paper in EfS during their teacher education, they felt confident and motivated to teach children as they felt they had acquired knowledge of sustainability and how to incorporate it into their teaching (Kennelly et al., 2008a, Kennelly et al., 2012).

For Julia, a contributing factor toward her knowledge and understanding of EfS was because EE3 had challenged her pre-existing beliefs about sustainability, and had encouraged her to reflect and adjust these beliefs, resulting in a change in her personal life. The study by O'Gorman and Davis (2013) indicated that awareness of sustainability issues had helped shape student teacher identity, while the beginning teacher in the study by Kennelly et al. (2008a), had incorporated a strong environmental focus into her teacher identity, based on the values toward sustainability that she held. It is possible that due to Julia's strengthening values and beliefs in relation to sustainability and the environment, she may reflect on how these could shape her teacher identity.

Meanwhile, Helen, Catrina, and Rachel felt that undertaking the environmental project was the most beneficial part of their learning from EE3. They felt that planning and undertaking the project afforded them the opportunity to see how they could engage young children to take responsibility for their environment. This opportunity appeared to have provided Helen and Rachel with some confidence to implement some EfS in their practice when they began teaching. Although Catrina had admitted she had not incorporated any EfS in her teaching at the time of the interview, she was planning to implement a similar practice to the one she undertook in her environmental project with the children she was currently teaching. These findings are similar those of Kennelly et al. (2012) in their study of pre-service primary teachers. Like Helen, Catrina and Rachel, those students had the opportunity to plan and implement a unit of work while on a teaching placement, and felt this was beneficial in providing them with confidence to include EfS in their teaching when they began their careers.

The teaching content of EE3 also had a focus on children's connections to the natural world. The findings from this study show that all four new graduates have provided the infants, toddlers and young children they teach, with experiences in nature. Early childhood EfS has been built on a tradition of providing young

children with experiences in nature. This has been viewed as a platform from which children's curiosity can develop into a sensitivity toward the natural world (Cutter-Mackenzie et al., 2014; Elliott & Davis, 2009). However, for children to develop "cognitive knowing" (Elliott, 2015, p. 47) they require more than just experiences in nature. They also require sensitive adults who can positively scaffold their understanding about the natural world (Ashby & Agius, 2015; Cutter-Mackenzie et al., 2014; Elliott, 2015). The new graduates in this study have supported the children they teach to move beyond experiencing nature to also learning about the natural world. They have each done this in their own way, being responsive to the age group of the children they work with, from gardening, feeding worms, and learning about bugs, to using pets to teach infants and toddlers how to be calm and gentle with animals. It is likely that if the new graduates in this study continue to build and develop their intentional teaching strategies toward the natural world, the infants, toddlers and young children they teach will have the opportunity to develop meaningful and positive knowledge of the natural world and develop connections to it, thus creating the foundations for "decision making from a sustainability frame of mind" (Elliott, 2015, p. 47).

5.4 Conclusions

Participation in a compulsory paper about sustainability appears to have influenced the pre-service teachers' conceptions of sustainability and in particular environmental sustainability. They demonstrated an awareness of the interconnectedness between humans and nature. This awareness may be an important step toward the shaping of their personal values and beliefs, as they also indicated some change in their values and beliefs toward sustainability, and in some instances, change to their personal environmental behaviour. It is therefore possible that these changes may influence their engagement with EfS when they begin their teaching career.

However, it should be recognised that the social and economic elements of sustainability were absent from the students' explanations of what sustainability meant to them. EE3 had a stronger environmental focus, with less focus on how the social and economic elements were interrelated with the environmental element. It is therefore understandable why the social and economic elements

were absent from students' conceptions of sustainability. This would indicate that a review of EE3 needs to be undertaken to provide a more balanced study of sustainability within this paper.

Student awareness of the importance of the inclusion of EfS in early childhood was evident at the conclusion of the paper. The students felt that it was the role of the teacher to support children to make connections with nature and to engage children in sustainable practices in order to teach them about the care and protection of the planet for future generations through living more sustainable life styles than current generations. The four new graduates, while having engaged in few or no sustainability practices, had however, provided and supported the infants, toddlers or young children they were teaching with experiences connected to the natural world. They also appear to have moved beyond just providing opportunities to play freely in nature, to engaging children with nature through some intentional teaching. It would seem that EE3 has influenced these new teachers to provide a more planned approach to providing opportunities for children to connect with nature.

Furthermore, it seems that engaging in EE3 had provided students with the understanding that EfS could be integrated across the curriculum, rather than being taught as a discrete topic. The majority of students indicated they felt curriculum integration was important for engaging young children with sustainability in a holistic way that would deepen understanding. It is possible that by having gained this understanding, when they begin teaching, the student teachers may find curriculum integration is an achievable vehicle for teaching EfS.

The majority of students felt they needed content knowledge and experience of sustainability issues to know what and how they should be teaching children, while some felt that they would be able to construct knowledge alongside the children. Even though they had not engaged in much EfS with children, the new graduates did indicate that they felt they had enough content knowledge and understanding to do so when they began teaching, although one did indicate that she could know more. She did, however, feel that she had enough knowledge as a starting point to engage children with EfS. While students in this study indicated

that they had some knowledge of at least three environmental practices that commonly occur in early childhood settings, it seems that there could have been more focus on these practices, and possibly a wider range of practices, in EE3. This could then have allowed the students to develop stronger content knowledge to enable them to feel more prepared to engage with EfS when they begin teaching, as there were indications their knowledge was poor for composting and worm farming.

There does, however, appear to be a correlation between content knowledge and experience with having confidence to teach EfS. The students who felt confident to teach EfS identified that it was due to the content knowledge and the experience they had gained from taking the EE3 paper. The four new graduates also stated that while they had not engaged in EfS to the level they could have, the knowledge they had gained through EE3 and the practical experience of undertaking the environmental project had given them a degree of confidence to engage with EfS in their teaching, and were planning to engage more in the future. Therefore, it seems having the practical component that provided the student teachers with the opportunity to implement practices that address sustainability issues was beneficial in giving the students and new graduates a sense of confidence that they would be able to teach EfS when they began their teaching careers.

It also appears that the raised awareness of the issues of sustainability and concern for the future had influenced the motivation of the majority of student teachers to want to engage with EfS. However, due to the inconsistent levels of EfS within the early childhood sector in Aotearoa New Zealand, the students' motivation to teach EfS would need to be strong if they are employed in a centre that has little or no engagement with it. The four new graduates gained employment in centres that had a range of levels of engagement with EfS and this has appeared to influence the degree to which they have also engaged with EfS. This was particularly evident in one graduate who had found that changing employment to another centre had provided her with more affordances to engage with EfS, and hence her motivation had increased.

Furthermore, the new graduates also were confronted with the realities of being a beginning teacher, which they were perhaps not prepared for. Making the transition from student to teacher has meant the new graduates in this study have had to contend with the realities of being in ratio while teaching, the responsibilities of being a teacher within a teaching team, while also learning how to manage behavioural issues with children, and coping with staff turnover and management changes. It seems these realities also had influenced the levels of engagement with sustainability practice in the teaching that the new graduates had undertaken. This would indicate that more preparation for the realities of being a beginning teacher in relation to engaging with EfS should be included in the content of the EE3 paper.

5.5 Implications and recommendations

Awareness of sustainability issues and how to address them with children is a key consideration for any teacher who engages with EfS. However, this awareness is not widespread amongst teachers across the early childhood sector in Aotearoa New Zealand, and EfS tends to be carried out by a small number of passionate teachers (Vaealiki & Mackey, 2008). Addressing this issue through early childhood initial teacher education is one way to raise awareness and commitment toward embedding EfS within early childhood education.

This study has shown that by undertaking a compulsory paper in pre-service teacher education, a cohort of early childhood pre-service teachers have had their awareness of sustainability issues raised, especially in relation to environmental issues, and have made some changes to their values and beliefs about sustainability. This implies that if early childhood teachers are exposed to a paper that supports them to explore sustainability issues during their teacher education, there may be a meaningful shift toward EfS in the early childhood sector, thus upholding the assertion by UNESCO (2005) that "teacher-education institutions serve as key change agents in transforming education and society" (p. 11).

As there is no current policy direction regarding how EfS is addressed in initial teacher education institutions in Aotearoa New Zealand, it is up to each provider to decide if, and how, they will support the teaching of EfS for pre-service teachers. This study has shown that if a provider plans a paper that not only

engages early childhood pre-service teachers in sustainability issues, but also affords them with the knowledge and skills of how they can implement EfS in their teaching, and practise this while on practicum, their confidence to engage with EfS is sound. Therefore, when initial teacher education institutions are planning programmes that engage pre-service teachers in the exploration of sustainability issues and how to engage with EfS within their own practice, inclusion of a practical component would be beneficial for raising confidence to explore sustainability issues with children. This may support pre-service teachers to be more confident to integrate EfS in their teaching when they graduate.

However, it also seems that due to the teaching content in EE3, the understanding of sustainability was biased toward protection of the environment. The students' definitions of sustainability were environmentally focused and the practices that the new graduates had implemented or intended to implement were also environmentally focused. For future students of EE3 to gain a more complete understanding of sustainability issues, there needs to be a balanced approach to addressing the social, environmental and political elements of sustainability and the interrelatedness of each element. Furthermore, consideration also needs to be given to how the early childhood pre-service teachers are taught to engage children to be agents of change in relation to each element, "focusing on real-life issues of relevance and importance to children" (Davis, 2014, p. 33). Such considerations should also be addressed by other pre-service early childhood teacher education institutions who are planning, or teaching papers that engage student teachers with EfS.

A further consideration for pre-service early childhood teacher education institutions is how to prepare new graduates to balance teaching what they have learnt about EfS with the realities of being a new teacher. This study found that for the beginning teachers there was a tension between learning how to be a teacher and trying to implement EfS into their practice. This requires teacher education institutions to prepare campus-based students for what to expect when they enter the early childhood sector, and provide guidance on how they can incorporate EfS across the curriculum. This is particularly pertinent as EfS is currently not a mandatory requirement in early childhood centres in Aotearoa New Zealand, and the levels of engagement with sustainability issues differ

between centres. Continuing to hold onto their motivation to teach EfS, as they grapple with the realities of being a beginning teacher, may be difficult for new graduates if they are employed in a centre that does not provide high levels of support for sustainability.

As a result of this research study, it is recommended that:

- Further research is undertaken on the engagement with EfS of early childhood teachers who have undertaken an EfS paper, and early childhood teachers who have not undertaken an EfS paper, during their pre-service teacher education
- Early childhood initial teacher education providers adopt programmes that include an EfS practical component to be undertaken with young children, to prepare pre-service teachers to teach EfS
- Future policy and curriculum review ensures that sustainability is a mandatory requirement in early childhood pre-service teacher education and early childhood education to raise awareness of the importance of EfS in the early childhood sector. However, until such a requirement is mandated, providers of early childhood education should ensure that their curriculum is guided by the strands and goals of *Te Whāriki* that reflect links to EfS
- The content of EE3 is reviewed to ensure that a balanced approach to all components of sustainability are addressed

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Appendix A Questionnaire

Section A

This set of questions relate to your understanding of, and values and beliefs toward sustainability

1. How would you rate your personal understanding of sustainability? Circle one option

   Very good Good Reasonable Little None

2. Please explain what sustainability means to you

   _____
   _____
   _____
   _____
   _____
   _____
   _____

3. How do you think EE3 has influenced your understanding of sustainability?

   _____
   _____
   _____
   _____
   _____
   _____
   _____

4. In relation to sustainability, what does the term ‘environment’ mean to you?

   _____
   _____
   _____

_____

_____

_____

_____

_____

5. Have your values and beliefs about sustainability changed during EE3?
   Circle one: Yes No

   Why do you think this?

   _____

   _____

   _____

   _____

   _____

   _____

   _____

   _____

Section B

Next there are four questions that relate human connectedness to nature from Yencken, Fien & Sykes (2000). Place your view along the scale by circling a number between 1 and 5, where 1 means you strongly agree with the statement on the left, 3 means your views are evenly balanced between the two statements, and 5 means you strongly agree with the statement on the right.

Because we are human, we are not subject to the laws of nature as are other species	1 2 3 4 5	Despite our special abilities, humans are subject to the laws of nature like other species
People should adapt to the environment whenever possible	1 2 3 4 5	The environment should be changed to meet people's needs
People must learn to control nature in order to survive	1 2 3 4 5	People must learn to live in harmony with nature to survive
Nature should be used to provide goods for people	1 2 3 4 5	Nature should be preserved for its own sake

Now that you have completed this scale, what do you think should be the relationship between humans and nature?

_____

_____

_____

_____

_____

_____

_____

_____

Section C

The next set of questions relate to the role of the teacher when teaching Education for Sustainability.

Please circle one answer for each question where 1= very important and 5 = not important, and provide comments.

Please rate your belief about the importance of teachers:

1. Providing young children with experiences in nature

Very important				Not important
1	2	3	4	5

Why do you think this?

_____

_____

_____

_____

_____

_____

2. Encouraging young children's sensitivity toward the natural environment

Very important				Not important
1	2	3	4	5

Why do you think this?

_____

_____

_____

_____

_____

_____

_____

3. Supporting young children to actively participate in sustainable practices

Very important				Not important
1	2	3	4	5

Why do you think this?

_____

_____

_____

_____

_____

_____

_____

4. Supporting children to actively make changes to their immediate and wider community

Very important				Not important
1	2	3	4	5

Why do you think this?

_____

_____

_____

_____

_____

Section D

The next set of questions relate to teaching and learning in Education for Sustainability. Please circle one answer for each question and provide comments.

Please rate your belief about the importance of teachers:

1. Having prior knowledge and experience of sustainability issues to teach young children

Very important Not important
1 2 3 4 5

Why do you think this?

_____
_____
_____
_____
_____
_____
_____

2. Integrating sustainability issues across the curriculum

Very important Not important
1 2 3 4 5

Why do you think this?

_____
_____
_____
_____
_____
_____
_____

3. In your project for EE3 which teaching strategies did you find most effective for teaching Education for Sustainability?

_____

_____

_____

_____

_____

_____

How would you rate your knowledge of:

Please circle one option that best represents your knowledge.

1=Excellent; 2 = Good; 3 = Average; 4 = Poor; 5 = Very poor

Growing things
1 2 3 4 5

Composting
1 2 3 4 5

Worm farming
1 2 3 4 5

Section E

This set of questions relates to your confidence and motivation to include Education for Sustainability in your teaching.

1. How confident are you about including Education for Sustainability in your teaching? Rate your confidence. Please circle one option

Very confident Confident Medium Not very confident Not confident at all

In your view what gives you this confidence or lack of confidence?

_____

_____

_____

_____

2. How motivated are you about including Education for Sustainability in your teaching? Rate your motivation. Please circle one option

Very motivated Motivated Medium Not very motivated Not motivated at all

In your view what gives you this motivation or lack of motivation?

_____

_____

_____

_____

_____

Thank you for participating in this study

Appendix B Interview Questions

1. What type of centre is this – private, corporate, community-based
2. How long have you worked here?
3. How do you like it?
4. How easy has it been to integrate into the centre?
5. What is your relationship like with other staff?
6. How many children are there?
7. What is the ratio of teacher to children?
8. Is there any emphasis toward EfS in the centre?
9. Tell me about how EfS is supported in this centre (management, colleagues, practices such as recycling, worm farming, gardening, composting, pets)
10. Have you been able to integrate EfS into your teaching? Into the centre? How have you done this?
11. What supports have you been given to do this?/Would you have liked to have done more?
12. What do you see as limitations/what frustrates your efforts?
13. Do you feel more or less confident to teach Education for Sustainability than you did when you graduated? Can you explain this
14. Do you feel more or less motivated to teach EfS than you did when you graduated? Can you explain this
15. Do you feel you had enough content knowledge to teach EfS when you began teaching? Can you explain this
16. Has anything influenced your teaching of EfS since you completed EE3?
17. Have you been able to foster young children's connections with nature? How
18. Have you been able to support young children to engage in sustainability practices? How?

You are no longer in my class or my student, so please feel free to say what you think for the following questions about EE3

19. Thinking about EE3, what do you think were the best parts of this paper and why?

20. How has completing EE3 influenced what you think and what you do?

21. Can you recall any aspects of EE3 that were of less interest to you? Can you explain why?

22. Have your values and beliefs about sustainability been influenced by your experiences as a beginning teacher? Can you explain this

23. What do you think would be important for future beginning teachers to understand about EfS before beginning their teaching?

If there has been no time to implement, ask if it would be ok to contact them a bit later in the year with some follow up questions to see how things might have changed.

Appendix C Teaching Plan Overview

Dates - Week Commencing	Topics
Feb 10	What is Education for Sustainability? Values and beliefs Sustainable practices Introduce Environment Project
Feb 17	Environmental Elements – Physical, Internal, Social, Cultural, Global Children's learning about sustainability
Feb 24	Theories that underpin Environment Education – Evolutionary, Ecological, Constructivist, Sociocultural Pedagogical approaches for EfS Assessment 1 briefing
Mar 03 – Apr 04	**Practicum**
Apr 07	Louv's nature deficit disorder Biophillia
Apr 14	Environmental Generational Amnesia
Apr 21 – May 02	**Holidays**
May 05	Nature based play Environmental Project ideas Writing learning stories for environmental learning
May 12	How do we teach children about sustainability? Writing reflections for your environment project
May 19	Western and indigenous views of the environment and sustainability Kaitiakitanga Assessment 2 briefing
May 26 – Jun 27	**Practicum**
Jun 30	Sharing environmental projects Interconnectedness Ted Talks: David de Rothschild – connection and disconnection with nature and the impact on nature of the media
Jul 07 – Jul 18	**Holidays**
Jul 21	Assessment 3 briefing Disseminating the Guidelines for Environment Education in New Zealand Schools – how does Te Whāriki link?

Dates - Week Commencing	Topics
Jul 28	Sustainability is more than 'just the environment' – the 3 pillars of sustainability
Aug 04 – Sep 12	**Practicum**
Sep 15	Sustainability and Environmental Education in Aotearoa New Zealand and the role of early childhood
Sep 22	Writing a policy of Education for Sustainability for an ECE centre
Sep 29 – Oct 10	**Holidays**
Oct 13	Presentations of environmental projects
Oct 20	Presentations of environmental projects
Oct 27	Designing an outdoor environment based on the principles of sustainability
Nov 03	Documentary: The lost adventures of childhood Revisiting our values about EfS
Nov 10	How can we as beginning teachers make a difference to teaching early childhood environment for sustainability? Complete online ecological calculator
Nov 17	Research community and practical resources to support EfS Review of the year

Appendix D Ethical Approval Memo

Dr Karsten Zegwaard

Chair, Human Ethics Faculty of Science and Engineering Faculty of Science & Engineering
Te Pūtaiao me te Mātauranga Pūkaha
The University of Waikato
Private Bag 3015
Hamilton, New Zealand

Telephone 64-7-838 4892
Email k.zegwaard@waikato.ac.nz

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

To: Anita Croft
Date: 7-11-2014
From: Karsten Zegwaard
Subject: Ethical approval for research

Dear Anita,

The Faculty of Science and Engineering Human Research ethics sub-committee has considered your proposal *"Preparing pre-service early childhood teachers to engage in Education for Sustainability practices with young children when they begin their teaching careers".*

The proposal as attached is approved. If you wish to vary the terms of the approved application in any way, please contact me to request an amendment.

We wish you all the best with your research!

Signed .....

7-11-2014

Appendix E Letter of Information and Informed Consent – Academic Manager

The Academic Manager

Tēnā koe

I am undertaking research to complete a Master of Education Degree. This study is about how pre-service early childhood teachers perceive they have been prepared to teach Education for Sustainability (EfS) when they begin teaching. I am interested to know whether by completing a compulsory course in EfS, beginning teachers will have the confidence, knowledge and motivation to include EfS in their work with young children.

I am writing to ask your permission to involve the students of EE300 in this study. The students' involvement will ask them to complete an anonymous questionnaire during the final class of the year for EE300. It is anticipated that the questionnaire will take no more than half an hour to complete.

Data collected during the study will be used in writing my thesis and may be used in writing reports, publications or in presentations. I will not use the name of the College or the names of any participants in any publications or presentations. I will make sure that I store all the information I gather securely. Any student can decline to be involved in the research, and can withdraw any or all data they have provided prior to its analysis during the study. If there is a withdrawal, I will destroy any data gathered from that participant.

I would appreciate your permission as described. If you need any more details about the project, or issues arise for you during the project, please contact me (email: acroft@teacher.co.nz, phone: 03 3653153 ext218). If I am unable to resolve your concerns, you may contact my research supervisor, Dr Chris Eames (email: c.eames@waikato.ac.nz, phone: 07 8384357).

Yours sincerely

Anita Croft

Research Consent Form – Academic Manager

I have read the attached letter of information.

I understand that:

1. The student's participation in the project is voluntary.
2. I have the right to withdraw my College/Students from the research at any time.
3. Informed consent will be gained from all participants before collecting any data from them for this project.
4. Data may be collected the students in the ways specified in the accompanying letter. This data will be kept confidential and securely stored.
5. Data obtained during the research project will be used for the purpose of writing a thesis and may be used in writing reports, published papers and making presentations. This data will be reported without use of names of participants or the College, however pseudonyms may be used.
6. I can direct any questions to Anita Croft (email: acroft@teacher.co.nz Tel: 03 3653155 ext 218].

For any unresolved issues I can contact the Project Supervisor, Dr Chris Eames (email: c.eames@waikato.ac.nz, phone: 07 8384357).

I give consent for the College students to be involved in the project under the conditions set out above.

Name:_____

Signed:_____

Date:_____

Please return to Anita Croft by hand

Appendix F Letter of Information and Informed Consent - Centre Manager

Date

The Manager

Dear

I am undertaking research to complete a Master of Education Degree. This study is about how pre-service early childhood teachers perceive they have been prepared to teach Education for Sustainability (EfS) when they begin teaching. I am interested to know whether by completing a compulsory course in EfS, beginning teachers will have the confidence, knowledge and motivation to include EfS in their work with young children.

A member of your staff, [teacher's name], has indicated an interest in participating in the research study.

I am writing to ask your permission to involve [teacher's/staff member's name] in this study. [Teacher's name] will be interviewed at your centre. It is anticipated that the interview will take no longer than 40 minutes. The interview will be audio recorded.

Data collected during the study will be used in writing my thesis and may be used in writing reports, publications or in presentations. I will not use the name of the Centre or the names of any participants in any publications or presentations and self-identifying statements will not be used. I will make sure that I store all the information I gather securely. [Teacher's name] can decline to be involved in the research, and can withdraw any or all data they have provided prior to its analysis during the study. If there is a withdrawal, I will return interview recording and transcript gathered from [Teacher's name] within one week of their notice of withdrawal or destroy any data gathered from [Teacher's name] if they do not want it returned.

I would appreciate your permission as described. If you need any more details about the project, or issues arise for you during the project, please contact me (email: acroft@teacher.co.nz, phone: 03 3653153 ext218). If I am unable to resolve your concerns, you may contact my research supervisor, Dr Chris Eames (email: c.eames@waikato.ac.nz, phone: 07 8384357).

Yours sincerely

Anita Croft

Research Consent Form – Centre Manager

I have read the attached letter of information.

I understand that:

1. [Teacher's name] participation in the project is voluntary.

2. I have the right to withdraw my Centre/teacher from the research at any time.

3. Informed consent will be gained from [Teacher's name] before collecting any data from them for this project.

4. Data may be collected from [Teacher's name] in the ways specified in the accompanying letter. This data will be kept confidential and securely stored.

5. Data obtained during the research project will be used for the purpose of writing a thesis and may be used in writing reports, published papers and making presentations. This data will be reported without use of names of participants or the Centre, however pseudonyms may be used.

6. I can direct any questions to Anita Croft (email: acroft@teacher.co.nz Tel: 03 3653155 ext 218].

For any unresolved issues I can contact the Project Supervisor, Dr Chris Eames (email: c.eames@waikato.ac.nz, phone: 07 8384357).

I give consent for the College students to be involved in the project under the conditions set out above.

Name:_____

Signed:_____

Date:_____

Appendix G Letter of Information - Questionnaire

Date

Dear

I am writing to invite you to participate in a research study for the completion of a Master of Education Degree. This study is about how pre-service early childhood teachers perceive they have been prepared to teach Education for Sustainability (EfS) when they begin teaching. I am interested to know whether by completing a compulsory course in EfS beginning teachers will have the confidence, knowledge and motivation to include EfS in their work with young children.

I would like to involve you in this study. Your involvement will require you to complete an anonymous questionnaire during the final class for the year for EE300. It is anticipated that the questionnaire will take no more than half an hour to complete. You may be invited to participate in an interview once you have started your teaching career.

Data collected during the study will be used in writing my thesis and may be used in writing reports, publications or in presentations. I will not use your name, the name of the College or the names of other participants in any publications or presentations and self-identifying statements will not be used. I will make sure that I store all the information I gather securely. You can decline to be involved in the research, and can withdraw any time prior to handing in your questionnaire during the study. Once you have submitted your survey it cannot be withdrawn. I am no longer involved in the assessment of your grades or in a position of authority as your tutor for EE300.

I would appreciate your consent to be involved as described. If you need any more details about the project, or issues arise for you during the project, please contact me (email: acroft@teacher.co.nz, phone: 03 3653153 ext218). If I am unable to resolve your concerns, you may contact my research supervisor, Dr Chris Eames (email: c.eames@waikato.ac.nz, phone: 07 8384357).

Yours sincerely

Anita Croft

Please return to Anita Croft by hand

Appendix H - Interviews Letter of Information and Informed Consent

Date

Dear

I am writing to invite you to continue participation in a research study for the completion of a Master of Education Degree. You may remember that at the end of last year I invited you to complete a questionnaire regarding your perception of how prepared you felt you were to teach Education for Sustainability (EfS) after completing EE300 and before you began teaching. I would now like to invite you to participate in an interview about how you have found incorporating EfS into your practice now that you are in a teaching position.

I would like to interview you at your early childhood centre. It is anticipated that the interview will take no more than 40 minutes. With your permission I would like to audio record your interview to help me analyse it later. You will be sent a transcript of the interview for checking.

Data collected during the study will be used in writing my thesis and may be used in writing reports, publications or in presentations. I will not use your name, the name of the College or the names of other participants in any publications or presentations and self-identifying statements will not be used. I will use pseudonyms for participants in any publications or presentations. I will make sure that I store all the information I gather securely. You can decline to be involved in the research, and can withdraw any or all of your interview data you have provided during the study up to two weeks after receiving your transcript for checking. If you do withdraw, I will return your interview recording and transcript within one week of your notice of withdrawal or destroy any data gathered from you if you do not want it returned.

I would appreciate your consent to be involved as described. If you need any more details about the project, or issues arise for you during the project, please contact me (email: acroft@teacher.co.nz, phone: 03 3653153 ext218). If I am unable to resolve your concerns, you may contact my research supervisor, Dr Chris Eames (email: c.eames@waikato.ac.nz, phone: 07 8384357)

Yours sincerely

Anita Croft

Research Consent Form

I have read the attached letter of information.

I understand that:

1. My participation in the project is voluntary.
2. I have the right to withdraw during the study up to two weeks after receiving a transcript of my interview for checking.
3. Data may be collected from me in the ways specified in the accompanying letter. This data will be kept confidential and securely stored.
4. Data obtained from me during the research project will be used in writing and thesis and may be used in the writing of reports or published papers and making presentations about the project. This data will be reported without use of my name, however a pseudonym may be used.

I give my consent to the following for the study to proceed.

I can direct any questions to Anita Croft (email: acroft@teacher.co.nz Tel: 03 3653155 ext 218].

For any unresolved issues I can contact the Project Supervisor, Dr Chris Eames (email: c.eames@waikato.ac.nz, phone: 07 8384357).

I give consent to be involved in the project under the conditions set out above.

Name:_____

Signed:_____

Date:_____

Please return this form to the researcher by mail using the self-addressed envelope enclosed.