Department of Environmental Sciences

Macquarie University, Sydney, Australia

Fostering Sustainability in Initial Teacher Education Primary Programs at Macquarie University

Alexandra Lynch

9th October 2017

A thesis in fulfilment of the requirements for the degree of Master of Research

Declaration

I hereby declare that this thesis has not been previously submitted to any other institution or university for a higher degree. Except where otherwise acknowledged, this thesis is comprised entirely of my own work. Ethical aspects of this research have been approved by the Macquarie University Human Research Ethics Committee (HREC Reference No. 5201700125).

Alexandra Lynch

9th October, 2017

The photo on the front cover is of the teaching garden in the Department of Educational Studies which I helped plant with a colleague from the Department of Educational Studies, as it was not being used by the Department as a resource for teaching when I started my research.

Acknowledgments

I would like to acknowledge and thank my supervisors Ms Wendy Goldstein and Dr Bronwen Wade-Leeuwen for their immense support and expertise which guided me throughout the project. Wendy provided the inspiration to pursue research in the field of education for sustainability, and Bronwen gave me great insight into initial teacher education.

I would like to thank all the Educators and teacher education students who gave their time as participants in interviews and questionnaires. Their insights into teacher education at Macquarie University were invaluable for this study.

Sincere thanks also goes to my discipline panel with Dr Lynne McLoughlin, Mr Richard Horsfield and Mr Mark Caddey who gave me a strong direction early on based on their own expertise in this field of research.

I would also like to thank the Environmental Sciences Master of Research team of 2017, with whom I spent many coffee breaks and shared a love/hate relationship with the campus ibises. Thanks also goes to my friend Olivia for reading through my questionnaire and providing insight into how a teacher education student would read it.

Finally, I'd like to thank my family for their support this year, and particularly my partner Chris who was a source of comfort when things didn't always go the way I planned.

Abstract

This case study explores how the initial teacher education primary programs at Macquarie University foster the Sustainability cross-curriculum priority. The study investigates the extent to which Sustainability is included in The Programs, as well as how confident initial teacher education students in The Programs feel to teach Sustainability. The study uses document analysis of Unit Guides to evaluate how Sustainability is fostered and follow-up semi-structured interviews with Educators to verify findings. Semi-structured interviews and a questionnaire to the 3rd and 4th year Students in The Programs are used to evaluate their confidence to teach Sustainability. The Educators and Students are asked about their perception of the relevance and importance of Sustainability and experiences in The Programs. Students are also asked about their perceived confidence to teach Sustainability. The evaluation of Unit Guides reveals limited explicit Sustainability included in the Bachelor of Education (Primary) program, though elements of teaching about Sustainability emerge as described by some Educators. The findings reveal that Students in The Programs perceive Sustainability as relevant, but most feel less than fully confident to teach Sustainability.

Contents

1. Introduction

This chapter introduces the area of research, context of the study, rationale, research questions and propositions, significance of the research, research assumptions, definition of terms, and concludes by describing the organisation of this thesis.

1.1 Fostering Sustainability in initial teacher education programs

In 2014, the Director-General of the United Nations Educational, Scientific and Cultural Organisation (UNESCO) said that the global community was facing "deep economic and social inequalities, environmental degradation, biodiversity loss, disruption caused by natural disasters and climate change" (Buckler & Creech, 2014, p. 3). It is therefore critical to view education as playing a decisive role in equipping all learners with knowledge, skills and values which help them challenge such unsustainable practices (Buckler & Creech, 2014). The United Nations (UN), through Agenda 21 (1992) called for education to be reoriented to sustainable development, and promoted a UN Decade of Education for Sustainable Development from 2005-2014 (Buckler & Creech, 2014). In 2015, the UN ratified seventeen Sustainable Development Goals, with 'Quality Education' included to ensure equal access to inclusive and quality education for all (United Nations, 2015). The UN (2015) stated that achieving 'Quality Education' can allow the other Sustainable Development Goals to be achieved.

The Australian government responded to international calls to reorient education to focus on sustainability through various policies, including the Australian Curriculum (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2017a), which introduced the Sustainability cross-curriculum priority to connect different aspects of curriculum content across different learning areas (ACARA, 2017d). This cross-curriculum priority encourages a sustainability perspective on the curriculum content. Considering that sustainability is highlighted as an international and national priority in teacher education, this research is focused on how the initial teacher education primary programs at Macquarie University foster the Sustainability cross-curriculum priority, in ways which foster confidence in teacher education students to teach Sustainability.

1.2 Context of the case study

The scope of the research as a case study is bounded in space and time by three factors. First, the case is limited to the initial teacher education primary programs (herein referred to as 'The Programs') in the Department of Educational Studies at Macquarie University. The Department offers four programs to initial teacher education students in primary education in a Bachelor of

Education. Two of these programs are combined with either a Bachelor of Arts - Psychology, or a Bachelor of Arts. Second, the participants in this study include the Educators teaching compulsory units in The Programs as unit convenors, lecturers or tutors. Teacher education students from the 3rd year or above in The Programs participated in interviews or a questionnaire. Finally, the case is bounded by time (period of study) as The Programs are currently being redeveloped for accreditation with the Australian Institute of Teaching and School Leadership (AITSL), providing an opportunity to reflect on The Programs as a result of the findings of the research. Figure 1.1 shows the broader policy context for this case study at different contextual levels. The study was approved by the Pro-Vice Chancellor for Learning and Teaching and the Head of the Department of Educational Studies.

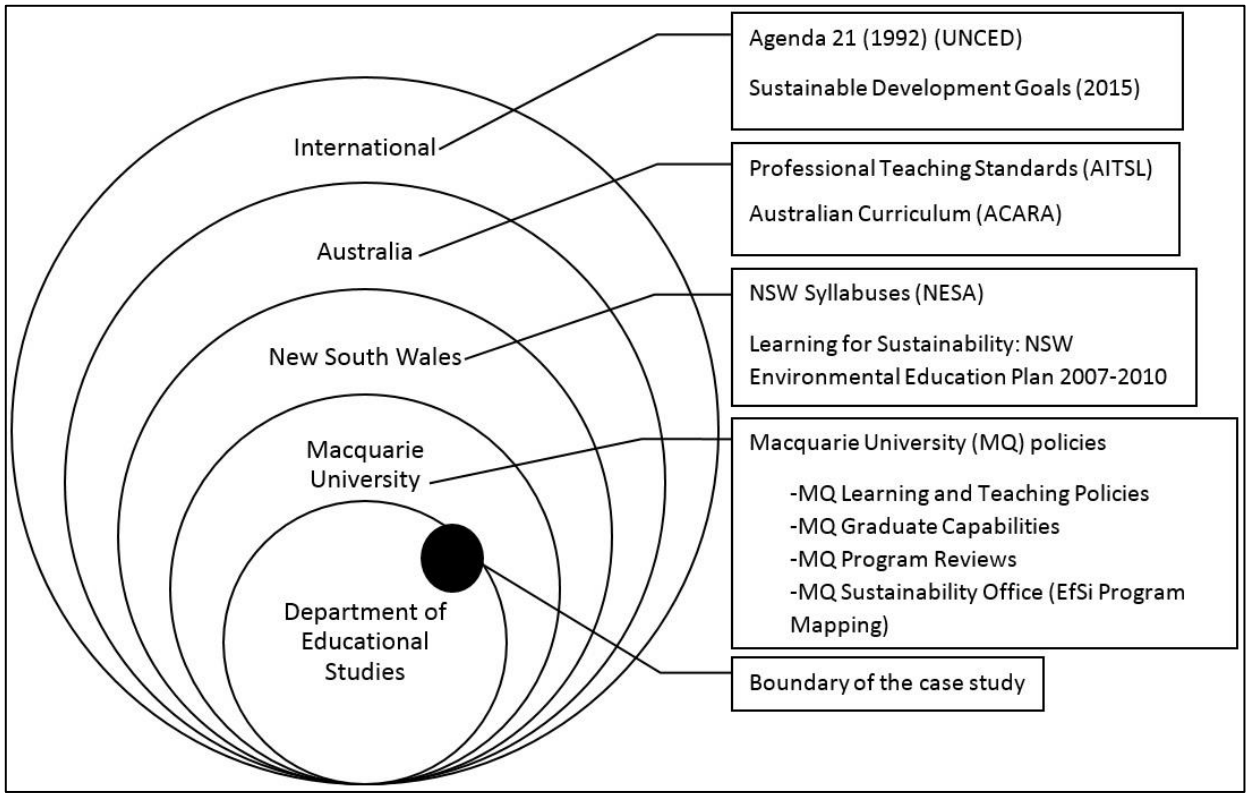

Figure 1.1. Policy context of the case study at Macquarie University. The diagram is based on Bronfenbrenner's (1979) Ecological Systems Theory, which identifies five environmental systems within which an individual acts, and has been applied here to refer to the systems within which the case study functions. The text boxes linking to each system level refer to policies made at that level related to Education for Sustainability in teacher education, or which strongly influence The Programs.

1.3 Rationale

My own standpoint is as an environmental sciences graduate concerned for the state of the planet. My values motivate me to encourage and facilitate sustainability learning in teacher education, so that schools develop sustainability in their students as a way of being. Yet my exploration of the field of teacher education is outside my expertise as a researcher concerned about environmental issues, and requires an approach to social research much different to my training in natural sciences. To construct a view of practice based on the perspectives of the social actors within teacher education, an exploratory case study (Yin, 2012) is undertaken with Educators and Students to explore how the teacher education programs foster the Sustainability cross-curriculum priority and how confident Students feel to teach Sustainability. To begin to understand how Sustainability is fostered in teacher education programs, it is necessary to explore with those involved in the teacher education system how relevant Sustainability is to them, and the motives of Educators and Students to teach and learn about Sustainability. The research seeks to understand teacher education from the point of view of Educators and Students (Bryman, 2016) and interpret their practices and experiences from their viewpoints.

Despite the call from Agenda 21 in 1992 (United Nations, 1992), embedding sustainability in teacher education is an emerging field (Evans, Stevenson, Lasen, Ferreira, & Davis, 2017). The *Australian Education for Sustainability Alliance* (AESA) (2014) report states that an audit and gap analysis of teaching programs is necessary to understand where the limitations of these programs are in addressing the ways in which teachers can teach about sustainability.

Kennelly, Taylor and Serow (2011) describe the Australian Curriculum Sustainability cross-curriculum priority as falling short to achieve the intent to build capacity of students to contribute to sustainability. There is limited research demonstrating how teacher education institutions, since the introduction of the cross-curriculum priorities in 2011 (Gough, 2011), are fostering sustainability in their teacher education programs. The literature reveals a gap in showing how these programs currently foster the Sustainability cross-curriculum priority (AESA, 2014), as well as how confident teacher education students feel to teach Sustainability. Addressing this gap, this thesis reports on a research project exploring how The Programs foster the Sustainability cross-curriculum priority.

1.4 Research questions

The research questions of interest to the study are:

- How do The Programs at Macquarie University foster the Sustainability cross-curriculum priority?; and

- How confident do initial teacher education students in The Programs at Macquarie University feel to teach Sustainability?

This research aims to explore how the Sustainability cross-curriculum priority is fostered in The Programs, and how confident Students in The Programs feel to teach Sustainability.

Research Method

This research project employs a case study design using mixed methods (Creswell, 2015; Yin, 2015) to investigate the field of sustainability education in initial teacher education, particularly in The Programs at Macquarie University. The methods include document analysis of Unit Guides, interviews with Educators and Students, and a questionnaire to Students, to build a narrative around Educators' and Students' perspectives on how The Programs foster the Sustainability cross-curriculum priority and how confident Students feel to teach Sustainability (Silverman, 2013). This concept is applied from the methodology of the research.

1.5 Significance of the research

The research contributes to documenting the practice of educating future teachers. The findings can contribute to the field of research by providing knowledge of what is happening in the initial teacher education primary programs at Macquarie University.

The research investigated Educators' and Students' attitudes and experiences relating to learning and teaching about sustainability and aims to understand the current practices employed in The Programs to foster the Sustainability cross-curriculum priority. The research provides the Department of Educational Studies with knowledge of how Sustainability is fostered currently, and can be used to provoke discussion on the potential to progress teacher education for sustainability.

1.6 Assumptions

The assumptions for this research are:

- Sustainability is necessary as a goal of education to ensure current and future generations are able to continue to live on Earth, within Earth's ongoing capacity to maintain life;
- teacher education programs should foster sustainability, particularly the ACARA (2017e) Sustainability cross-curriculum priority to ensure their students feel confident to teach it;
- a case study approach with mixed methods is useful in building a narrative around the experiences and perspectives of individuals within their teacher education programs; and

- providing a report on current practice can stimulate dialogue with the Department of Educational Studies and further integration of Sustainability.

1.7 Definition of terms

A number of concepts used in the communication of this research should first be defined.

- *Sustainability*: The definition used to frame the researcher's perspective on how sustainability is fostered in teacher education is from the Australian Curriculum, which says that Sustainability addresses Earth's ongoing capacity to maintain life (ACARA, 2017e). The word 'Sustainability', if capitalised, is used when describing the Sustainability cross-curriculum priority, and the lower case word 'sustainability' is used in all other instances.
- *Education for Sustainability*: Australian policy and research tends to use the term 'Education for Sustainability' (EfS). EfS is a process of learning where all learners are encouraged to think and act for change to address sustainability (Holdsworth & Hegarty, 2015).
- *The Programs*: The term 'The Programs' is used in the study to refer to the initial teacher education primary (as opposed to secondary) programs offered at Macquarie University.
- *Educators*: The staff from the Department of Educational Studies who teach units (i.e. as unit convenors, lecturers, or tutors) in The Programs are called 'Academic Educators'. They are referred to in the text as 'Educators' with a capital letter. All other 'educators' in initial teacher education are referred to without capitalisation.
- *Students*: The initial teacher education students enrolled in The Programs are referred to in the text as 'Students'. All other 'students' in initial teacher education are referred to without capitalisation.
- *Learners*: The word 'learners' refers to primary school students in the text.

1.8 Organisation of this thesis

The thesis first presents a review of literature (Chapter 2) in the field of education for sustainability in teacher education. Next, it outlines the methodology (Chapter 3) used, with detail on the research design and methods. The findings (Chapter 4) of the research are presented. A discussion of the findings, synthesis and conclusions is presented (Chapter 5), followed by the conclusion (Chapter 6) of the study which outlines the implications of the research.

2. Literature Review

This chapter presents a review of the literature relating to Sustainability and how and why it is fostered in initial teacher education programs. The review enables this research to benefit from the expertise of many others and extend understanding of the state of education for sustainability in Australian initial teacher education programs.

2.1 Teaching Sustainability in initial teacher education

Sterling et al. (2013) wrote that reorienting education to foster sustainability learning for the future is a critical challenge for higher education institutions to address. The United Nations highlighted the priority to reorient education towards sustainable development in Chapter 36 of Agenda 21 (United Nations, 1992), and re-emphasised its significance recently through the Decade of Education for Sustainable Development (2005-2014) (United Nations Educational, Scientific and Cultural Organization (UNESCO), 2005).

In the Australian context, the *Melbourne Declaration on Educational Goals for Young Australians* (MDEGYA) (Ministerial Council on Education, Employment, Training, and Youth Affairs, 2008) emphasised three focus areas for Australian education: sustainability, Indigenous perspectives and engagement with Asia. The definition of sustainability used in the Australian Curriculum is that sustainability addresses Earth's ongoing capacity to maintain life (ACARA, 2017e). This definition of sustainability states that through educational processes, learners develop the knowledge, skills, values, attitudes, understanding and capacity that will help them to engage with sustainability (ACARA, 2017e). The inclusion of sustainability in the national curriculum arises from a longer history and discourse on the definition of sustainability.

What is Sustainability?

The root word *sustinere* in sustainability means "to nourish and endure" (Wooltorton, 2003, p. 56). The term sustainability originated from ecology, and refers to the potential of ecosystems to subsist over long periods of time (Baker, 2016). Now the term 'sustainability' is used to refer to the goal of sustainable development or the "*goal* of policy" (Baker, 2016, p. 9). Dryzek (2005, p. 6) refers to sustainable development as a discourse, as there is currently a lack of clarity on the concept in the literature and because there are "continuing disputes between people who think in sharply different ways". This exemplifies the contest over meaning which is ongoing and continually changing, and the importance of education exploring these 'world views' where learners imagine and work

towards views of a sustainable world, demonstrated in the Sustainability cross-curriculum priority (ACARA, 2017e).

Sustainability is difficult to conceptualise, and cannot be too tightly defined as it is a process of transformation which must adapt to uncertainty and risk so that the environment, society and economy can be maintained (Birdsall, 2014; Jackson, 2011). In other words, sustainability is a dynamic concept where there is no end point for humanity achieving it, but sustainability is necessary to work towards as it aims to nourish ecosystems so they subsist over time.

For the purposes of this research, the Australian Curriculum definition (ACARA, 2017e) of sustainability as being about addressing Earth's capacity to maintain life will underpin the research. This definition has been shaped by the global discourse around the meaning of sustainability and sustainable development, and the meaning used in Australian policy and strategy.

What is Education for Sustainability?

Education for Sustainability (EfS) is a process of learning and teaching about, in and for sustainability, where all learners are encouraged to think and reflect critically, systemically, and in a future-oriented way to act for change to address social, environmental and economic problems (Holdsworth & Hegarty, 2015). Particular efforts through policy and curriculum development that catalysed and supported EfS in Australia and New South Wales (NSW) include *Learning for Sustainability - NSW Environmental Education Plan 2007-10* (NSW Council on Environmental Education, 2006); *Caring For Our Future – the Australian Government Strategy for the United Nations Decade of ESD* (Department of the Environment and Heritage, 2007); the MDEGYA (Ministerial Council on Education, Employment, Training, and Youth Affairs, 2008); *Education for Sustainability: The role of education in engaging and equipping people for change* (Australian Research Institute in Education for Sustainability, 2009); *Living Sustainably – the Australian Government's National Action Plan for Education for Sustainability* (Department of the Environment, Water, Heritage and the Arts [DEWHA], 2009); and the *Sustainability Curriculum Framework* (DEWHA, 2010).

Education for Sustainability (EfS) in Australia is still an emerging field in research and practice (Evans et al., 2017). The role of EfS is to provide "learners across the world with the knowledge, skills and values to discover solutions to today's sustainability challenges" (Buckler & Creech, 2014, p. 3). EfS has its roots in environmental education, where education focuses on learning about, in, and for the environment (Gough, 2011; Kennelly et al., 2011). Hedefalk, Almqvist, and Östman (2014) wrote that whilst education *about* the environment refers to knowledge of earth systems, education *in* the environment places an emphasis on education directly in nature, as both

experiential learning and to develop empathy. Education *for* the environment looks at actively solving environmental issues (Hedefalk et al., 2014). These elements of environmental education contribute to what is now known as EfS in Australia.

Sustainability in Australian initial teacher education programs

The Australian policy environment for EfS is built on the shoulders of earlier efforts to integrate environmental education in the curriculum (Gough, 2011). Gough (2011) wrote about the Australian Curriculum and noted that attempts to integrate Sustainability are superficial and questionable in key learning area content, and this is one example of curriculum development in Australia that attempts to integrate Sustainability in a problematic way. This raises issues for the feasibility of teacher education programs to foster the Sustainability cross-curriculum priority.

The first version of the Australian Curriculum was released in 2010 with the cross-curriculum priorities in continual development since 2011 (ACARA, 2017b). The NSW Educational Standards Authority (NESA), formerly called Board of Studies, Teaching and Educational Standards (BOSTES), is responsible for developing the syllabuses used by teachers in NSW schools under the guidance of the Australian Curriculum (NSW Education Standards Authority, 2017). The Sustainability cross-curriculum priority is applied in NSW Syllabuses under the heading 'Learning across the curriculum' alongside the 'General capabilities' (ACARA, 2017c) for students. Two syllabuses which have not yet been completed to include the Sustainability cross-curriculum priority are the two Creative Arts and Personal Development, Health, and Physical Education (PDHPE) key learning areas (KLAs) (Board of Studies NSW, 2006, 2007). Teachers use these syllabuses to guide them through various aspects of the curriculum. Initial teacher education students in NSW use these syllabuses in their work in order to learn the curriculum context in which they will teach.

The Sustainability cross-curriculum priority highlights the key organising ideas of 'systems', 'world views' and 'futures' which should be taught to children in order to contribute to sustainable patterns of living (ACARA, 2017e). The 'systems' component of the sustainability cross-curriculum priority develops students' conceptualisation of the interdependent nature of systems supporting life on Earth (ACARA, 2017e). The second component 'world views' enables students to discuss the diversity of views which are formed by people at personal, local, national and global levels (ACARA, 2017e). The 'futures' component aims to build students' capacities for thinking and acting critically and creatively in ways that support sustainable living (ACARA, 2017e). Another component of Sustainability is 'action competence', which is essential to Sustainability as it builds capacity of learners to address sustainability issues and be responsible change agents.

Since Sustainability was first emphasised as a cross-curriculum priority, there is a mandate from the Australian Curriculum for teachers to teach Sustainability in the classroom. However, the *Review of the Australian Curriculum* report (Donnelly & Wiltshire, 2014) highlighted that there is widespread misunderstanding about whether teaching Sustainability is mandatory. The Australian Curriculum encourages teachers to embed sustainability into all areas of teaching, but it can have a varying presence in different KLAs depending on how relevant teachers see it in terms of their established teaching practices (ACARA, 2017b; Effeney & Davis, 2013).

2.2 How is the Sustainability cross-curriculum priority fostered in initial teacher education programs?

Education for Sustainability (EfS) is an emerging concept that has developed since the call from Agenda 21 (United Nations, 1992) to reorient education towards achieving sustainable development. Evans et al. (2017) highlight the significance of educating students in teacher education to enhance the integration of sustainability into teaching practice. In Australian universities such as James Cook University (Boon, 2011; Evans et al., 2017; Mills & Tomas, 2013), and the Australian Catholic University in both the Queensland (Effeney & Davis, 2013) and the Australian Capital Territory campuses (Wilson, 2012), researchers have investigated the integration of EfS into teacher education programs (Australian Education for Sustainability Alliance, 2014; Hegarty, Thomas, Kriewaldt, Holdsworth, & Bekessy, 2011; Steele, 2010).

Further research by Hill and Dyment (2016) and Dyment, Hill, and Emery (2015) in Tasmanian universities investigating how Sustainability is being taught to students looked at the receptivity of schools and school leaders to implementing the Sustainability cross-curriculum priority. The former Australian Research Institute in Education for Sustainability (ARIES) based at Macquarie University researched models for integrating sustainability in teacher education programs (Ferreira, Ryan, Davis, Cavanagh, & Thomas, 2009).

Drivers and Barriers

In order to understand why Sustainability is or is not fostered in The Programs at Macquarie University, the drivers and barriers which help or hinder the integration of sustainability in initial teacher education are explored. The MDEGYA (Ministerial Council on Education, Employment, Training, and Youth Affairs, 2008) was instrumental in driving the message that sustainability can help students understand the connections between the environmental, social and economic dimensions of their lives, as well as how individuals can take action to address local and global sustainability challenges (Hill & Dyment, 2016). However, there are several barriers preventing

sustainability from being mainstreamed into teacher education at the tertiary level (Australian Education for Sustainability Alliance, 2014).

The Australian Education for Sustainability Alliance report (2014) investigating sustainability integration in learning across all subject areas in the Australian Curriculum was developed after engaging with teachers and educators through focus groups, interviews and online surveys. The report found that lack of time, and the lack of confidence to teach and comprehend EfS were major barriers to teachers integrating sustainability education into their teaching programs (Australian Education for Sustainability Alliance, 2014). In addition to these barriers, there is confusion about whether the cross-curriculum priorities are mandatory to teach. Donnelly and Wiltshire (2014) wrote in the *Review of the Australian Curriculum* that the cross-curriculum priorities could be political and thus change over time. The Review also called for the cross-curriculum priorities to be clarified as a mandatory part of the Australian Curriculum to reduce the confusion about whether or not teachers had to teach them (Donnelly & Wiltshire, 2014). Gough (2011) and Kennelly et al. (2011) argue that the new Sustainability cross-curriculum priority is not clarified as a mandatory component of Australian curricula, so Sustainability would not be fostered strongly in teacher education programs as a result.

Mills and Tomas (2013) found in their review of literature that perceived relevance and priority of sustainability, particularly EfS, and educators' awareness and expertise in EfS are both enablers and constraints for mainstreaming sustainability in initial teacher education. The research by Mills and Tomas (2013) showed that professional conversations and incentives to engage with EfS are enablers for its integration, whilst universities' disciplinary boundaries were constraints. Wilson (2012) concluded that four major barriers exist for EfS integration in higher education: overcrowded curricula, perceived irrelevance by academics, limited staff awareness, and limited expertise. The drive for university rankings and research orientation can mean universities are "less interested in curriculum change" (Roberts, n.d., cited in Wals, 2014, p. 11). The research into embedding sustainability in teacher education programs in Australia indicates that there are a number of enabling and constraining factors for curriculum developers to consider. The literature about drivers and barriers informed the questions posed to Educators and Students in The Programs.

2.3 How do you mainstream sustainability in the teacher education system?

The practices of universities mainstreaming sustainability into teacher education programs in Australia are limited, despite efforts by universities to include sustainability in their programs (Australian Education for Sustainability Alliance, 2014; Holdsworth & Thomas, 2015; Lozano et

al., 2014). ‘Mainstreaming’ refers to the embedding of the philosophy, content and activities of EfS in such a way that it becomes a natural feature of higher education for teacher education students (Ferreira, Ryan, & Tilbury, 2007). Ferreira and Ryan (2012), as an extension of an ARIES project, developed a strategy to mainstream sustainability into teacher education. Their research found that mainstreaming EfS through a whole-system approach involving stakeholders from all levels within a system is most effective for embedding EfS in teacher education (Ferreira & Ryan, 2012; Steele, 2010). The research by Ferreira and Ryan (2012) is valuable in demonstrating the potential for system-wide change to ensure sustainability is mainstreamed *as* initial teacher education.

A factor in mainstreaming is educators’ competence in EfS and their ability to impart knowledge and skills to their students (United Nations Economic Commission for Europe (UNECE), 2011). Students must develop themselves and learn how to teach skills such as critical and creative thinking, problem solving, and building cooperative partnerships with others (Holdsworth & Hegarty, 2015; Lasen, Tomas, & Hill, 2015). To teach Sustainability, students need capacity to help learners develop sustainability competence “through a range of innovative teaching and learning practices” (UNECE, 2011, cited in Wals, 2014, p. 13). The UNECE (2011) suggests a comprehensive range of competencies for Educators to teach EfS, which are connected to the UNESCO four pillars of learning (Delors, 1996). Students are expected to know the content and how to teach it upon graduating from their teacher education program (AITSL, 2017b). As Sustainability content is mandated in the Australian Curriculum (Kennelly et al., 2011), educators and students are expected to learn about the content of Sustainability and skills for teaching it.

Evaluating how Programs foster sustainability

The analysis of program curricula is often conducted to research whether sustainability is fostered in initial teacher education (Lozano, 2010; Wilson, 2012). The AESA (2014) report suggests a gap analysis is necessary to understand how EfS is being mainstreamed in Australian teacher education.

At Macquarie University, the Learning and Teaching Strategic Framework for 2015-2020 (Macquarie University, 2015) states that all programs are to address sustainability. The Sustainability Office is embarking on analysis of the depth and breadth of sustainability coverage in various academic programs using an EfS mapping framework. Their framework was developed in consultation with a multidisciplinary group of academics in the field of EfS and tested by academics teaching what the university calls ‘People’ and ‘Planet’ units (Denby & Rickards, 2016). The framework is used to analyse the units that make up a whole program, such as the Bachelor of Education (Primary) program, to determine how sustainability is being embedded through assessments, tutorials, lectures, and pedagogy. The process being rolled out is that the Sustainability

Office approaches the Head of School before going on to meet with individual unit convenors to intensively review their unit. The process would have been adopted for this research project, but due to the limited timeframe of the research this was not possible.

Wilson (2012) audited the integration of EfS at Australian Catholic University in Canberra, through document analysis of unit guides both broadly across all units, and in greater depth in three units. The audit referenced Australian Government documents in order to ensure that EfS principles and key concepts from relevant policy documents were included in the analysis (Wilson, 2012). Wilson (2012) used a mixed methods approach, incorporating data gathered through interviews, focus groups, and reflections from lecturers based on discussions with members of the education community. The mixed methods approach used by Wilson (2012) is emulated in this research project.

In the United Kingdom, Lozano (2010) audited 5800 course descriptions from 19 schools at Cardiff University using a specialist tool called the Sustainability Tool for Auditing Universities Curricula in Higher Education (STAUNCH©). The audit was conducted to investigate whether sustainability concepts and pedagogy were embedded in courses (Lozano, 2010). The STAUNCH© tool (Lozano, 2010) offers insightful methods which inform the case study. The lessons learnt from the methods used by Lozano (2010) are applied to this research, where data collection relies on using publicly available Unit Guides which contain the course description, learning outcomes, and assignment information.

2.4 How confident do students feel to teach Sustainability?

The research aims to understand how confident Students feel in teaching Sustainability. Insights are gained from recent research into this question of students' confidence. Research by Boon (2011), Effeney and Davis (2013), and Tomas, Girgenti and Jackson (2015) show that students enrolled in specialist courses on EfS perceive it as relevant to what they teach, and feel a degree of confidence in teaching EfS.

Kennelly (2010) surveyed teacher education students to understand their confidence to teach sustainability, and found only 35% of students were confident to teach sustainability before undertaking an EfS-focused unit. This proportion of students increased to 69% following the completion of a specialist EfS unit. Evans, Tomas, and Woods (2016) found at James Cook University that the majority of surveyed students indicated that increased levels of understanding around sustainability concepts most strongly influenced their confidence to teach EfS. Perceived

feelings of confidence and having experience learning about EfS or sustainability appear to be linked according to research (Evans et al., 2016; Kennelly, 2010).

Evaluating teacher education students' confidence

The methods used to evaluate students' understanding, attitudes and experiences relating to EfS usually involve self-completion questionnaires and semi-structured interviews. Some research has used the focus group method (Stants, 2014; Wilson, 2012) but Students in The Programs demonstrated a lack of interest in participating in focus groups for the case study research. The mixed methods approach with interviews and a questionnaire are used to engage participants in the research.

Semi-structured interviews enable the researcher to ask open-ended and probing questions to the participants where they can provide in-depth responses (Creswell, 2015). These responses can be analysed thematically to help answer research questions (Creswell, 2015). Silverman (2013) suggests when investigating experiences, the interview method is appropriate as it contributes to narrative construction around social phenomena. Winter, Cotton, Hopkinson, and Grant (2015) conducted interviews in two universities in the United Kingdom with students and educators to gain a deep understanding of their experiences around universities as a site for transformative learning in EfS. Conducting interviews with students as well as educators from teacher education programs uncovers part of a complex narrative where interviewees can share their perceptions of how Sustainability is fostered in their programs.

Self-completion questionnaires (herein referred to as questionnaires) are also a useful method for collecting qualitative and quantitative data, especially from a large group of people (Bryman, 2016). Questionnaires are used in research to look at how EfS is embedded in teacher education, in particular to assess the knowledge, attitudes, experiences, and skills of teacher education students regarding sustainability (Boon, 2011; Dyment & Hill, 2015; Effeney & Davis, 2013). Semi-structured interviews have been used alongside questionnaires in research on EfS in teacher education, as part of mixed methods approaches (Gkioka, Leci, Stavridis, & Seroglou, 2015; Kennelly, 2010; Tomas, Girgenti, & Jackson, 2015; Tomas, Lasen, Field, & Skamp, 2015).

Confidence and attitudes of teacher education students

The question of whether students and educators in teacher education programs view sustainability as relevant to what they teach and how confident they feel to teach it is addressed in recent research. Tomas, Girgenti, and Jackson (2015) surveyed students at James Cook University before and after completing an EfS-specific course, finding that students perceive EfS as relevant to their teacher

education program. The students "believed [EfS] contributed to the development of their knowledge, skills and confidence to teach EfS in schools" (Tomas, Girgenti, et al., 2015, p. 11). Boon (2011) asked first year students to respond to a questionnaire at James Cook University and found that students endorsed the value of EfS and feel confident to teach it. Effeney and Davis (2013) found through a survey of students at Australian Catholic University in Brisbane that the students perceived EfS as important, and self-efficacy with EfS increases with perceived knowledge of the concept. Self-efficacy is similar in meaning to confidence, and refers to "the perceived ease or difficulty in performing a behaviour" (Christmas, Wright, Morris, Watson, & Miskelly, 2013, p. 95). Research where universities have an existing EfS-focused course shows that students studying that course tend to perceive sustainability as highly relevant. Although Macquarie University does not have an undergraduate course dedicated to EfS, there are 'People' and 'Planet' units which students are required to take, aimed at expanding their cross-disciplinary perspectives (Denby & Rickards, 2016; Macquarie University, 2017b).

2.5 Summary

Since the development and implementation of Sustainability in the Australian Curriculum, scholars such as Gough (2011), and Kennelly et al. (2011) have critiqued its concepts and application in initial teacher education programs. However, there is a gap showing limited research has investigated how teacher education programs can foster the Sustainability cross-curriculum priority (Australian Education for Sustainability Alliance, 2014). Drawing on insights gained from other research in the field (Kennelly, 2010; Lozano, 2010; Wilson, 2012), this study is designed to demonstrate how the Sustainability cross-curriculum priority is fostered in The Programs, and how confident Students feel to teach Sustainability.

The present research aims to investigate how the Sustainability cross-curriculum priority is being fostered in The Programs and to understand how confident Students feel to teach sustainability. The research aims to fill the gap in the literature on how initial teacher education primary programs foster Sustainability, particularly in relation to where ACARA (2017e) curriculum documents are centred on teaching about Sustainability. Additionally, this research contributes to an understanding of how confident Students feel to implement the Sustainability cross-curriculum priority in their teaching. The methods of research used in other cases have informed the mixed methods approach of this study.

3. Methodology

This chapter explains the context, methodology, research design, strategies of inquiry, data analysis, validity of the findings, limitations of the methods, and ethics approval for the study. The research is approved by the Human Research Ethics Committee (HREC) at Macquarie University (HREC Reference Number 5201700125; see Appendix A).

3.1 Context

There are approximately 350 Students enrolled in the 3rd and 4th years of The Programs of the Department of Educational Studies at Macquarie University (M. Ryan, personal communication, February 23, 2017). There are approximately 90 Educators in the Department employed as unit convenors, lecturers and tutors in The Programs. Teacher education students start the professional experience component of their program in the 3rd year, and are required to undertake a number of KLA units and curriculum and teaching units listed in their undergraduate program student guide (Department of Educational Studies, 2017c). Students have a choice of four Programs when they enrol, two of which are combined degrees of a Bachelor of Education (Primary) with either a Bachelor of Arts or a Bachelor of Arts - Psychology.

3.2 Methodology

Philosophy of research

All scientific knowledge and inquiry is based on a set of assumptions conceived by the researcher (Hiles, 2017). These assumptions are declared in order to demonstrate how knowledge is created in social research. This study falls within certain philosophical assumptions around social research and the way the research is designed. These assumptions relate to epistemology, axiology and ontology.

The position of the researcher demonstrates how the researcher views the research, because social research does not take place in a vacuum (Bryman, 2016). The researcher personally views sustainability as an essential goal for the wellbeing and diversity of all life being maintained, now and into the future. The researcher's knowledge of sustainability and experience from completing an undergraduate science degree at the university in which the study was conducted influences her view of the research in studying sustainability in the university. Whilst the study sits within an initial teacher education context, the researcher comes from an environmental sciences background with a personal love of nature. The researcher gained the assistance of an Educator in the Department of Educational Studies, in order to view The Programs from the perspective of an

Education practitioner, rather than viewing the research only through a scientific lens. Engaging with Educators in the case study allowed insights to be gained regarding the practice of teaching sustainability in The Programs (Kemmis & Mutton, 2012).

Axiological assumptions relate to how values influence research. The assumption of this study is that the researcher views sustainability as a way of being, and that education plays a role in advancing sustainable ways of living and being. These values of a social researcher determine their view of how knowledge is generated from inquiry (Hiles, 2017). As the perceptions and experiences of participants in this study were collected and evaluated, the researcher's own value of sustainability influenced the research process.

The epistemological assumptions of the research relate to the interpretivist standpoint that social phenomena should be understood from the point of view of the social actors (Yin, 2015). Interpretivist writers hold the view that subjects studied in the social sciences are different from the natural sciences (Bryman, 2016). That is, the subject matter of the social sciences (i.e. people and their institutions) are different to what is studied in the natural sciences, and therefore should be researched using different assumptions. The interpretivist standpoint requires the social scientist to interpret the social world of a person and their institution from the person or institution's point of view. The interpretivist standpoint is used to view this research from the point of view of the Students and Educators involved in The Programs.

The ontological standpoint of the research is constructionism (Creswell, 2015). Constructionism challenges the notion that cultures and institutions exist outside humans' reality and are not made by social actors (Bryman, 2016). This study views reality as existing in relation to social actors, and reality as a social construct made by the perceptions and actions of social actors. The study is viewed from the constructionist standpoint as The Programs are shaped by many contextual environments made by social actors, ranging from the national level of Australian education policy, to the Department of Educational Studies level which directly manages The Programs.

The study holds a number of standpoints in relation to how knowledge is generated from research into social phenomena. These assumptions are declared in order to demonstrate the point of view of the researcher.

3.3 Research design

Case study approach

The research utilises an exploratory case study approach (Yin, 2012). A case study approach is employed in research when a researcher is interested in exploring a system in-depth which is bounded by time, place, or physical boundaries, and where extensive amounts of data are collected (Creswell, 2015). The case study in this research is based within policy environments from the international to the Department level (Figure 1.1). Figure 3.1 shows the boundary of the case study and the policies influencing The Programs.

The purpose of a case study can be to explore 'how' and 'why' questions to construct a narrative in a case of interest to the researcher, in order to understand how social actors in a program perceive their own program (Creswell, 2015). In this research an exploratory case study approach aims to explore the research question of how The Programs foster the Sustainability cross-curriculum priority, from the perspective of Educators and Students, and based on Unit Guides from units in The Programs. According to Silverman (2013), the generalisability of the findings to other teacher education programs in higher education is limited as the case is shaped by the people within it and their views. However, the case can be compared to relevant aspects of other cases in the discussion of the research (Silverman, 2013).

To develop the case study a mixed-methods approach was used including primarily qualitative and some quantitative methods (Creswell, 2015). The specific methods used in the study included document analysis of the Unit Guides for the Bachelor of Education (Primary) program, semi-structured interviews with Educators and Students in The Programs, a self-completion questionnaire for Students, and focus groups with Educators which aimed to provide feedback to the Educators and validate the findings.

The document analysis, interviews, and focus group methods collected qualitative data on both documentation for and participants' views of The Programs. The self-completion questionnaire collected quantitative data on Students' experiences and perceptions of their confidence to teach Sustainability, and qualitative data on ways to improve sustainability teaching. The questionnaire design was influenced by data gathered from semi-structured interviews with Students. The mixed methods approach was used to ensure the views of The Programs from Educators and Students were studied in depth (Creswell, 2015).

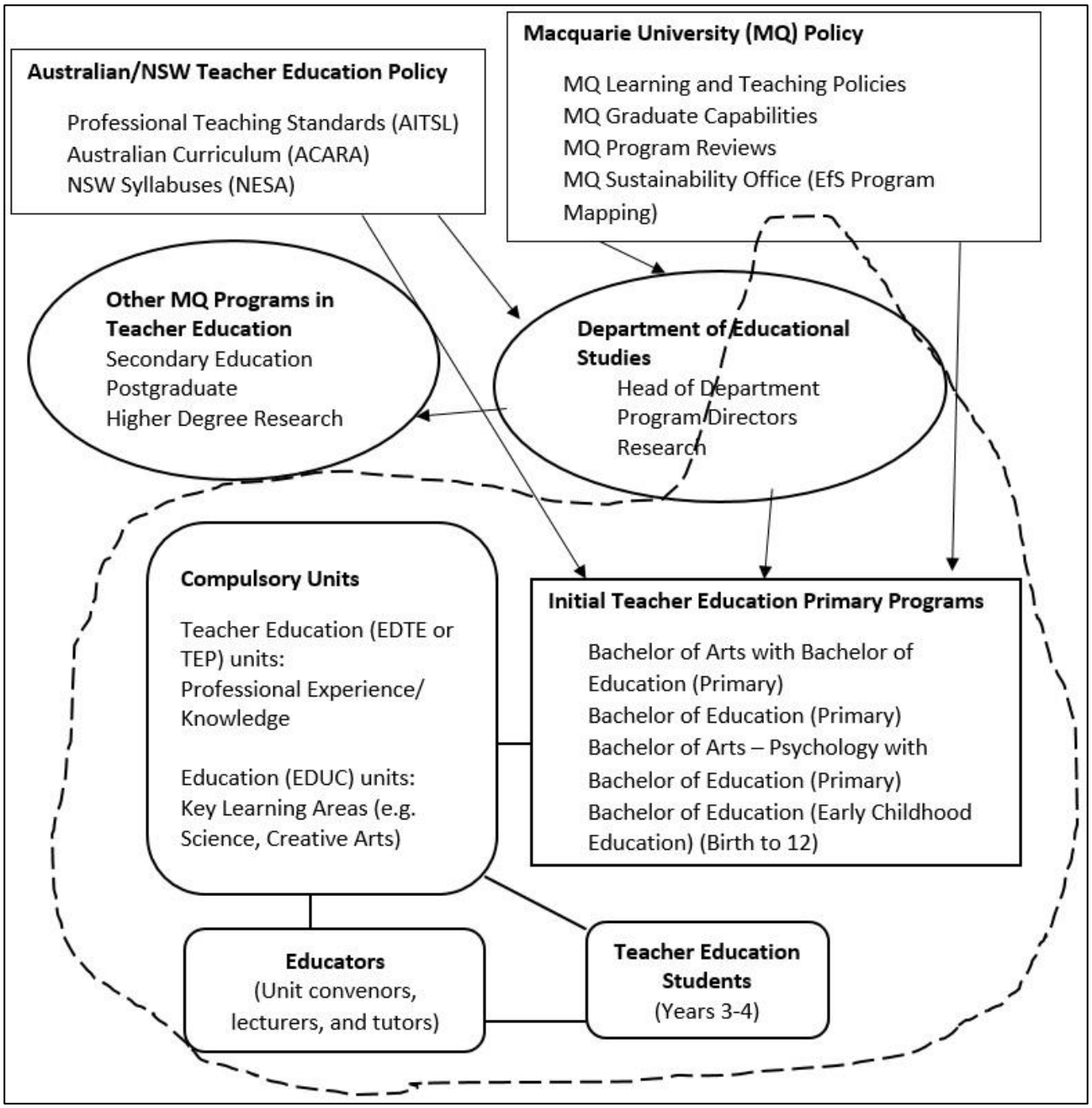

Figure 3.1. The diagram shows the case study boundary and influential policies. The dashed black line represents the boundary of the case study. The boxes which lie within the case study boundary, such as 'Educators' and 'Teacher Education Students', were included in the research design. The boxes which lie outside the case study boundary, such as 'Australian/NSW Teacher Education Policy', are influential to the case study but are not included in the research design. The boxes which lie on the dashed boundary line, such as 'Department of Educational Studies', are discussed in the case study but are not included in the research design. The arrows between boxes mean a box influences another box where the arrow is pointing. Lines between boxes without arrows mean the boxes relate to each other.

3.4 Strategies of inquiry: using mixed methods

Document Analysis - Evaluation of Unit Guides in The Programs

In order to respond to the research question of how the Sustainability cross-curriculum priority is fostered in The Programs, the study included document analysis of eighteen compulsory Bachelor of Education (Primary) units from the double degree program of Bachelor of Arts (B.Arts) with the Bachelor of Education (Primary) (the double degree is herein referred to as 'B.Ed (Primary)'). The B.Arts program offers Students a wide range of different Arts majors, but sits outside the boundary of the case study so was not evaluated for how it fosters the Sustainability cross-curriculum priority.

The evaluation of Unit Guides assisted the researcher in gaining insight into how Sustainability is being fostered in The Programs. This method is utilised in other studies in this field (Holdsworth, 2010; Holdsworth & Thomas, 2015; Wilson, 2012). Analysis of unit guides has been conducted in research by Wilson (2012) in Australia, in analysing how EfS was integrated in teacher education programs, and Lozano (2010) in the United Kingdom. The evaluation of Unit Guides was informed by insights gained from research by Lozano (2010). Lozano (2010) used the STAUNCH© tool in a higher education institution in the United Kingdom to assess curricula in terms of their contribution to sustainable development, with the use of words linked to 'social', 'environmental', 'economic', or 'cross-cutting themes' as the dimensions of sustainable development. Insights gained from Lozano's (2010) tool were applied in this study by identifying key elements of the Sustainability cross-curriculum priority which contribute to Sustainability education, in order to evaluate how the cross-curriculum priority is fostered in The Programs.

Unit Guides (Macquarie University, 2017a, 2017c) are updated each session, approved, made available to students at the start of the unit, and are publicly available. Unit Guides introduce students to the whole of a unit, relating the learning activities, assessment tasks, and outcomes to the Macquarie University graduate capabilities. One of these graduate capabilities includes sustainability, whereby university graduates will be 'Socially and Environmentally Active and Responsible', stating:

> *We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.* (Department of Educational Studies, 2017b)

Unit Guides might be expected to reveal how the Sustainability cross-curriculum priority is recognised and taught in units in the B.Ed (Primary) program. The Unit Guides evaluated include those from either Semester 2 of 2016, or Semester 1 of 2017.

The text of each of the eighteen Unit Guides for compulsory education units offered by the B.Ed (Primary) program was analysed by content analysis where information is organised into categories relevant to the research question (Bowen, 2009), and coded for key words associated with the Sustainability cross-curriculum priority (ACARA, 2017e). Coding processes used NVivo 11 (QSR International Pty Ltd., 2015). The coding process included word search queries of key words such as 'sustainability', and three organising ideas from the Sustainability cross-curriculum priority: 'systems', 'worldviews' and 'futures' (ACARA, 2017e). The primary key words shown in Table 3.1 were adapted from the Sustainability cross-curriculum priority document (ACARA, 2017e) and show whether The Programs foster elements of Sustainability. Secondary key words searched for in the coding process were 'environment', 'economy', and 'social'. The secondary key words were adapted from the dimensions of sustainability on which the Sustainable Development Goals are based (United Nations, 2015). Some references to key words in Unit Guides were not analysed because they were believed to be irrelevant to the educational curriculum. For example, if the word 'system' was found in the 'University policy' section of a Unit Guide, it was left out of the evaluation as university policies are standard for all unit guides in all programs in the university.

Table 3.1. Primary key words from the text of the Sustainability cross-curriculum priority (ACARA, 2017e) included in the word search query for the evaluation of Unit Guides.

Primary key words		
Across the KLAs	Empower	Sustainability
Action	Equity	Sustainable ways of living
Capacity building	Futures	Systemic thinking
Community	Individual	Systems
Creative thinking	Justice	Values
Critical thinking	Participation	Wellbeing/Living well
Cross-curriculum priority	Reflection	World views

Semi-structured interviews with Educators

Semi-structured interviews (herein referred to as interviews) with ten Educators from the Department of Educational Studies were conducted between April and May 2017. A convenience sample was obtained by speaking to one Educator about who they know might be interested in

participating in an interview, and contacting those people to ask their permission to interview them. The interviews lasted on average 22 minutes, were audio recorded, and then transcribed into word documents by an external agency. Participants' names were coded to maintain anonymity (Ethics, 5201700125). The interview questions are included in Appendix B.

The interviews aimed to explore participants' experiences (Silverman, 2013) teaching about Sustainability and their perspectives on how to effectively embed the Sustainability cross-curriculum priority into The Programs. The main topics covered in each interview were:

- how Sustainability is understood;
- how confident Educators feel in integrating Sustainability in their units;
- how Educators currently embed Sustainability in their units; and
- perceptions of the relevance of Sustainability and its importance to Educators.

Individual interviews with staff were beneficial to this project as participants could stipulate when their schedules were free (Bryman, 2016). Observational reports of general notes about the interviews with Educators were written immediately after each interview.

Semi-structured interviews with Students

Semi-structured interviews (herein referred to as interviews) were conducted with six Students in The Programs between April and June 2017. Participants were recruited through convenience sampling, after asking one Educator if participants could be recruited through their class. The interviews lasted on average 22 minutes, were audio recorded, transcribed by an external agency in separate word documents, and coded to ensure anonymity. These interviews aimed to explore sustainability education in The Programs from the perspectives of Students, and to develop the questionnaire. The question topics covered:

- how Sustainability is understood;
- perceptions of the relevance and importance of Sustainability in teaching;
- experiences in The Programs of learning about Sustainability; and
- feelings of confidence and skill in teaching Sustainability.

Observational reports for interviews with Students were immediately written after each interview. The interview questions are included in Appendix C.

Self-completion questionnaire for Students

A self-completion questionnaire (herein referred to as a questionnaire) was constructed in order to answer the research question "How confident do the initial teacher education students in The

Programs feel to teach Sustainability?" The questionnaire aimed to explore the level of understanding, confidence and experience around Sustainability in the target group of 3rd and 4th year Students studying in The Programs. These Students have some practical experience teaching in schools, which was pertinent to whether they had experience or confidence to teach Sustainability. The questionnaire (Appendix D) used insights gained from Boon's (2011) study which explored students' perceptions of EfS. Students in The Programs participating in the questionnaire were asked about their feeling of preparedness to teach Sustainability, which is linked to their feeling of confidence to engage with Sustainability (Kennelly, 2010).

The sampling strategy applied was convenience sampling. The researcher approached two people in The Programs who were able to advertise the questionnaire to Students. The questionnaire was advertised in two places: iLearn (the system for online learning, teaching, communication and collaboration at Macquarie University), on a page for all teacher education students on two occasions, and the private Facebook group for the Macquarie University Education Society. The questionnaire was administered through Qualtrics Online Survey Software (Qualtrics, 2017) and was open to respondents for approximately three months from 31st May 2017 to 8th September 2017.

There were 20 questions (fourteen closed, and six open questions) which were categorised under the following headings: (1) Encountering sustainability in personal and professional life; (2) Perceptions of teaching sustainability; and (3) Teaching experiences. A questionnaire was used to obtain views from a larger sample of the target population of Students than could be achieved by interview methods alone. However, due to the convenience sampling strategy used, it is difficult to generalise the findings from the questionnaire to the larger population of Students. Students who participated in the questionnaire were self-selected and may already be interested in sustainability. The questionnaire was informed by the earlier interviews with Students as a way of determining the data needed to answer the research questions, and to ensure that any new information found during the interviews was properly addressed in the questionnaire to the larger population sample.

3.5 Data Analysis

Analysing Unit Guides

The analysis of Unit Guide documents incorporated a grading system on top of counting the number of references for each key word in the evaluation. Primary and secondary key words found in Unit Guides were considered as having weak, moderate, or strong links to Sustainability, or had no links to Sustainability. Macquarie University graduate capabilities written in the Unit Guides are not

originally written by the unit convenor or curriculum developer for The Programs. Thus, references found in the graduate capabilities were considered to have no links to Sustainability, and were graded as such. The grading system for analysing Unit Guides involved reading and re-reading the referenced key words within the context of the Unit Guide for how strongly they link to Sustainability.

Thematic analysis of Semi-structured interview transcripts

All interview transcripts were analysed thematically (Creswell, 2015) after being coded using NVivo 11 (QSR International Pty Ltd., 2015) to reveal Students' and Educators' experiences of learning and teaching about sustainability. Themes which were relevant to the research questions emerged from the interview transcripts (Silverman, 2013).

Analysis of the Questionnaire results

The questionnaire data were analysed using descriptive statistics for closed questions. For example, Question 10 asked Students to indicate on a 5-point Likert scale whether they think Sustainability is important and/or relevant to teach in Primary schools. The data were analysed by calculating the number and proportion of respondents who chose each option on the 5-point scale. This process of analysis was used for all closed questions.

Responses to open-ended questions were coded into categories. For example, Question 16 asked Students to describe how their Programs could improve for their confidence to teach Sustainability to improve. Responses were categorised into codes based on what type of improvements Students suggested for The Programs, then those categories were clustered into the UNESCO four principles of learning: Learning to Know, Learning to Do, Learning to Live Together, and Learning to Be (Delors, 1996). Some Students' responses to Question 16 were categorised into multiple codes before being clustered into the four principles of learning.

3.6 Validity of findings

Focus group discussions

Educators teaching on The Programs who were available participated in two focus group sessions for evaluating The Programs. Using the document analysis results they were able to cross-examine the data in more depth. The findings were also disseminated via email to the Head of the Department of Educational Studies and the Department's Program Directors to ensure they could also examine the findings.

3.7 Limitations of the methods used

There were some limitations of the methods used in the research. First, one limitation of the document analysis of the Unit Guides is that they do not include everything that is taught in each unit. The Unit Guides explain the expected outcomes rather than state the realised delivery of curricula, and miss detail on class activities and tutorials. To address this, semi-structured interviews and two follow-up focus groups were used to check the validity of the findings. The original research design included focus groups with Students. However, there was a lack of interest from Students to participate, so this method was dropped and several one-on-one semi-structured interviews with Students were conducted.

3.8 Research Ethics

The original application for ethical approval and subsequent amendments to research The Programs was approved by the Human Research Ethics Committee (HREC) in February 2017 (HREC reference no. 5201700125). The notice of approval and date of approved amendments can be found in Appendix A.

3.9 Summary

It is important to note that fostering of sustainability in initial teacher education is still an emerging field (Evans et al., 2017). Researchers in this field use a number of qualitative and quantitative methods to answer their research questions as described in the literature review. A case study approach using mixed methods (Creswell, 2015; Yin, 2015) was used to develop knowledge of how The Programs foster the Sustainability cross-curriculum priority, and how confident Students feel to teach Sustainability.

4. Results

This chapter outlines the results gained from the evaluation of Unit Guides, interviews with Educators and Students in The Programs, the questionnaire to Students, and focus group discussions with Educators.

4.1 Participants in the study

The participants interviewed include ten Educators such as unit convenors, lecturers, and tutors who teach units in The Programs, and six Students enrolled in the 3rd year or 4th year of The Programs. The Educators interviewed all teach different key learning areas (KLAs) for The Programs, such as Science, Creative Arts, Mathematics, and Literacy. Students (n=36) from the 3rd year or 4th year of The Programs participated in the questionnaire. Six Educators participated in the two focus group discussions.

4.2 Evaluation of Unit Guides for Units in the Bachelor of Education (Primary) program

The Unit Guides for the B.Ed (Primary) program contain information covering how the Sustainability cross-curriculum priority (ACARA, 2017e) is being addressed in the B. Ed (Primary) program. The evaluation of eighteen Unit Guides for compulsory education units offered in the B.Ed (Primary) program indicate a number of findings.

The first finding relates to the sustainability-linked graduate capability for Macquarie University (Department of Educational Studies, 2017b). There are seven Unit Guides out of eighteen compulsory units in the B.Ed (Primary) program with assignments and learning outcomes linked to this graduate capability for sustainability. The units which reference ‘sustainability’ through links to the graduate capability are EDUC106, EDTE252, TEP248, EDUC264, EDTE301, EDTE354, and EDTE404 (Table 4.1). Table 4.1 shows the number of references to ‘sustainability’ in Unit Guides in the first column under the heading ‘Sustainability cross-curriculum priority’. Table 4.1 also shows the number of references found in each Unit Guide for different key words included in the evaluation.

The second finding from the evaluation of Unit Guides is that the ‘Education: The Policy Context’ (EDUC264) Unit Guide demonstrates multiple links to the Sustainability cross-curriculum priority. The EDUC264 Unit Guide exhibits (n=42) references in total linked to the Sustainability cross-curriculum priority, with (n=15) different key words referenced (Table 4.1). In the EDUC264 Unit Guide, three key words appear with strong links to sustainability principles. For example, ‘social’ was referenced (n=8) times, ‘justice’ referenced (n=5) times, and ‘equity’ referenced (n=1) time.

Table 4.1. Results of the evaluation of Unit Guides. The first and second columns indicate the subject code and subject name for the Unit Guides evaluated. The far-right section indicates the number of references found for each key word adapted from the Sustainability cross-curriculum priority. References were graded through colour coding for the strength of their link to the Sustainability cross-curriculum priority.

Bachelor of Arts with Bachelor of Education (Primary)		Sustainability cross-curriculum priority																						
Subject Code	Subject Name (B. Ed (Primary) units only)	Sustainability	Systems	World view	Futures	Social	Economic	Environment	Sustainable ways of living	Across the KLAs	Cross-curriculum priority	Justice	Equity	Wellbeing/ living well	Community	Individual	Capacity/capacity building	Values	Reflection	Participation	Creative thinking	Critical thinking	Action	Empower	Systemic thinking
EDUC105	Education: The Psychological Context					2									1				6		3	8			1
EDUC106	Education: The Social and Historical Context	1	1			27		1				2			4				8	3	6	8			1
EDTE251	Curriculum and Teaching in the Primary School 1					1		1							1					2	3	2			1
EDTE252	Curriculum and Teaching in the Primary School 2	1				1									1					1	9	2			1
EDUC258	Mathematics in Schools																					1			1
EDUC260	Language, Literacy and Learning					1		1							1					1	4	2			1
EDUC267	Classroom Management and Assessment																					1			1
TEP248	Key Competencies in Inclusive Education	1				3		2				1			11				1	3	3	2			1
EDUC262	Education: The Learner					1									1						3	2			1
EDUC264	Education: The Policy Context	1			3	8	1	1				5	1	2	1			2	4	4	3	16			1
EDTE301	Professional Experience in the Primary School 1	1				3		1		12		1			1				1	3	3	2			1
EDTE353	Curriculum and Teaching in the Primary School 3					1		1			1				1				21	2	26	2			1
EDTE354	Curriculum and Teaching in the Primary School 4	1				5		1			1	1			1				25	16	3	12			1
EDUC371	Reading Acquisition in the Primary Classroom					2		1				1			1				13	2	15	14			1
EDTE403	Professional Experience in the Primary School 2														1						3	2			1
EDTE404	Professional Experience in the Primary School 3	1				3		1		6		1			1				8	3	3	2			1
EDTE455	Curriculum and Teaching in the Primary School 5														1				7		3	3			1
EDTE456	Curriculum and Teaching in the Primary School 6					4		2		2		1			1				10	4	18	17			1

No links to Sustainability CCP
Weak links to Sustainability CCP
Moderate links to Sustainability CCP
Strong links to Sustainability CCP

The EDUC264 Unit Guide has the highest number of different words (n=15) linked to the Sustainability cross-curriculum priority (ACARA, 2017e).

The third finding is that the Unit 'Education: The Social and Historical Context' (EDUC106) also has strong links to the Sustainability cross-curriculum priority. EDUC106 is a prerequisite for EDUC264 with (n=27) strong references to 'social', and (n=2) moderately strong references to 'justice'.

The fourth finding from the evaluation of Unit Guides is that several key words from the Sustainability cross-curriculum priority are referenced to a very limited extent in the Unit Guides. For example, the key organising ideas of 'systems', 'world views' and 'futures' are referenced a total of (n=4) times with links to the Sustainability cross-curriculum priority. Another example is that there are no references to the key word 'action' in any Unit Guides, whilst 'action' is referenced (n=19) times in the Sustainability cross-curriculum priority document (ACARA, 2017e). A third example demonstrating limited references to key elements of the Sustainability cross-curriculum priority is shown by the (n=2) references to the 'cross-curriculum priorities' across all the B.Ed (Primary) program Unit Guides (Table 4.1).

4.3 Semi-structured interviews with Educators teaching in The Programs

Interviews were conducted with ten Educators between April and September 2017, in the Department of Educational Studies building at Macquarie University. Interviewed Educators' responses are coded as 'E (number)' to maintain anonymity. Interview transcripts were analysed for the range of experiences of Educators teaching about Sustainability in The Programs.

Three themes have emerged from these interviews:

1. What are the Educators' attitudes towards sustainability?
2. How are the Educators applying 'sustainability' in their teaching practices?
3. What are the perceived drivers and barriers for including sustainability in Educators' units?

The findings of the interviews are described in this section.

What are the Educators' attitudes towards sustainability?

Educators hold a range of views around their attitudes to the relevance of sustainability to their units. Seven Educators appear to perceive sustainability as being relevant to their teaching practice. Three Educators express mixed views on the relevance of sustainability to their units. For example, an Educator teaching mathematics units perceives sustainability as relevant, but they "don't see [sustainability] always as relevant as it should be" (E1). Another Educator who teaches a literacy

unit states that “direct relevance to literacy and learning is a hard direct link to make” (E2). Educators teaching units that focus more on the five ACARA (2017d) KLAs of Science, Mathematics, PDHPE, Geography, and Creative Arts perceive sustainability as being important to their practice. For example, one Educator from one of these KLAs states:

> “I don’t think that we use the word too much in the Department of Educational Studies, but I do think that we should always be teaching for sustainability and it should become a core value that each educator carries with them” (E3).

Similarly, another Educator teaching units from the range of KLAs listed perceives sustainability as being relevant to the education of Students:

> “I guess, philosophically most people have a teaching philosophy of what they do and for me that's a big factor. … I guess what I'm getting at is that I live that ethos and so what I try to do is, in my teaching, show lots of times where that can be put in” (E4).

These comments provide examples of a range of views from Educators in the Department of Educational Studies regarding their attitudes to the relevance of sustainability to The Programs.

How are the Educators applying ‘sustainability’ in their teaching practices?

The Educators were asked how they include the concept of Sustainability in their units, such as in lectures, tutorials, or assignments. This section outlines the varied responses given by Educators regarding their experiences teaching Sustainability in their units. One Educator states that they do not integrate sustainability into their unit on the classroom environment (E5). Another Educator who teaches a literacy unit says:

> “…if sustainability is brought to your attention, then you can use that as an example when you're teaching something else. So that's the only way I could do it, but I haven't done that this semester” (E2).

One Educator teaching science indicates that sustainability is taught “incidentally …and probably rarely” (E6). These are three examples of Educators who do not include the concept of sustainability in their units.

There are two examples of Educators who do include sustainability in their units despite it not being evident in the Unit Guides. One Educator provides a comment on one unit they teach:

> “We actually looked at the cross-curricular priorities and people could choose sustainability as one of the areas. … I'd say two-thirds of the students chose sustainability (E3)”

Another Educator explains that Students are given an assignment in one science unit where “they have to design a unit of work that's based around school-based gardens” (E4). The Educator also notes that “it's interesting because the focus tended to be place-based gardens, not sustainability” (E4). The interviews provide two examples where Educators foster Sustainability in The Programs that are not evident in the Unit Guides.

What are the perceived drivers or barriers for including sustainability in participants’ Units?

Perceived drivers

Educators were asked about what main drivers and barriers exist for the integration of Sustainability in their units. The findings show three main drivers for integrating sustainability into the units, from the perspective of Educators. First, efforts to raise awareness are perceived as a significant driver. One Educator says that “awareness raising and training of people to be conscious” (E2) would be one driver for the integration of Sustainability in their unit. Second, awareness of sustainability issues is viewed as a key driver by another Educator who comments:

> “Oh, climate change, the world drying up, no water … I mean I think nobody teaches in a vacuum. I think you can't teach without being aware about what's happening around the world at the moment, and sustainability is a huge, huge issue” (E7).

Finally, another Educator perceives a top-down approach as a driver for integrating Sustainability into units in The Programs. This Educator states:

> “The main driver is to have a top-down approach … Once people at the top are actually using sustainability and asking everyone to include it in their programs, then people will start valuing it” (E3).

The comments from Educators show they perceive three main drivers for integrating Sustainability into units in the Programs: awareness raising, current issues, and top-down policy directives.

Perceived barriers

Educators also perceive three main barriers to integrating Sustainability in their units: time constraints, personal awareness, and university/school organisations. One Educator describes time constraints and personal awareness as barriers, commenting that:

> “I think there's probably two [barriers]. One is your personal awareness of what it is as an educator, so if you don’t have a deep awareness of it, you're not going to put it in all that much … The other is time” (E4).

One Educator also comments that time is a key barrier:

> "With only 11 weeks per semester and many many immediate needs that we're responsible for in terms of teaching skills, I have to prioritise those" (E8).

Another participant describes "the way universities are organised and schools are the same, particularly high schools" (E2) as a key barrier. Educators' comments show they perceive three main barriers for integrating sustainability in their units: time, personal awareness, and university/school organisations.

4.4 Semi-structured interviews with Students in The Programs

The semi-structured interviews with six Students were analysed for the range of experiences of learning and teaching about Sustainability. Interviewed Students' responses are coded as 'S (number)' to maintain anonymity. Two major themes emerged from the analysis of transcripts from interviews. The themes were:

1. Confidence to teach Sustainability; and
2. Experiences learning and teaching about Sustainability in The Programs.

Confidence to teach Sustainability

The Students were asked how confident they feel about teaching Sustainability based on current knowledge and skills. The six Students indicate through their comments that they feel semi-confident to teach sustainability. For example, one Student states:

> "I could probably fake it till I make it but I would definitely prefer to do more research before talking to kids about it" (S1).

Another Student states:

> "I feel maybe semi-confident. I don't know enough details about the world today... So I think with a bit more research, I could be much more confident" (S2).

One more Student explains that "I feel like I could do it, but I don't necessarily feel confident doing it" (S3). Comments from the three other Students include one feeling "probably 50/50" (S4) confident, another feeling "probably not a tonne" (S5) of confidence, and a third Student feeling "not very good" (S6) regarding confidence to teach Sustainability. These examples demonstrate Students' confidence to teach Sustainability based on their perceived levels of knowledge and skill.

Experiences learning and teaching about Sustainability in The Programs

Four Students could remember encountering Sustainability in the unit 'Curriculum and Teaching in the Primary School 2' (EDTE252). For example, one Student recalls that the unit "touched on" (S1) Sustainability. Another Student says the unit taught sustainability to some degree:

> "In … the half of the units where we did history and geography we also did sustainability. Some of that was in the lectures … the textbook was really, really thorough with Sustainability a lot of the time which was really excellent" (S3).

The third Student states that:

> "We did problems that addressed it [in EDTE252]. So it was mostly Maths problems, but they were about the environment and got kids … thinking about a real life situation" (S2).

The fourth Student states that the EDTE252 unit "talked about what you can reuse and not reuse" (S6). The examples provided from four Students seem to show that one science unit in The Programs offers some experiences for Students learning about Sustainability.

Another unit which is found to offer experiences to Students learning about Sustainability is 'Education: The Social and Historical Context' (EDUC106). One interviewed Student says:

> "I would sort of argue that the units … had some kind of sustainability perspective that was involved in there because you were talking about things like disadvantage and all of those sorts of things and social structures and different sorts of social institutions" (S3).

Two Students recall Sustainability being taught in two units: EDTE252, and 'Curriculum and Teaching in the Primary School 3' (EDTE353). One Student recalls learning about sustainability in EDTE353, saying:

> "…the only time it's really been mentioned has been one set of tutorials from [EDTE353]" (S4).

One Student states that in EDTE353:

> "We were meant to create a puppet show about sustainability that would get across to stage three students specifically and design an assignment for them to do it that would build research skills, critical thinking and also a little bit of problem solving" (S2).

The comments provided by interviewed Students demonstrate that Students get different experiences in EDTE252, EDUC106, and EDTE353 from The Programs in which Students learn about and learn to teach sustainability.

4.5 Self-completion questionnaire for Students in The Programs

The questionnaire respondents consisted of (n=36) Students. Thirty-four respondents are female (94%) and two are male (6%). The ages of most respondents are between 18 and 25 (69%; n=25), while the rest are aged 26 and older (31%; n=11). The Students are enrolled in a range of different Programs, shown in Table 4.2.

Table 4.2. Students (n=36) indicate which program they are enrolled in out of the four offered by the Department of Educational Studies, listed in the 'Name of Program' column.

Name of Program	Number of respondents	Proportion of total (%)
Bachelor of Education (Early Childhood Education) (Birth to 12)	16	44
Bachelor of Arts Degree combined with the Bachelor of Education (Primary)	14	39
Bachelor of Arts - Psychology with the degree of Bachelor of Education	3	8
Bachelor of Education (Primary)	3	8

The Students responding to the questionnaire are mostly female with most Students aged between 18 and 25, and are enrolled in different Programs.

Results from the Questionnaire

The results from five of the 20 questions in the questionnaire are substantive to the research question and are described.

Question 10: Do you think sustainability is important and/or relevant to teach in Primary schools?

Respondents were asked to indicate their response to Question 10 on a 5-point Likert scale. Figure 4.1 shows the responses from participants to Question 10. Most respondents (92%; n=33) indicate that they think sustainability is 'Important AND relevant', whilst others (8%; n=3) think it is 'Relevant'. No respondents said sustainability is 'neither important nor relevant'.

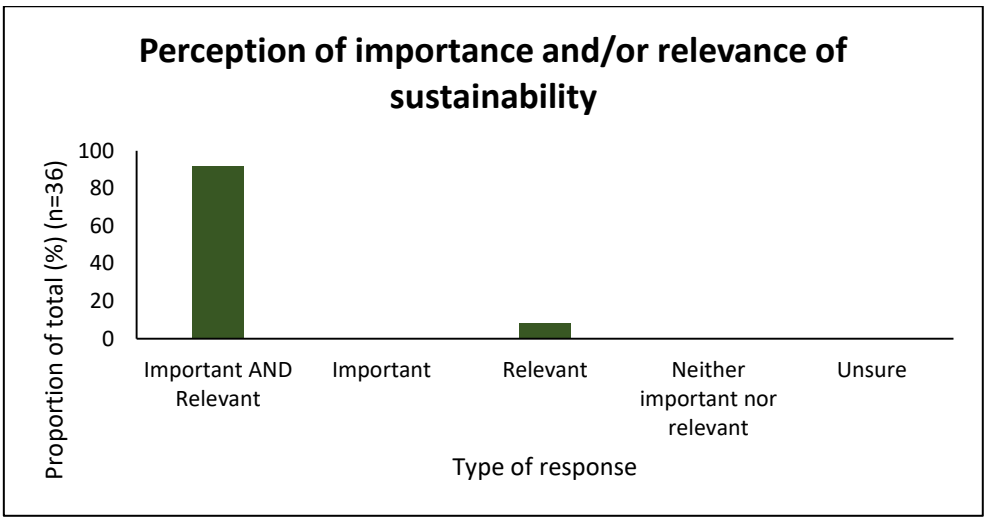

Figure 4.1. Students (n=36) indicate their perception of the importance and/or relevance of sustainability to teach in Primary schools, choosing between the choices listed on the x-axis. The y-axis shows the proportion of respondents choosing each response.

Question 12: Overall, how prepared do you feel to teach sustainability in Primary schools?

Participants were asked how prepared they feel overall to teach sustainability in Primary schools. Figure 4.2 shows the results indicating how respondents answered the question. The results indicate that most Students feel 'somewhat prepared' to teach Sustainability (64%; n=23) (Figure 4.2). Results show 8 Students (22%) feel 'not very well prepared' to teach sustainability (Figure 4.2). Five Students (14%) feel 'very well' or 'fully prepared' to teach sustainability (Figure 4.2).

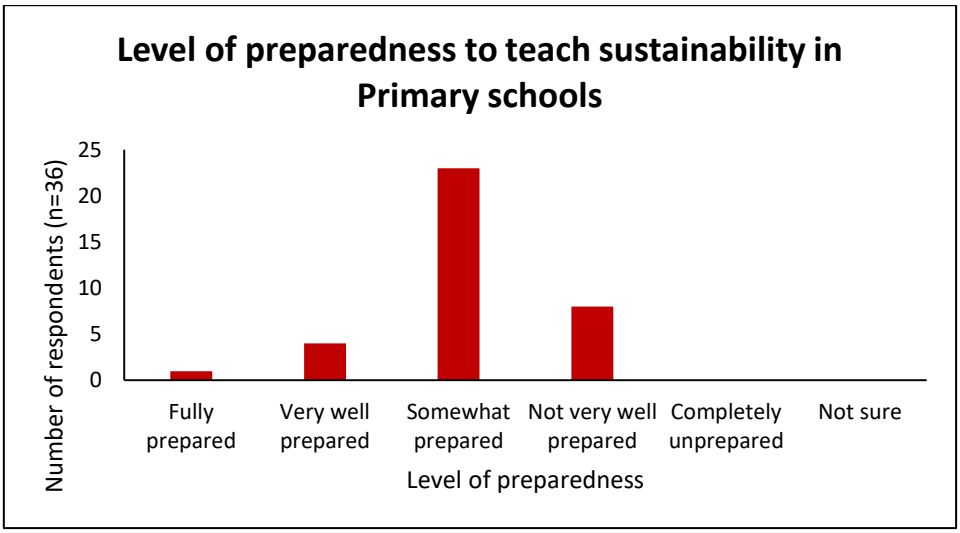

Figure 4.2. Students (n=36) indicate how prepared they feel overall to teach sustainability in Primary schools by selecting a response ranging from 'Fully prepared' to 'Not sure'.

Question 11: How confident do you feel to teach the following competencies and general capabilities to Primary school students?

Students indicate in response to Question 11 the varying degrees of confidence they feel to teach various capabilities and skills. Figure 4.3 shows comparison between the Students' confidence to teach different General Capabilities from the Australian Curriculum, compared with capabilities adapted from the Sustainability cross-curriculum priority (ACARA, 2017e). The results in Figure 4.3 show Students tend to feel more confident to teach 'Creative thinking' and 'Critical thinking' capabilities compared to the Sustainability capabilities of 'Thinking about sustainable futures', 'Acting to create sustainable futures' and 'Thinking about systems'.

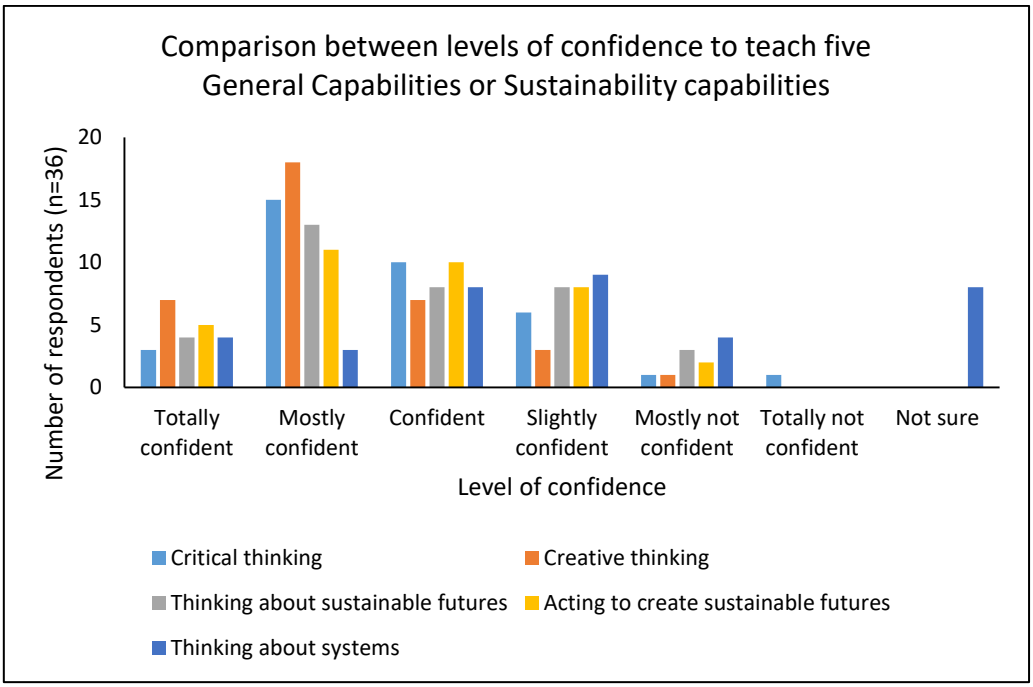

Figure 4.3. The comparison of Students' confidence to teach General Capabilities in the Australian Curriculum including 'Critical thinking' and 'Creative thinking' and skills adapted from Sustainability (i.e. 'Thinking about sustainable futures', 'Acting to create sustainable futures', and 'Thinking about systems') (ACARA, 2017e). The x-axis shows the level of confidence reported by Students and the y-axis shows the number of respondents. 'Critical' and 'Creative thinking' are skills internationally recognised as skills to be developed through EfS (Bedi & Germein, 2016).

Question 19: As a pre-service teacher have you observed or helped deliver a sustainability learning module in any of the following situations?

Question 19 is a closed question, and asked Students if they have ever observed or helped deliver a Sustainability learning module in the situations listed in Table 4.3 of Appendix E. About half (44%; n=16) of all Students indicate that they have experience in 'classroom-based activities' which

delivered a Sustainability learning module whereas fifteen (42%; n=15) participants indicate they 'have never observed or helped deliver sustainability learning'.

Question 16: In two sentences, please describe what aspects of your pre-service teacher training could be improved to increase your confidence around teaching the Sustainability Cross-Curriculum Priority in the Key Learning Areas.

Question 16 is an open question. The responses to this question vary, and are categorised into sixteen (n=16) different codes through NVivo 11. The categories found with the most responses were 'examples of practice' (n=17) and 'KLAs' (n=10) which relate to knowledge of how to integrate sustainability in KLAs and 'learning to do' (Delors, 1996). The categories were clustered again into UNESCO pillars of learning (Delors, 1996; Table 4.4, Appendix F): 'Learning to Know' (knowledge about Sustainability), Learning to Do (teaching Sustainability), Learning to Live Together (sharing resources for Sustainability), and Learning to Be (models of teaching Sustainability).

4.6 Focus group discussions with Educators

The focus groups with Educators allowed more understanding to be gained regarding the integration of Sustainability in units from The Programs. Findings from focus group sessions demonstrate where two Educators teach about Sustainability. One Educator states:

> "I don't explicitly go "we're doing sustainability", I just do stuff like "go outside and find sticks, why do you think we're doing that?" … So I actually model it though the activities" (E9).

Another Educator says:

> "…the students have to come up with a big idea that links to the cross-curriculum priorities … So there'd be a question they then have to generate … linked to a big idea that is a sustainable idea" (E10).

These Educators offer examples of how they include Sustainability in their units. In the course of discussion, it was suggested that Indigenous perspectives in education taught by one expert teacher may embrace sustainability, though using different terminology. This occurrence is not revealed in the Unit Guides. During the focus group discussion, it was also revealed that redevelopment of The Programs for accreditation is underway, and a 'focus on sustainability' is proposed for two science units in the new programs in the Department of Educational Studies.

5. Discussion

This chapter presents a discussion of the findings based on the research questions. The main findings are interpreted and related to previous research or theory. The chapter closes on the significance of the research, and how the research relates to the original aims.

5.1 How is the sustainability cross-curriculum priority fostered in The Programs?

The findings indicate various ways in which The Programs foster the Sustainability cross-curriculum priority as discussed in the following sections.

Interviews with Educators

The views of interviewed Educators only represent a handful of perspectives from all Educators for compulsory units in The Programs, and who seemed the most interested in the research. The results of interviews with Educators show that Educators differ in how they foster Sustainability in The Programs. Some Educators suggest that they integrate Sustainability "incidentally… more than intentionally" (E6). Many Educators did not offer examples of how they integrate Sustainability in their units, however two Educators were able to describe their efforts to teach Sustainability through either place-based gardens, or in an assignment in a final year unit. The unit is not named to maintain anonymity of the interview participant. The Unit Guide for this unit, when assessed, was not found to incorporate many explicit references to key words from the Sustainability cross-curriculum priority. The other Educator's unit, incorporating place-based gardens (E4), shows an example of how Educators can use local spaces to teach sustainability principles, such as understanding environmental systems (ACARA, 2017e). It is interesting to reflect on these units as concealing a hidden curriculum which incorporates teaching about the sustainability cross-curriculum priority. The notion of a hidden curriculum is described as what is learnt by students outside the publicised curricula (Winter & Cotton, 2012), such as learning from what is transmitted unconsciously by Educators. The Educators' comments show perspectives on how Sustainability is fostered in The Programs. These examples demonstrate that Educators use the approach of embedding sustainability in a component of a compulsory subject (Evans et al., 2017). This approach, and others, are discussed later in this chapter. The Educators' perspectives are interesting because in both cases, the Unit Guides were written by Educators other than those physically teaching in the units.

Understanding the attitudes of Educators towards sustainability is important for learning how Educators make efforts to foster sustainability in their units. The attitudes of Educators regarding fostering Sustainability in The Programs are varied. Two Educators offered examples of how they include sustainability in their units, and show two reasons for why they perceive sustainability as

being relevant to teacher education. First, they see it as a core value all educators should carry with them, and second, that living in a sustainable way is an ethos they live every day. Based on the findings it is evident that Educators who see sustainability as relevant to initial primary teacher education view it at a personal level connected to their professionalism. This world view of sustainability enables these Educators to have characteristics of expert teachers (Hattie, 2003). According to Hattie (2003), expert teachers are able to meaningfully integrate new knowledge of content with prior knowledge. The expert teachers in The Programs are able to integrate Sustainability into their teaching in ways that are not easily discerned through an evaluation of Unit Guides. These Educators' attitudes demonstrate their capacities as expert teachers (Hattie, 2003) to approach Sustainability in their teaching as a way of life.

On the other hand, other Educators see sustainability as relevant, but are unsure of how to apply sustainability thinking in practice. One Educator stated that "direct relevance to literacy and learning is a hard direct link to make" (E2). The NSW English Syllabus demonstrates this is not necessarily the case. This Syllabus states that literature and literacy are key in developing students' world views (Board of Studies NSW, 2012a). As 'world views' is a key organising idea in the Sustainability cross-curriculum priority, the English syllabus demonstrates direct relevance of literacy capabilities in students with one of the key organising ideas of the Sustainability cross-curriculum priority. The perceptions of Educators regarding relevance of sustainability to their KLA demonstrates misconceptions around how sustainability relates to teacher education. Despite the international and national policy context surrounding sustainability in teacher education, Educators have limited understanding regarding the relevance of Sustainability to their work.

Focus group discussions

As discussed earlier, the focus group discussions with Educators reveal a hidden curriculum (Winter & Cotton, 2012) in The Programs. Educators discussed a final year unit which requires Students to develop an integrated unit of work linking multiple KLAs across one of the cross-curriculum priorities. The hidden curriculum (Winter & Cotton, 2012) of Sustainability in The Programs was also discussed in the focus groups. It was suggested that a unit on Indigenous perspectives, taught by an expert teacher (Hattie, 2003) in the Department, is strongly linked to 'world views' on Sustainability. However, the Unit Guide and the Educators' world view may result in different terminology compared to this study. The hidden curriculum taught by expert teachers yields intriguing findings about how Sustainability is fostered in teacher education by Educators who are interested in or value Sustainability in some way. The focus groups with Educators also yielded findings regarding the progression of curriculum development for new initial teacher education primary programs to be accredited by the Australian Institute for Teaching and School Leadership

(AITSL). Educators discussed putting a 'focus on sustainability' into at least two science units in The Programs being developed for accreditation. This progressive move highlights the potential for Sustainability to be fostered and embedded in future programs.

Interviews with Students

Interviews with six Students helped to develop an interpretation of how Sustainability is fostered in The Programs. One Student (S3) interviewed stated that the first-year unit 'Education: The Social and Historical Context' (EDUC106) developed her understanding of the valuable role education plays in reducing disadvantage. This finding shows the Student has a sophisticated insight into the meaning and role of education for reducing inequality and could link equity to Sustainability, although this was not explored in great depth during the interview. International documents such as Agenda 21 (United Nations, 1992) and the Sustainable Development Goals (United Nations, 2015) highlight education as a strong means by which people can develop capacity to address sustainability challenges. The Student (S3) interviewed is predisposed to an understanding of social disadvantage as she is actively interested in gender issues. This Student's insight raises the question of whether most Students in The Programs have the capacity to discern links between concepts of sustainability and education as a means of reducing inequalities.

Interviews with these Students reveal there are two curriculum and teaching units for Science (EDTE252), and the other for Creative Arts (EDTE353) KLAs which currently offer experiences for Students to learn about Sustainability and how to teach it. One of the examples offered by Students was looking at reusable materials (EDTE252), and the other examples was developing a puppet show for children based around sustainability principles (EDTE353). These examples demonstrate different ways in which Students can recognise Sustainability is fostered in The Programs. Integrating Sustainability based on the NSW Syllabus for K-10 curriculum (Board of Studies NSW, 2012b) is a possible learning activity in The Program and should therefore be integrated into the Science and Creative Arts teaching units. The Creative Arts syllabus for primary school education (Board of Studies NSW, 2006) is currently investigating how to integrate Sustainability and for this reason, the impetus for Educators to incorporate Sustainability in their curriculum and teaching units may not be prominent.

Evaluation of Unit Guides

The evaluation of Unit Guides for all compulsory units in the B.Ed (Primary) program found some evidence that The Programs foster Sustainability. The strongest example of this is the unit 'Education: The Policy Context' (EDUC264) provided in the second year of the B.Ed (Primary) program, with eight references to the word 'social' linking strongly to Sustainability. Interestingly, EDUC106 which was discussed by one interviewed Student is a prerequisite for EDUC264,

demonstrating there are strong links to social aspects of the United Nations' (2015) concept of sustainability across units in The Programs. As EDUC106 and EDUC264 are connected in The Programs, their capacity to foster the social dimensions which underpin the Sustainable Development Goals (United Nations, 2015) demonstrate how they foster Sustainability strongly. The EDUC264 unit refers to 'justice' and 'equity' six times, and the references were graded as being strongly linked to Sustainability. The social dimension of sustainability is strongly represented in some Unit Guides, thus fostering aspects of the Sustainability cross-curriculum priority in The Programs. However, when evaluating the Unit Guides, the researcher found indications that Sustainability was not being explicitly fostered. The Unit Guides reveal more explicit examples where Sustainability was not being fostered.
It is surprising that first, the word 'sustainability' could only be found seven times in the Unit Guides' graduate capabilities. This is problematic because graduate capabilities are not written by educational curriculum developers, but rather by the university, and as a result an ad hoc approach to sustainability assessments and learning outcomes is prevalent in the Unit Guides.

A second example of how The Programs do not foster Sustainability appears in the limited presence of the phrase 'cross-curriculum priorities' and the key organising ideas ('systems', 'world views', and 'futures') in the Unit Guides. The key organising ideas are necessary components for the sustainability cross-curriculum priority as they are underpinned by scientific principles around Earth's ongoing capacity to maintain life (ACARA, 2017e). Rockstrom et al. (2009) emphasised that the process of sustainable development must act within the planetary boundaries in order to achieve sustainability, providing an important basis for an appreciation of the 'systems' component of Sustainability (ACARA, 2017e). Additionally, the organising idea of 'futures' relates to sustainability aspects of the precautionary principle (Taylor, Quinn, & Eames, 2015) advocated by the science world, where actions are designed to prevent any unpredictable challenges to sustainability. The idea of 'futures' also refers to envisioning the future and developing critical and creative thinking around key EfS skills (Wals, 2012). The organising idea of 'world views' engages the learner in recognising and valuing social justice and diversity principles (ACARA, 2017e). Comparing systemic ideas with others about how sustainability can be achieved is vital for all higher education students. This enables students to understand and appreciate the value of the Sustainable Development Goals in reducing inequalities through education (United Nations, 2017).

An analysis of the Department of Educational Studies Unit Guides indicates limited evidence of Sustainability being fostered in The Programs. However, Sustainability is being fostered in at least two units, one of which is a unit (EDUC264) focusing on the policy context of formal education. The other unit (EDUC106) focuses on teaching Students about the meaningful role of education in

addressing social inequalities in society today. However, the researcher notes that these interpretations of Unit Guides are preliminary and suggests this is an area for further research.

Questionnaire

The questionnaire findings indicate that 36 self-selected, possibly more interested Students out of approximately 350 Students in The Programs have limited experience in teaching Sustainability. The research found that nearly a quarter of respondents have never observed or helped deliver a Sustainability learning module. Teacher education students do not appear to be experiencing learning or explicitly practising teaching about Sustainability in any systematic way in their assignments or assessment outcomes within The Programs. This demonstrates The Programs do not foster learning experiences for Students in relation to the Sustainability cross-curriculum priority.

This is a major finding particularly as Sustainability is mandated in the Australian Curriculum (Kennelly, Taylor, & Serow, 2011), and Students in The Programs are expected to know the content and how to teach it (AITSL, 2017b). The findings suggest The Programs are not offering Students with the experiences required for them to teach Sustainability. This connects with the UNECE Competencies for Educators to teach EfS (UNECE, 2011) which is organised under the UNESCO framework of Learning to Know, Learning to Do, Learning to Be and Learning to Live Together (Delors, 1996). The UNESCO learning framework provides specific skills for Students who require these competencies to teach syllabus content for Sustainability to learners in schools. Recent research demonstrates how teacher education programs offer experiences for students to learn about and learn how to teach Sustainability. Tomas, Girgenti, and Jackson (2015) found in their research at James Cook University that students reported feeling more confident to teach EfS after learning the content knowledge and linking theory with practice. Such a 'specialist EfS course' approach to fostering sustainability learning, also identified by Evans et al. (2017), is one approach to embedding sustainability in teacher education, offering insights into how Programs can foster Students' confidence to teach Sustainability.

Fostering the Sustainability cross-curriculum priority in teacher education

The exploratory case study (Yin, 2015), provided the opportunity to understand how Sustainability is being fostered in The Programs, which was the aim of the research. The literature review discussed how other initial teacher education programs are attempting to foster the Sustainability cross-curriculum priority since its conception in the Australian Curriculum in 2011 (Gough, 2011).

Dyment and Hill (2015) investigated teacher education students' understanding of Sustainability, as well as the students' willingness and capacity to embed the Sustainability cross-curriculum priority in their teaching practice. Their research found that students generally have weak understandings of

the Sustainability cross-curriculum priority, and they lack the confidence and competence to teach Sustainability (Dyment & Hill, 2015). Students also reported having limited learning opportunities relating to the implementation of the Sustainability cross-curriculum priority. Sustainability is important to integrate into teaching and learning (Dyment & Hill, 2015). Dyment and Hill (2015) offer similar findings to those in this research, where 42% of Students in this case study report they have never observed or helped deliver a sustainability teaching module during their time in the Department of Educational Studies Programs. This indicates that The Programs require further curriculum development for all teacher education students to learn how to practise the Sustainability cross-curriculum priority.

The findings of the case study show that the Sustainability cross-curriculum priority, suggested by Donnelly and Wiltshire (2014) as being confusing, is not being fostered in The Programs. There are few examples from the literature of how initial teacher education in Australia fosters the Sustainability cross-curriculum priority. However, there are some examples in international research demonstrating how sustainability learning can be fostered. Evans et al. (2017, p. 410) reported a typology of four main approaches Educators use to embed sustainability education in teacher education programs: (1) “across curriculum areas, courses, and institution”; (2) “through a dedicated core/compulsory subject”; (3) “through a component of a core/compulsory subject”; or (4) “through a dedicated elective subject” . The first approach is described as systemic, where sustainability is embedded in departmental policies, daily practices, and activities (Evans et al., 2017). This approach is underpinned by research from Ferreira and Ryan (2012), who developed the “Embedding Education for Sustainability (EfS) Change Model” which seeks to mainstream EfS in the teacher education system. The second approach using dedicated compulsory EfS subjects is unusual, and three out of the four papers investigated by Evans et al. (2017) discussed research that was conducted in one regional Australian university by the same researchers. The third approach, with Sustainability included as one topic covered in lectures, tutorials, and as required for assignments, is the most common. The findings of the case study show various examples of this approach being used in The Programs, such as using place-based gardens and making a puppet show to teach about sustainability issues. However, if Sustainability is not included in the NSW Syllabuses such as for the Creative Arts and PDHPE key learning areas, it is possible Educators will not foster it in their units. The fourth approach of embedding sustainability through a specialist elective subject is found in programs where students come from a variety of disciplines and have fewer competing conflicts or interests. The typology of approaches found by Evans et al. (2017) provides possible ways in which The Programs could foster Sustainability. All four approaches

have merit, but the most holistic way Sustainability can be fostered is through the first approach, exemplified by the "Embedding EfS Change Model" developed by Ferreira and Ryan (2012).

Ferreira and Ryan (2012) reported on research into a mainstreaming change model which was initially funded by the Australian Government through the ARIES research hub at Macquarie University. This model, now called "Embedding EfS Change Model" (Ferreira & Ryan, 2012), looks at a whole-system approach to embedding sustainability education into teacher education systems. The assumption of this model is that long-term, sustained change can occur most likely when change is a common vision shared by stakeholders throughout a system (Ferreira & Ryan, 2012). Some processes to be followed for the model to be successfully used include "identifying the system and its components", "identifying ... change agents within and across the system", and "using action research processes" so that change agents can build the capacity to ensure change and "continuously evaluating and monitoring" progress occurs (Ferreira & Ryan, 2012, p. 39).

A future review of The Programs could include Educators and Students as change agents, who are passionate about Sustainability. In this way, the Students interested in participating in the process of embedding Sustainability could be given leverage, together with interested Educators, over the accreditation process for The Programs. According to the model from Ferreira and Ryan (2012), change agents would drive The Programs towards sustainable outcomes for short and long-term goals. The "Embedding EfS Change Model" (Ferreira & Ryan, 2012) approach, and those reviewed by Evans et al. (2017), demonstrate how Sustainability is and can be fostered in teacher education programs in Australia.

5.1.1 What drivers and barriers exist for fostering Sustainability in The Programs?

Perceptions of Educators

Educators viewed three main drivers and three main barriers for integrating Sustainability in their units in The Programs. The three main drivers are awareness raising, a sense of urgency, and top-down policy directives. The main barriers include time constraints, personal awareness, and university structures. These drivers and barriers are typical for educators to perceive in the education system (AESA, 2014). The AESA (2014) report indicated that a lack of time, comprehension of EfS, and having no top-down prioritisation of EfS in schools are some barriers perceived by teachers in schools for embedding EfS into teaching practices.

The AESA (2014) report found that out of the 80% of teachers who reported lacking an awareness of EfS or a clear understanding of what EfS entails, 50% viewed top-down communication of the importance of EfS as a key enabler to help them engage with the concept and practice more deeply.

The AESA (2014) report also outlined strategies of awareness raising to facilitate understanding of what Sustainability means in the context of teaching teacher education students. The Students who responded to the questionnaire suggest very similar strategies (Table 4.4, Appendix F) for their Programs to change so their confidence levels to teach Sustainability improve.

5.2 How confident do Students feel to teach sustainability?

The second research question sits within the bounds of the main research question, as the confidence levels fostered in Students to teach sustainability are based on whether The Programs foster Sustainability. The research yields interesting findings relating to the perceived confidence levels of Students.

Interviews with Students

The Students interviewed all indicated they feel semi-confident to teach sustainability. Some Students also stated that they could feel more confident if they had done more research on sustainability. This is interesting to note in light of the literature, as Evans et al. (2016) found through their survey research that students who undertook an EfS-specialist course demonstrated increased levels of perceived confidence and knowledge around EfS. This implies that Students who commented in interviews that further experience and research for learning about Sustainability would help aid their confidence could perhaps gain improved confidence through a specialist EfS course in The Programs.

Questionnaire

The questionnaire results indicate that most Students feel either somewhat prepared or not very well prepared to teach Sustainability in Primary schools (86%). In addition, the data show variation between respondents' confidence to teach a number of general capabilities (ACARA, 2017c) and capabilities for Sustainability (Figure 4.3). It is interesting to note that differences between the levels of confidence felt by Students to teach the general capabilities and the cross-curriculum priorities are apparent, with data showing the respondents tend to feel more confident to teach 'critical' and 'creative thinking' than 'thinking about systems', 'thinking about sustainable futures' and 'acting to create sustainable futures'. While the number of questionnaire respondents as a proportion of the entire cohort from The Programs is low (10%), these findings are interesting as the respondents are self-selected, implying they have an interest in Sustainability integration in their Programs but do not feel confident to teach Sustainability capabilities.

The findings of the questionnaire demonstrate that teacher education students do not feel strongly prepared to teach Sustainability-related capabilities like 'thinking about' and 'acting to create sustainable futures', and 'thinking about systems'. Although the rate of response to the

questionnaire was low, the results demonstrate that teacher education students tend to feel less than fully prepared to teach such capabilities from the Sustainability cross-curriculum priority.

Students indicated in Question 16 of the questionnaire that their Programs could be improved in various ways to enhance their confidence to teach Sustainability in relation to the key learning areas (KLAs). Students' suggestions are organised under the UNESCO four pillars of learning (Delors, 1996; Table 4.4, Appendix F). The most frequently coded term from Students' responses to Question 16 was 'examples of practice' (Table 4.4, Appendix F). Most suggestions were in the area of Learning to Know (about sustainability and how to integrate it in KLAs) and Learning to Do (through having teaching practice modelled in examples, developing lesson plans, and having practicum experience). Students made few suggestions within the Learning to Be and Learning to Live Together pillars, demonstrating they have limited awareness of sustainability as a way of being or how working with others can help achieve sustainability. The suggestions from Students offer opportunities for The Programs to re-align in order to develop Students' confidence to teach Sustainability. Resources have been written for Educators and Students to learn how to integrate Sustainability in teaching the KLAs (Taylor, Quinn, & Eames, 2015), and The Programs could foster Students' confidence to teach Sustainability by highlighting that these resources exist.

Opportunities for mainstreaming sustainability in The Programs

The opportunities to mainstream change in The Programs should first be understood based on influential factors in the context of the study. The "Embedding EfS Change Model" by Ferreira and Ryan (2012) shows influential change agents affect how Sustainability could be embedded in teacher education institutions. Students and Educators are change agents who influence how Sustainability is taught in The Programs through program reviews and feedback. Educators who are expert teachers (Hattie, 2003) where sustainability is a world view are more likely to know how to embed Sustainability in their units. These expert teachers should be considered key leaders in driving change. Understanding these influences provides opportunities to foster Sustainability in The Programs.

The Educators referred to potentially integrating Sustainability into their units if it was seamless or as an example when teaching something else. As the Australian Curriculum emphasises that Sustainability can connect content across learning areas, this is a possible opportunity for The Programs to foster the Sustainability cross-curriculum priority. The Sustainability cross-curriculum priority is embedded in the NSW Syllabuses for the KLAs of English, Mathematics, Science, Geography, and History, whilst the Creative Arts and PDHPE Syllabuses are in development (Board of Studies NSW, 2006, 2007). As most Syllabuses currently integrate Sustainability, the

next step to foster Sustainability in The Programs is to analyse syllabus content for Sustainability, and then determine how to foster it in The Programs.

The Students who commented in the questionnaire that sustainability experiences can be achieved through practicum expectations raises a strong argument about linking the Sustainability cross-curriculum priority with school-based teaching practice. The practicum expectations for Students in their professional experience units do not include teaching about Sustainability. This is a complex issue for professional experience units. Teacher education students only start their professional experience requirements in the third year of their Programs, and depending on the school they are placed at or their supervising teachers, they may not get any opportunity to integrate Sustainability into their teaching practice. This would be especially true if they have limited experiences within their Programs actually learning about Sustainability and how to integrate it into teaching practice. Professional experience requirements to include Sustainability can be addressed by involving agents of change from schools that supervise Students, based on the "Embedding EfS Change Model" (Ferreira & Ryan, 2012).

5.3 Significance of the research

Education can provide learners with the knowledge, skills and values to finding solutions to the challenges of today's society surrounding sustainability (Buckler & Creech, 2014). Macquarie University has an important role towards educating for Sustainability and providing an impetus for The Programs to teach about Sustainability. The Australian policy and curriculum documents such as the Australian Curriculum (ACARA, 2017a) highlight Sustainability as a cross-curriculum priority, thereby mandating teachers learn about how to teach Sustainability through the NSW Syllabuses in schools. Additionally, Macquarie University's Learning and Teaching Strategic Framework (Macquarie University, 2015) highlights sustainability as a priority area across all higher degree programs. The Department of Educational Studies (2017a) vision of future-focused programs based on interdisciplinary research provides an explicit opportunity for change in The Programs. Changing the policy through top-down directives provides the context in which The Programs can foster the Sustainability cross-curriculum priority more explicitly.

Sustainability as a priority for study can be used in teacher education to teach the key learning areas (Dyment & Hill, 2015). According to Beynaghi et al (2016), young people should be taught how to address local and global challenges as they are facing increased uncertainty around the earth's continuing capacity to maintain all life (Steffen et al., 2015). Education is a key process by which the capacity of learners can be enhanced and developed for learners to address sustainability challenges effectively. The present study found some examples of Sustainability learning being

fostered in The Programs through an intrinsic hidden curriculum, and yet most units were not incorporating explicit elements of the Sustainability cross-curriculum priority. Albeit from a small sample, the Students in the study are calling for modelling of practice in their programs providing opportunities for them to confidently teach Sustainability. Education is a key driver for equipping learners with the knowledge and capacity to enact changes to ensure humans contribute to sustainable ways of living (Buckler & Creech, 2014).

5.4 How the research relates to its aims

The first aim of the case study research was to explore how The Programs foster Sustainability. The Programs were found not to foster Sustainability very strongly. This is confirmed by the research findings as there are few explicit examples of lectures, tutorials, documentation or practical experience in which the Sustainability cross-curriculum priority is fostered, from the perspectives of Educators and Students, and based on the evaluation of Unit Guides.

The second aim is related to the first. The case study research aimed to explore whether Students feel confident to teach Sustainability. The findings of the research demonstrate limited confidence in the Students surveyed. Students indicated they feel either somewhat prepared or not very well prepared to teach Sustainability, and have limited confidence in teaching Sustainability capabilities.

This case study attempted to build a narrative based on an exploration of how The Programs foster the Sustainability cross-curriculum priority from the perspectives of Educators and Students, alongside document analysis. This approach was useful in viewing the case from the perspective of the social actors within it, despite the researcher being limited in how she could view The Programs from these methods.

6. Conclusion

The concluding chapter presents the implications of the findings, limitations of the research, recommendations for future work by the Department of Educational Studies, and future research.

6.1 Implications of the findings

This research provides an exploratory case study (Yin, 2015) of how the initial teacher education primary programs (The Programs) in a Sydney-based university currently foster Sustainability. The main findings in relation to the research questions are that The Programs currently do not foster Sustainability in an explicit way, and Students studying in The Programs voiced that they do not feel confident to teach Sustainability in schools. The case is a timely investigation for communicating the findings to the Department of Educational Studies, and conducting a literature review into the Sustainability cross-curriculum priority in the Australian Curriculum (Gough, 2011; Kennelly et al., 2011). The investigation is timely for the Department of Educational Studies because all of The Programs are being reviewed. The case study is important to the field of research as it demonstrates ways in which such programs can foster the Sustainability cross-curriculum priority, and therefore develop the capacities of Students so that they feel confident to teach Sustainability.

Apart from the findings of the AESA (2014) report on the *Education for Sustainability and the Australian Curriculum Project*, the extent to which the Sustainability cross-curriculum priority is integrated into education in Australia is still largely unknown (Hill & Dyment, 2016). This present research is therefore contributing to the body of knowledge in explicit ways, highlighting the complexities associated with teacher education research.

It became obvious during this research that confidence of Students to teach Sustainability in The Programs is limited, but this timely research can contribute in a constructive way towards the program review in the Department. For example, initiatives have begun to mandate Sustainability in two science units, while students demand modelling of practices that teach Sustainability. This will in turn foster confidence in Students to teach actions to achieve Sustainability.

The findings from the research around educators' and students' experiences of and attitudes towards Sustainability are rich material for The Programs to foster Sustainability. The key organising ideas of 'systems', 'world views', and 'futures' should be kept under strong consideration to achieve Sustainability goals (ACARA, 2017e).

6.2 Limitations of the research

There are limitations in the scope and depth of the case study. The research scope is small, pertaining only to the initial teacher education primary programs at Macquarie University, a handful of Educators employed to teach compulsory units in the Department, and 10% of primary education Students undertaking professional experience units. This limits the generalisability of the findings to the Department more generally and to other teacher education programs and institutions. However, the case study can be compared with other institutions in terms of how they conduct research into the fostering of the Sustainability cross-curriculum priority in teacher education. There were practical constraints which hindered the research. As an environmental sciences researcher, I felt outside the Department's research community, and my ability to gain access to Students, Educators and deep exploration into The Programs' content was limited. Any access was mainly facilitated through the networking of one Educator who negotiated time and space for the integrity of this research. Under these constraints, this might have influenced who was willing to communicate with me in the Department.

6.3 Recommendations for future work in The Programs

The Programs at Macquarie University are currently being reviewed for accreditation with the Australian Institute for Teaching and School Leadership (2017a). The findings and recommendations have already been communicated through email correspondence to the Head of Department for fostering the Sustainability cross-curriculum priority in The Programs. The most noteworthy recommendation arising from focus group discussions with Educators is the assurance that Sustainability is to be included in two units in the new programs. Support for embedding Sustainability can come from top-down policy directives, and can be enhanced through collaboration with sustainability experts and Educators at the university. However, a systemic approach to embedding sustainability was also recommended (Ferreira & Ryan, 2012) so that school practice and engagement of the Students in learning about Sustainability initiatives are included in the approach.

6.4 Future research

The future revised Department of Educational Studies programs provide possibilities for investigation into the effects of embedding Sustainability in units. The researcher recommends there be an action research study undertaken, which engages with key change agents in systematic ways in the university, thereby connecting to research practices in the domain of education (Kemmis &

Mutton, 2012). Empowering staff and students in The Programs to use up-to-date evidence-based research is vital for mainstreaming Sustainability across the key learning areas. Organising follow-up focus group discussions with self-selected Educators from the Department of Educational Studies will provide opportunities to reflect on assumptions, trigger insights and ask deeper meaningful questions about how Sustainability is and how it can be fostered in The Programs. It is also an opportunity to connect trans-disciplinary areas of science and education together. While Macquarie University has a long history of committing to integrating sustainability across many aspects of university life and continues to support the Sustainability Office, limited progress has occurred in the Department of Educational Studies (Primary) Programs. Therefore, recommendations are for future research to be conducted in initial teacher education programs.

References

Australian Curriculum, Assessment and Reporting Authority. (2017a). About the Australian Curriculum. Retrieved September 25, 2017, from http://australiancurriculum.edu.au/about-the-australian-curriculum/

Australian Curriculum, Assessment and Reporting Authority. (2017b). Cross-curriculum priorities. Retrieved October 2, 2017, from https://www.australiancurriculum.edu.au/f-10-curriculum/cross-curriculum-priorities/

Australian Curriculum, Assessment and Reporting Authority. (2017c). General Capabilities. Retrieved September 28, 2017, from https://www.australiancurriculum.edu.au/f-10-curriculum/general-capabilities/

Australian Curriculum, Assessment and Reporting Authority. (2017d). Learning Areas/Subjects. Retrieved October 7, 2017, from https://www.australiancurriculum.edu.au/f-10-curriculum/learning-areas/

Australian Curriculum, Assessment and Reporting Authority. (2017e). Sustainability. Retrieved September 25, 2017, from https://www.australiancurriculum.edu.au/f-10-curriculum/cross-curriculum-priorities/sustainability/

Australian Education for Sustainability Alliance. (2014). *Education for Sustainability and the Australian Curriculum Project: Final Report for Research Phases 1 to 3*. Melbourne, Australia.

Australian Institute for Teaching and School Leadership. (2017a). Accreditation of initial teacher education programs in Australia - Standards and Procedures. Retrieved September 27, 2017, from https://www.aitsl.edu.au/tools-resources/resource/accreditation-of-initial-teacher-education-programs-in-australia---standards-and-procedures

Australian Institute for Teaching and School Leadership. (2017b). Australian Professional Standards for Teachers. Retrieved October 5, 2017, from https://www.aitsl.edu.au/australian-professional-standards-for-teachers/standards/list

Australian Research Institute in Education for Sustainability. (2009). *Education for Sustainability: The role of education in engaging and equipping people for change*. Sydney, Australia.

Baker, S. (2016). *Sustainable development* (2nd ed.). Abingdon, Oxon: Routledge.

Bedi, G., & Germein, S. (2016). Simply Good Teaching: Supporting Transformation and Change Through Education for Sustainability. *Australian Journal of Environmental Education*, *32*(1), 124–133. https://doi.org/10.1017/aee.2015.52

Beynaghi, A., Trencher, G., Moztarzadeh, F., Mozafari, M., Maknoon, R., & Leal Filho, W. (2016). Future sustainability scenarios for universities: moving beyond the United Nations Decade of Education for Sustainable Development. *Journal of Cleaner Production*, *112*, 3464–3478. https://doi.org/10.1016/j.jclepro.2015.10.117

Birdsall, S. (2014). Measuring student teachers' understandings and self-awareness of sustainability. *Environmental Education Research*, *20*(6), 814–835. https://doi.org/10.1080/13504622.2013.833594

Board of Studies NSW. (2006). Creative Arts K – 6 Syllabus. Sydney, Australia: Board of Studies NSW.

Board of Studies NSW. (2007). Personal Development, Health and Physical Education K-6

Syllabus. Sydney, Australia: Board of Studies NSW.

Board of Studies NSW. (2012a). English K - 10 Syllabus. Sydney, Australia: Board of Studies NSW.

Board of Studies NSW. (2012b). Science K-10 (incorporating Science and Technology K-6) Syllabus. Sydney, Australia: Board of Studies NSW.

Boon, H. J. (2011). Beliefs and Education for Sustainability in Rural and Regional Australia. *Education in Rural Australia*, *21*(2), 37–54.

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, *9*(2), 27–40. https://doi.org/10.3316/qrj0902027

Bronfenbrenner, U. (1979). *The Ecology of Human Development: Experiments by Nature and Design*. Cambridge, MA: Harvard University Press.

Bryman, A. (2016). *Social Research Methods* (5th ed.). Oxford, UK: Oxford University Press.

Buckler, C., & Creech, H. (2014). *Shaping the Future We Want: UN Decade of Education for Sustainable Development (2005-2014) Final Report*. Paris, France.

Christmas, S., Wright, L., Morris, L., Watson, A., & Miskelly, C. (2013). *Engaging people in biodiversity issues. Final report of the Biodiversity Segmentation Scoping Study*. London: Defra–Department for Environment, Food and Rural Affairs.

Creswell, J. W. (2015). *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research* (5th ed.). Boston, MA: Pearson Education, Inc.

Delors, J. (1996). *Learning: The Treasure Within. Report to UNESCO of the International Commission on Education for the Twenty-first Century*. https://doi.org/10.1086/447500

Denby, L., & Rickards, S. (2016). An Approach to Embedding Sustainability into Undergraduate Curriculum: Macquarie University, Australia Case Study. In W. Leal Filho & P. Pace (Eds.), *Teaching Education for Sustainable Development at University Level* (pp. 9–34). Springer International Publishing Switzerland. https://doi.org/10.1007/978-3-319-32928-4

Department of Educational Studies. (2017a). Department of Educational Studies. Retrieved October 5, 2017, from http://www.mq.edu.au/about/about-the-university/faculties-and-departments/faculty-of-human-sciences/departments-and-centres/department-of-educational-studies

Department of Educational Studies. (2017b). EDUC106 – Education: The Social and Historical Context. Retrieved October 2, 2017, from http://unitguides.mq.edu.au/unit_offerings/72279/unit_guide

Department of Educational Studies. (2017c). Student Guides. Retrieved September 28, 2017, from http://www.educ.mq.edu.au/undergraduate/current_students/student_guides/

Department of the Environment, Water, Heritage and the Arts. (2009). *Living Sustainably - The Australian Government's National Action Plan for Education for Sustainability*. Canberra, Australia.

Department of the Environment, Water, Heritage and the Arts. (2010). *Sustainability Curriculum Framework: A guide for curriculum developers and policy makers*. Canberra, Australia.

Department of the Environment and Heritage. (2007). *Caring For Our Future - The Australian Government Strategy for the United Nations Decade of Education for Sustainable Development, 2005–2014*. Canberra, Australia. https://doi.org/10.1016/j.amjmed.2004.07.035

Donnelly, K., & Wiltshire, K. (2014). *Review of the Australian Curriculum*. Australian Government Department of Education.

Dryzek, J. S. (2005). *The Politics of the Earth: Environmental Discourses* (2nd ed.). Oxford: Oxford University Press.

Dyment, J. E., & Hill, A. (2015). You mean I have to teach sustainability too? Initial teacher education students' perspectives on the sustainability cross-curriculum priority. *Australian Journal of Teacher Education*, *40*(3).

Dyment, J. E., Hill, A., & Emery, S. (2015). Sustainability as a cross-curricular priority in the Australian Curriculum: a Tasmanian investigation. *Environmental Education Research*, *21*(8), 1105–1126. https://doi.org/10.1080/13504622.2014.966657

Effeney, G., & Davis, J. (2013). Education for Sustainability: A Case Study of Pre-service Primary Teachers' Knowledge and Efficacy. *Australian Journal of Teacher Education*, *38*(5), 32–46.

Evans, N. (Snowy), Stevenson, R. B., Lasen, M., Ferreira, J.-A., & Davis, J. (2017). Approaches to embedding sustainability in teacher education: A synthesis of the literature. *Teaching and Teacher Education*, *63*, 405–417.

Evans, N. S., Tomas, L., & Woods, C. (2016). Impact of Sustainability Pedagogies on Pre-Service Teachers' Self-efficacy. *Journal of Education for Sustainable Development*, *10*(2), 243–261.

Ferreira, J.-A., & Ryan, L. (2012). Working the System: A Model for System-Wide Change in Pre-Service Teacher Education. *Australian Journal of Teacher Education*, *37*(12), 29–45. https://doi.org/10.14221/ajte.2012v37n12.3

Ferreira, J.-A., Ryan, L., Davis, J., Cavanagh, M., & Thomas, J. (2009). *Mainstreaming sustainability into pre-service teacher education in Australia*. Sydney, Australia: Australian Research Institute in Education for Sustainability.

Ferreira, J.-A., Ryan, L., & Tilbury, D. (2007). Mainstreaming education for sustainable development in initial teacher education in Australia: A review of existing professional development models. *Journal of Education for Teaching*, *33*(2), 225–239. https://doi.org/10.1080/02607470701259515

Gkioka, A., Leci, A., Stavridis, D., & Seroglou, F. (2015). A Learning Model for the Introduction of the Principles of Bioclimatics and Sustainability in the Education of Pre-service Teachers. *European Journal of Sustainable Development*, *4*(3), 55–63. https://doi.org/10.14207/ejsd.2015.v4n3p55

Gough, A. (2011). The Australian-Ness of curriculum jigsaws: Where does environmental education fit? *Australian Journal of Environmental Education*, *27*(1), 9–23. https://doi.org/http://dx.doi.org/10.1017/S0814062600000045

Hattie, J. (2003). Teachers Make a Difference: What is the research evidence? In *Building Teacher Quality: What does the research tell us ACER Research Conference* (pp. 1–17). Melbourne, Australia. https://doi.org/10.1177/002221949002300106

Hedefalk, M., Almqvist, J., & Östman, L. (2014). Education for sustainable development in early childhood education: a review of the research literature. *Environmental Education Research*, *4622*(March), 1–16. https://doi.org/10.1080/13504622.2014.971716

Hegarty, K., Thomas, I., Kriewaldt, C., Holdsworth, S., & Bekessy, S. (2011). Insights into the value of a "stand-alone" course for sustainability education. *Environmental Education Research*, *17*(4), 451–469. https://doi.org/10.1080/13504622.2010.547931

Hiles, D. R. (2017). Axiology. Retrieved September 23, 2017, from http://sk.sagepub.com/reference/research/n31.xml

Hill, A., & Dyment, J. E. (2016). Hopes and Prospects for the Sustainability Cross-Curriculum Priority: Provocations From a State-Wide Case Study. *Australian Journal of Environmental Education*, *32*(3), 225–242. https://doi.org/10.1017/aee.2016.20

Holdsworth, S. (2010). *A critique of academic development in sustainability for tertiary educators*. RMIT University.

Holdsworth, S., & Hegarty, K. (2015). Towards a praxis of sustainability education in universities. *International Journal of Innovation and Sustainable Development*, *9*(3/4), 205. https://doi.org/10.1504/IJISD.2015.071861

Holdsworth, S., & Thomas, I. (2015). Framework for Introducing Education for Sustainable Development into University Curriculum. *Journal of Education for Sustainable Development*, *9*(2), 137–159. https://doi.org/10.1177/0973408215588246

Jackson, M. G. (2011). The Real Challenge of ESD. *Journal of Education for Sustainable Development*, *5*(1), 27–37. https://doi.org/http://dx.doi.org/10.1177/097340821000500108

Kemmis, S., & Mutton, R. (2012). Education for sustainability (EfS): Practice and practice architectures. *Environmental Education Research*, *18*(2), 187–207. https://doi.org/10.1080/13504622.2011.596929

Kennelly, J. (2010). *Education for Sustainability and Pre-Service Teacher Education*. University of New England. https://doi.org/10.1017/aee.2012.9

Kennelly, J., Taylor, N., & Serow, P. (2011). Education for Sustainability and the Australian Curriculum. *Australian Journal of Environmental Education*, *27*(2), 209–218. https://doi.org/10.1375/ajee.27.2.209

Lasen, M., Tomas, L., & Hill, A. (2015). Potential of service-learning to promote sustainability competencies in pre-service teachers: a case study. *Teaching Education*, *26*(4), 341–365. https://doi.org/10.1080/10476210.2015.1018157

Lozano, R. (2010). Diffusion of sustainable development in universities' curricula: an empirical example from Cardiff University. *Journal of Cleaner Production*, *18*(7), 637–644. https://doi.org/10.1016/j.jclepro.2009.07.005

Lozano, R., Ceulemans, K., Alonso-Almeida, M., Huisingh, D., Lozano, F. J., Waas, T., Lambrechts, W., Lukman, R., & Hugé, J. (2014). A review of commitment and implementation of sustainable development in higher education: Results from a worldwide survey. *Journal of Cleaner Production*, *108*, 1–18. https://doi.org/10.1016/j.jclepro.2014.09.048

Macquarie University. (2015). Learning for the Future: Learning and Teaching Strategic Framework: 2015-2020. Retrieved October 5, 2017, from http://www.mq.edu.au/__data/assets/pdf_file/0015/209400/MQ-LT-Strategic-Framework-White-Paper-Sep16_Spreads.pdf

Macquarie University. (2017a). Archived Unit Guides. Retrieved September 22, 2017, from http://unitguides.mq.edu.au/units/archive

Macquarie University. (2017b). People and Planet. Retrieved October 5, 2017, from https://students.mq.edu.au/study/my-study-program/core-experiences/people-and-planet

Macquarie University. (2017c). Unit Guides 2017. Retrieved September 22, 2017, from

http://unitguides.mq.edu.au/units

Mills, R., & Tomas, L. (2013). Integrating Education for Sustainability in Preservice Teacher Education: A Case Study From a Regional Australian University. *Australian Journal of Environmental Education*, *29*(2), 152–164. https://doi.org/10.1017/aee.2014.3

Ministerial Council on Education, Employment, Training, and Youth Affairs. (2008). *Melbourne Declaration on Educational Goals for Young Australians*. https://doi.org/10.1016/0738-0593(81)90019-5

NSW Council on Environmental Education. (2006). *Learning for Sustainability - NSW Environmental Education Plan 2007-10*. Sydney, Australia.

NSW Education Standards Authority. (2017). NSW Curriculum and Syllabuses. Retrieved October 5, 2017, from http://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/understanding-the-curriculum/curriculum-syllabuses-NSW

QSR International Pty Ltd. (2015). NVivo qualitative data analysis Software. QSR International Pty Ltd.

Qualtrics. (2017). Qualtrics. Provo, Utah. Retrieved from http://www.qualtrics.com

Rockstrom, J., Steffen, W., Noone, K., Persson, A., Chapin, III, F. S., Lambin, E. F., Leton, T. M., Scheffer, M., Folke, C., Schellnhuber, H. J., Nykvist, B., de Wit, C. A., Hughes, T., van der Leeuw, S., Rodhe, H., Sörlin, S., Snyder, P. K., Costanza, R., Svedin, U., Falkenmark, M., Karlberg, L., Corell, R. W., Fabry, V. J., Hanse, J., Walker, B., Liverman, D., Richardson, K., Crutzen, P., & Foley, J. A. (2009). A safe operating space for humanity. *Nature*, *461*(September).

Silverman, D. (2013). *Doing Qualitative Research* (4th ed.). London: Sage Publications Ltd.

Stants, N. B. (2014). *Understanding the education for sustainable development knowledge and teacher self-efficacy of middle level preservice teachers*. University of Pennsylvania. https://doi.org/10.1080/13504622.2015.1118748

Steele, F. (2010). *Mainstreaming Education for Sustainability in Pre-Service Teacher Education: Enablers and constraints*. A report prepared by the Australian Research Institute in Education for Sustainability for the Australian Government Department of the Environment, Water, Heritage and the Arts.

Steffen, W., Richardson, K., Rockstrom, J., Cornell, S. E., Fetzer, I., Bennett, E. M., Biggs, R., Carpenter, S. R., de Vries, W., de Wit, C. A., Folke, C., Gerten, D., Heinke, J., Mace, G. M., Persson, L. M., Ramanathan, V., Reyers, B., & Sorlin, S. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science*, *347*(6223), 1259855. https://doi.org/10.1126/science.1259855

Sterling, S., Maxey, L., & Luna, H. (Eds.). (2013). *The sustainable university: Progress and prospects*. Abingdon, Oxon: Routledge.

Taylor, N., Quinn, F., & Eames, C. (Eds.). (2015). *Educating for Sustainability in Primary Schools: Teaching for the Future*. Rotterdam, The Netherlands: Sense Publishers.

Tomas, L., Girgenti, S., & Jackson, C. (2015). Pre-service teachers' attitudes toward education for sustainability and its relevance to their learning: implications for pedagogical practice. *Environmental Education Research*, *November*, 1–24. https://doi.org/10.1080/13504622.2015.1109065

Tomas, L., Lasen, M., Field, E., & Skamp, K. (2015). Promoting Online Students' Engagement and

Learning in Science and Sustainability Preservice Teacher Education. *Australian Journal of Teacher Education*, *40*(11), 79–107. https://doi.org/10.14221/ajte.2015v40n11.5

United Nations. (1992). *Agenda 21*. *Earth Summit - The UN Conference on Environment and Development*. Rio de Janeiro, Brazil. https://doi.org/10.1007/s11671-008-9208-3

United Nations. (2015). Sustainable Development Goals. Retrieved September 27, 2017, from https://sustainabledevelopment.un.org/?menu=1300

United Nations. (2017). Sustainable Development Goal 10. Retrieved September 29, 2017, from https://sustainabledevelopment.un.org/sdg10

United Nations Economic Commission for Europe (UNECE). (2011). Learning for the future. *Strategy for Education for Sustainable Development*. Geneva: UNECE. https://doi.org/10.1088/0031-9120/32/3/007

United Nations Educational, Scientific and Cultural Organization (UNESCO). (2005). UN Decade of Education for Sustainable Development 2005 - 2014: The DESD at a glance. Paris, France: UNESCO. https://doi.org/ED/2005/PEQ/ESD/3

Wals, A. E. J. (2012). *Shaping the Education of Tomorrow*. *2012 Full-length Report on the UN Decade of Education for Sustainable Development*. Paris, France.

Wals, A. E. J. (2014). Sustainability in higher education in the context of the UN DESD: a review of learning and institutionalization processes. *Journal of Cleaner Production*, *62*, 8–15. https://doi.org/10.1016/j.jclepro.2013.06.007

Wilson, S. (2012). Drivers and Blockers: Embedding Education for Sustainability (EfS) in Primary Teacher Education. *Australian Journal of Environmental Education*, *28*(1), 42–56. https://doi.org/DOI: 10.1017/aee.2012.5

Winter, J., & Cotton, D. (2012). Making the hidden curriculum visible: Sustainability literacy in higher education. *Environmental Education Research*, *18*(6), 783–796. https://doi.org/10.1080/13504622.2012.670207

Winter, J., Cotton, D., Hopkinson, P., & Grant, V. (2015). The university as a site for transformation around sustainability. *International Journal of Innovation and Sustainable Development*, *9*(3/4), 303–320. https://doi.org/10.1504/IJISD.2015.071857

Wooltorton, S. J. (2003). *School-As-Community: Bridging The Gap To Sustainability*. Murdoch University.

Yin, R. K. (2012). Case Study Methods. In *APA Handbook of Research Methods in Psychology, Vol 2: Research designs: Quantitative, qualitative, neuropsychological, and biological.* (Vol. 2, pp. 141–155). https://doi.org/10.1037/13620-009

Yin, R. K. (2015). Case Studies. In *International Encyclopedia of the Social & Behavioral Sciences* (2nd ed., Vol. 3, pp. 194–201). Elsevier. https://doi.org/10.1016/B978-0-08-097086-8.10507-0

Appendices

Appendix A

The original Ethics application and amendment approval notices are included in this appendix.

From: Faculty of Science Research Office <sci.ethics@mq.edu.au>
Sent: Thursday, 2 March 2017 4:40 PM
To: Wendy Goldstein
Cc: fse.ethics; Katherine Shevelev; Cathi Humphrey-Hood
Subject: Ethics Project 5201700125 Final Approval

Dear Ms Goldstein

RE: Ethics project entitled: "Sustainability Teaching and Learning Integration into Teacher Education Programs at Macquarie University"

Ref number: 5201700125

The Faculty of Science and Engineering Human Research Ethics Sub-Committee has reviewed your application and granted final approval, effective 2/03/2017. You may now commence your research.

This research meets the requirements of the National Statement on Ethical Conduct in Human Research (2007). The National Statement is available at the following web site:

http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/e72.pdf

The following personnel are authorised to conduct this research:
Ms Wendy Goldstein
Ms Alexandra Lynch
Dr Bronwen Wade-Leeuwen
Please retain a copy of this email as this is your official notification of final ethics approval.

Yours sincerely,
Human Research Ethics Sub-Committee
Faculty of Science and Engineering
Macquarie University
NSW 2109

Dates of approval for amendments to the original Ethics application:

17/03/2017

01/05/2017

17/05/2017

22/08/2017

Appendix B

Interviews with Educators – Questions

Demographics Questions:

Which units are you currently involved in this semester, as a unit convenor, lecturer, or tutor?

Interview Questions:

1. What do you understand sustainability to be about? Do you feel that it's relevant to what you teach in your unit/s?
2. Have you been involved in the Sustainability Office's Unit Mapping process to assess how much sustainability is integrated in your unit/s?
   - *Follow up (Yes or No):*
   - Answer No: Are you interested in taking part in this mapping process with the Sustainability Office so you can understand how your unit/s currently incorporate sustainability? Why or why not?
   - Answer Yes: Did your understanding of sustainability change after this mapping process? In what ways did your understanding change?
   - Answer Yes: Were you surprised by anything you learnt during this mapping process? E.g. about sustainability, the mapping process, or about your own unit? Why do you think that?
   - Answer Yes: Are you interested in following up with the Sustainability Team to receive information or resources about how to integrate sustainability into your unit more? Why or why not?
   - Answer Yes: Is there anything that Macquarie Sustainability could do to improve, or to assist in integrating sustainability into your unit/s?
3. How do you include the concepts of sustainability in your unit/s (i.e. in lectures, tutorials, unit guide, assignments)?
4. How important is it for you and your students to engage with sustainability learning now and into the future?
5. How confident do you feel about incorporating teaching for and about sustainability in your unit/s?
6. Are you aware of any resources that may help teacher educators include sustainability in their teaching? If so, what are they?
7. What do you see as the main drivers and barriers for the integration of sustainability in your Education unit/s?
8. Considering both the drivers and barriers you mentioned that exist at Macquarie, how can work by the university and various key people in integrating sustainability in the Teacher Education Program at Macquarie be upscaled to ensure its success?

Appendix C

Interviews with Students – Questions

This interview is being conducted for research purposes, and it will not impact on your assessment at all. The aim of this research is to understand your experiences as a pre-service teacher in relation to sustainability learning and teaching in the Primary teacher education program here at Macquarie. This session will be recorded on an audio-only recording device.

I will ask a few questions to warm you up, and then we can get into the interview questions once you're comfortable. The session will go for 30 minutes, where all your responses are valuable and important for this research. Please don't hesitate to give any answer you can think of as a response to my questions. If you feel uncomfortable at any point, please let me know and I will stop the interview.

Warm up questions:

What attracted you to primary teaching?

What kind of skills do students need to learn in primary school?

Do you think teaching about and for 'sustainability' is relevant in primary education?

In your opinion, how important is sustainability to you as a teacher?

Have you heard of the Cross-Curriculum Priorities? Can you name them for me?

Interview Questions

1. What do you understand "sustainability" to be about?

2. How confident do you feel about teaching sustainability based on your current knowledge and skills?

3. Sustainability is a cross-curricular priority in the national Australian Curriculum (2014). The Australian Curriculum encourages teachers to integrate sustainability into the KLAs where it is relevant, which can be done by putting a sustainability perspective on teaching strategies for teaching the Key Learning Areas. Some examples of how teachers can integrate sustainability in their teaching of the KLAs is through problem solving, visualising the future based on current trends, creativity, and critical thinking. These skills can be used to teach sustainability issues and perspectives in classrooms. Considering this, what skills do you feel you need as a future teacher to implement sustainability in your teaching?
   - *Follow up: What knowledge do you feel you need to have in order to implement sustainability in your teaching?*
   - *Follow up: What kinds of experiences do you feel you need in order to implement sustainability in your teaching?*

4. Could you provide some examples of ways you have encountered sustainability in your teacher education programs so far?
   - *Follow up/Prompt: was it practical fieldwork, assignments, class discussion, activities within tutorials, lectures, or something else?*
   - *Follow up: was it covered in any of your Education Units?*
   - *Have you studied Sustainability in other units outside your teacher education program?*

- *In what ways do you come across sustainability concepts and practices outside uni?*

5. Could you now provide some examples of ways you have encountered sustainability in the school system? (if you have done any in-service practicals yet?)
   - *Follow up/Prompt: for example, is it part of your in-service professional learning?*
   - *Have you encountered it in your teaching experience or in general school activities?*

6. In your own teacher education course, what were the Sustainability teaching practices being employed? (skip if none for question 4)
   - *Follow up/Prompt: Was there practical fieldwork, assignments, class discussion, activities within tutorials, lectures, or something else?*

7. Have you ever made any teaching guides or plans for teaching sustainability?
   - *Follow up: If you were given the opportunity, how would you incorporate sustainability in your learning and teaching practice?*

8. If you are going on placement in a school in the next month or so, would you be willing to integrate the sustainability cross-curricular priority in your lesson plans?
   - *Follow up:* Would you be willing to allow me to read your documented lesson plans which include sustainability, for the purpose of this research?

9. Do you have any other comments you would like to add?

Appendix D

Questionnaire to Students

The aim of this questionnaire is to look at students' perception of how the Sustainability Cross-Curriculum Priority (ACARA, 2017) is integrated in the Department of Educational Studies Primary Teacher Education Program at Macquarie University. The information collected will inform future teacher education curriculum development.

We would appreciate it if you would answer all the questions as honestly as possible especially, as there are no right or wrong answers. The questionnaire is anonymous and no individuals will be identified. Your participation in this study is voluntary and there is no remuneration for participating.

By completing this questionnaire, you agree to your responses being used for the purposes of research being conducted by a Master of Research student Alex Lynch (alexandra.lynch@hdr.mq.edu.au) at Macquarie University, who is supervised by Wendy Goldstein (wendy.goldstein@mq.edu.au) in Dept of Environmental Sciences and Bronwen Wade-Leeuwen (bronwen.wadeleeuwen@mq.edu.au) in Dept of Educational Studies.

The ethical aspects of this study have been approved by the Macquarie University Human Research Ethics Committee (HREC Ethics Reference Number: 5201700125). If you have any complaints or reservations about any ethical aspect of your participation in this research, you may contact the Committee through the Director, Research Ethics & Integrity (telephone (02) 9850 7854; email ethics@mq.edu.au).

Q1 What degree or degrees are you currently enrolled in?

- o Bachelor of Education (Early Childhood Education) (Birth to 12)
- o Bachelor of Arts with the degree of Bachelor of Education (Primary)
- o Bachelor of Arts - Psychology with the degree of Bachelor of Education (Primary)
- o Bachelor of Education (Primary)
- o Other (please specify) _____

Q2 What is your gender?

- o Male
- o Female
- o Other
- o Prefer not to say

Q3 What age group are you in?

- o 18-21
- o 22-25
- o 26-29
- o 30-33
- o 34 or older
- o Prefer not to say

Q4 What year of your education degree are you currently in?

- o First year
- o Second year
- o Third year
- o Fourth year
- o Fifth year or above

Q3 What age group are you in?

- 18-21
- 22-25
- 26-29
- 30-33
- 34 or older
- Prefer not to say

Q4 What year of your education degree are you currently in?

- First year
- Second year
- Third year
- Fourth year
- Fifth year or above

Q5 Please list which Education units you're studying this year.

Q6 If known, please list the three Cross-Curriculum Priorities in the Australian Curriculum.

Q7 Where do you hear about 'sustainability'? Please select the three most common areas from the list below.

- Primary Education units
- Units from outside of my Education degree
- On campus, but outside classes
- At home
- In the local community
- Traditional media (TV news or newspapers)
- Social media (Facebook news, Twitter, Instagram, blogs)
- From friends
- From family members
- I don't hear anything about Sustainability
- Other (please specify) _____

Q8 How often is sustainability discussed in the following situations?

	Every week	Every couple of weeks	Every month or two	Every six months	Never	Not applicable/unsure
Compulsory units for my Education degree	❍	❍	❍	❍	❍	❍
Compulsory units from outside the School of Education	❍	❍	❍	❍	❍	❍
Elective units for my Education degree	❍	❍	❍	❍	❍	❍
Elective units from outside the School of Education	❍	❍	❍	❍	❍	❍
At university, but outside lectures and tutorials	❍	❍	❍	❍	❍	❍
At home	❍	❍	❍	❍	❍	❍

Q9 Please list 4 words or phrases that express your understanding of what sustainability is about.

Q10 Do you think sustainability is important and/or relevant to teach in Primary schools?

- o Important AND Relevant
- o Important
- o Relevant
- o Neither important nor relevant
- o Unsure

Q11 How confident do you feel to teach the following competencies and general capabilities to Primary school students?

	Totally confident	Mostly confident	Confident	Slightly confident	Mostly not confident	Totally not confident	Not sure
Literacy	❍	❍	❍	❍	❍	❍	❍
Numeracy	❍	❍	❍	❍	❍	❍	❍
ICT Capability	❍	❍	❍	❍	❍	❍	❍
Critical thinking	❍	❍	❍	❍	❍	❍	❍
Creative thinking	❍	❍	❍	❍	❍	❍	❍
Ethical understanding	❍	❍	❍	❍	❍	❍	❍
Intercultural understanding	❍	❍	❍	❍	❍	❍	❍
Personal and social capability	❍	❍	❍	❍	❍	❍	❍
Thinking about sustainable futures	❍	❍	❍	❍	❍	❍	❍
Acting to create sustainable futures	❍	❍	❍	❍	❍	❍	❍
Appreciating and respecting a diversity of worldviews	❍	❍	❍	❍	❍	❍	❍
Thinking about systems	❍	❍	❍	❍	❍	❍	❍

Q12 Overall, how prepared do you feel to teach sustainability in Primary schools?

- o Fully prepared
- o Very well prepared
- o Somewhat prepared
- o Not very well prepared
- o Completely unprepared
- o Not sure

Q13 Have you ever made any teaching guides or plans for teaching sustainability?

- o Yes
- o No
- o Unsure/don't know

Display This Question:
If Have you ever made any teaching guides or plans for teaching sustainability? Yes Is Selected

Q14 In 3-5 sentences, please describe the most recent teaching guide or plan you made for teaching sustainability.

Q15 In two sentences, please describe how you would incorporate the Sustainability cross-curriculum priority in your teaching practice of one Key Learning Area (of your choosing) in a Primary school classroom?

Q16 In two sentences, please describe what aspects of your pre-service teacher training could be improved to increase your confidence around teaching the Sustainability Cross-Curriculum Priority in the Key Learning Areas.

Q17 Have you ever accessed high quality sustainability learning resources?

- o Yes
- o No
- o Not sure

Display This Question:
If Have you ever accessed high quality sustainability learning resources? Yes Is Selected

Q18 From where did you access learning resources to teach the Sustainability Cross-Curriculum Priority?

- □ BOSTES
- □ Scootle
- □ Department of Education
- □ Cool Australia
- □ Sustainable Schools
- □ Environmental Education center or provider
- □ Google
- □ International websites
- □ Science teachers
- □ Humanities and Social Science teachers
- □ Teacher Associations (e.g. Geography)
- □ Other (please specify) _____
- □ I can't remember

Q19 As a pre-service teacher have you observed or helped deliver a sustainability learning module in any of the following situations?

- □ School-based activities
- □ Classroom-based activities
- □ Project-based learning
- □ Integrated (cross-curriculum) research project or assignment
- □ Other situations (please specify)_____
- □ I have never observed or helped deliver sustainability learning

Q20 Do you have any final comments you would like to add?

Appendix E

Table 4.3. Participants were asked in Question 19 about their experiences observing or helping deliver a sustainability module in six different situations listed. Participants could choose more than one option from the range in the 'Response' column.

Response	Count (n=61)	Percentage of total (%)
School-based activities	10	16
Classroom-based activities	16	26
Project-based learning	10	16
Integrated (cross-curriculum) research project or assignment	9	15
Other situations (please specify)	1	2
I have never observed or helped deliver sustainability learning.	15	25
Total	61	100

Appendix F

Table 4.4. Responses to Question 16 were categorised and then clustered into the four pillars of learning (Delors, 1996). Examples of responses are given for each category. The number of participants whose responses were categorised in a particular category are indicated.

Category	No. of responses	Example/s from Questionnaire responses
Learning to Know – About Sustainability		
Content – dedicated subject	3	"There should be a subject dedicated to it, as there is with Indigenous perspectives"
Understanding	1	"…just mentioning the word 'sustainability' isn't adequately teaching us techniques to incorporate it. Often many students do not have a deep understanding about what sustainability is"
Word or definition of Sustainability	3	"Focus more about what it means, aspects that come under this broad umbrella."
Learning to Know – About Integrating in KLAs		
Cross-curriculum	2	"…we should be educated on how to incorporate the Cross-Curriculum Priorities into any KLA"
Key Learning Areas (KLAs)	10	"Practical tools for how to incorporate sustainability into the classroom in each KLA would be very useful."
Literacy	1	"…during a literacy unit, a current teacher could discuss how they relate literacy and sustainability."
Learning to Do – How to teach Sustainability		
Assessment	1	"Design assessments around the topic which encourages students to design their own methods for introducing the concept"
Examples of practice	17	"Dedicated examples in each key learning area about how sustainability can be taught" "Examples as to how schools are currently implementing this"
Experiences (to plan lessons)	3	"…experience on how to teach and plan for authentic lessons surrounding sustainability"
In schools (practising teaching Sustainability)	2	"My understanding of practical ways to be sustainable, especially in the classroom"
Learning activities	1	"Opportunities to write lesson plans to incorporate sustainability in a range of KLA areas"
Professional experience (practicum)	1	"Have practicum expectations that require a certain amount of sustainability experiences integrated within lessons."
Research (tasks)	2	"Further research incorporation of sustainability with other KLA and other subjects other than science and geography."
Learning to Live Together		
Lecture and/or tutorial content	2	"It would be excellent to have a guest lecturer with many practical ideas and how they are linked to the syllabus in each KLA"
Resources (knowledge of shared resources)	3	"Resources that are available and accessable [*sic*] i.e. lesson plans / unit of work."
Learning to Be		
Perception of importance	3	"I think the first step is making students AWARE and interested in sustainability issues"