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Loving Mother Earth: Exploring education for sustainable development and the circular economy concept in an Irish primary school context.

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Abstract

This thesis examines key concepts of circular economy in education for sustainable development in the Irish primary school. Using arts-based methods, participants were invited to explore the concepts of a circular economy, circularity, and waste valorisation and to develop knowledge and awareness around measures we can take through education for sustainable development, to heal Mother Earth.

Relevant literature was used to analyse how education for sustainable development is presented in policy and curriculum, drawing on Bacchi's model of policy analysis. The research was guided by a theoretical framework of Froebelian philosophy and ecofeminism which highlight the holistic, participative, and loving potential of creative pedagogies in primary school education. This research examined, with participants, how their learning and activities on sustainability with regard to the sustainable development goals (SDGs) positively impacted on their lives and the lives of others, helping to sustain and protect the natural world. It explicitly introduced the concept of a circular economy in the Irish primary school, with emphasis on the concepts of circularity and reciprocity. It explored an integrative approach to sustainability concepts, specifically the concept of circular economy with visual art approaches.

The research reveals findings which demonstrate the place complex concepts such as the circular economy concept have in the primary classroom, when approached carefully and democratically through carefully designed pedagogical approaches, informed by a Froebelian ecofeminist theoretical framework and a pedagogy of love.

Keywords: circular economy, circularity, waste valorisation, sustainability, no away, 5Rs, participatory, reuse, repurpose, recycle, education for sustainable development, reciprocity, Mother Earth.

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List of Abbreviations

3Rs	Reduce, Reuse, Recycle
5Rs	Refuse, Reduce, Reuse, Repurpose, Recycle
BERA	British Educational Research Association
CCPI	Climate Change Performance Index
CE	Circular Economy
COP24	24th Conference of Parties to the UNFCCC
DECLG	Department of the Environment Community and Local Government
DES	Department of Education and Skills
EC	European Commission
EMAF	Ellen MacArthur Foundation
ESD	Education for Sustainable Development
EU	European Union
GSP	Green-Schools Programme
IPSC	The Irish Primary School Curriculum
ITE	Initial Teacher Education
MDGs	Millennium Development Goals
NCCA	National Council for Curriculum and Assessment
PRC	People's Republic of China
SD	Sustainable Development
SDGs	Sustainable Development Goals
SESE	Social Environmental Scientific Education
SPHE	Social Personal and Health Education
UN	United Nations
UNESCO	The United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Climate Change Conference
UNICEF	United Nations International Children's Emergency Fund

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1. Chapter 1

1.1 Introduction

This thesis examines the educational potential of including the concept of a circular economy in primary schooling. The circular economy concept focuses very clearly on sustainability and care for the natural world while maintaining a deep respect for the ecological and social world. In line with care and respect, love towards the natural world is invoked in this thesis to consider how it might contribute to children's ways of engaging in the circular economy. The thesis illuminates how the circular economy concept can be examined in the Irish primary classroom as a form of Education for Sustainable Development (ESD), exploring the following key questions:

How do young people engage with sustainability and the circular economy concept through arts-based methods?

What is the impact of these approaches on the children's engagement with the circular economy and sustainability?

The issues of climate change and sustainability – as well as possible responses to them such as is offered through the concept of circular economy – in primary education is at the core of the thesis. The thesis asks whether the primary education system can afford to remain on the margins of the current sustainability crisis. UNESCO highlight the world's population is expected to increase by 2 billion people in the next 30 years, from 7.7 billion to 9.7 billion in 2050. By 2050 solid waste globally is expected to increase from 2.01 billion tons to 3.40 billion tons annually. They emphasise that continuing this trajectory of overconsumption and wasteful behaviour means three planets would be needed to provide the required natural resources directly contributing to the climate crisis. 'What we do has implications not just for our own lives but the lives of everyone else on our shared planet, today and in the future'

(UNESCO, 2021: 3). The research conducted here in schools explored practices which produce excessive waste and possible solutions in the form of a circular economy. This was conducted as part of the larger AgroCycle Project funded by the European Union (EU), as is outlined in chapter 5.

Given the focus on sustainability, young people, and care and love of the natural world, a Froebelian ecofeminist philosophy acts as an appropriate theoretical framework for this research. This is primarily due to 19th century German educator Friedrich Froebel's (1782 – 1852) emphasis on the importance of the natural world for young people and ecofeminism's emphasis on overcoming dualistic modes of thought which hinder love of the Earth. The use of Froebelian philosophy and ecofeminist philosophy for this thesis will be discussed in detail in chapter two.

1.2 Aims

The aims of this qualitative research project emerged from my values as a Froebelian educator, guided by ecofeminist theory, and informed by a transformative research paradigm (See section 4.1). The central aims are:

- To examine, with participants, how their learning and activities on sustainability with regard to the sustainable development goals (SDGs) may positively impact on their lives and the lives of others, helping to sustain and protect the natural world.
- To explicitly introduce the concept of a circular economy in the Irish primary school and place emphasis on the concept of circularity
- To explore an integrative approach to sustainability concepts, specifically the concept of circular economy, with visual art approaches.

Guided by these aims, the concept of a circular economy was explored in three primary schools with children aged from 11 to 13 years old. This thesis is committed to the idea that

exploring ESD and applying a sustainable approach to living, must be firstly rooted in a feeling of love for the Earth. Sobel writes: 'what's important is that children have an opportunity to bond with the natural world, to learn to love it, before being asked to heal its wounds' (1996: 10). Thus, the aims and my theoretical framework position this bond as central to this dissertation.

1.3 Philosophical Basis

Having completed my undergraduate degree in education embedded in Froebelian philosophy, I proceeded to work as a Froebelian educator for several years in primary school settings and at third level. I was therefore keen to have the opportunity to explore my Froebelian values throughout the thesis journey, using qualitative research to explore how children engaged with the concept of a circular economy in the primary school curriculum, and if tendencies towards stewardship for the Earth emerged just as Froebel himself advocated.

Throughout the research in schools, a love of Mother Earth (the concept of Mother Earth specifically relevant to this research is discussed in detail in chapter 2) was modelled, discussed, and nurtured during a series of sessions at each site, which is explained in greater detail in Chapter Four on methodology. It foregrounds creativity as an important factor in this research and pedagogical engagement and is grounded in a view of love synonymous with a mother's or parent's love. Parental love, traditional or otherwise, can be engendered towards the natural world and all within her, through an approach of stewardship. This approach was influenced by my Froebelian values. As explored in chapter 2, the most influential and

significant aspect of a Froebelian practice for me personally and professionally is the connection to the outdoors and the potential this offers in encouraging environmentally sustainable dispositions. This reflects why the outdoors were integral to the research. Tovey

highlights:

Today as many children spend longer amounts of time indoors and are increasingly disconnected from the natural world, Froebel's ideas have renewed importance and urgency. If children can develop a sense of wonder about nature, can see the effect of their actions on things around them and can get to know their own small garden in deep ways, they are much more likely to want to conserve nature and help shape a sustainable future. (2019: 17)

This is not to suggest there was any intention to place the urgent call for greater sustainable behaviour and conservation of nature on the shoulders of children alone, but rather to include them in a conversation in search of solutions to issues contributing to environmental degradation and climate change. The emphasis throughout the research at the three sites was love, care, and observance of nature. The notion of circularity was central to the research as nature leaves no waste. In nature everything has a purpose, and nothing is discarded. Froebel claimed that all children should have the opportunity to experience every element of nature. 'The child should experience nature "in all its aspects – form, energy, substance, sound and colour"' (Froebel in Lilley 1967: 148). Tovey adds that for Froebel this included:

the universal laws of nature such as forces, gradient, gravity, motion, energy, light, sound, properties of materials and their transformations. One of the best ways children can experience nature, he argued, is through their play outdoors in the garden and in the wider natural environment. (2019: 8).

I would also add the concept of circularity to this point. The thesis focuses on how children can engage with the natural environment through their learning, by working with adults as participants in exploration of the circular economy concept. This entails observation and biomimicry of the circularity of life in the natural world, by remembering that there is 'no away' in the natural world. These two ideas are woven throughout the thesis and discussed

in more detail in the discussion of the concept of the circular economy in chapter three. Froebel himself emphasised 'everything is based on unity, strives towards and comes back to unity' (Froebel in Lilley 1967: 45). This emphasis on unity is what makes Froebelian philosophy a key part of the theoretical framework of the thesis. It is appropriately combined with ecofeminist philosophy to fully support the thesis as outlined and discussed in chapter two.

Ecofeminism, or ecological feminism, is a branch of feminism which examines the connection between nature and the oppression of both in a patriarchal society. Ecofeminist theory, like the knowledges of indigenous peoples, helps us to understand the reciprocity of the relationship Mother Earth has with all living things in a holistic, interdependent ecosystem. The inclusion of ecofeminism is a vital element in the theoretical framework of this research as it illuminates the research in a way that Froebelian philosophy cannot. Ecofeminism provides an 'ecosystem model of historical change' that 'looks at the relationship between the resources associated with a given natural ecosystem... and the human factors affecting its stability or disruption over a historical period' (Merchant, 1980: 42, 43). It provides a means of analysing how our pathway of economic development, emerging from industrial development and through advanced capitalism, have had destructive consequences for the health of all living things on Earth, including humanity. Ecofeminist philosophy draws our attention to the oppression of Mother Earth and the relentless abuse of the natural world, highlighting the connection and analogy between women and the ecological crisis. Shiva explains how we are being simultaneously ecological and feminist,

what we are trying to do is not look so much at what women are but how the dominant path perceives them and manipulates structures to exclude, violate, dominate, and to see how closely the attitudes to women are related to attitudes to nature and how violence against women and the ecological crisis mimic each other all the time (Shiva, 2012).

It reveals the patriarchal roots of these types of economic development and critiques the current imbalance originating from patriarchy and capitalism, but also emphasises the need for transformative action.

Ecofeminism 'is not a singular position' and emerged from 'different intellectual and political traditions' (Buckingham, 2015: 845). Ecofeminism draws our attention to intersectional and relational elements of the world and

helps us imagine healthier relationships; stresses the need to attend to context over universal judgements; argues for the importance of care as well as justice, emotion as well as rationality, in working to undo the logic of domination and its material and practical implications. (Adams and Gruen, 2014: 1)

Central is their critique of dualistic thinking 'that creates inferior others and upholds certain forms of privilege as in the human/animal, man/woman, culture/nature, mind/body dualism' as an oppressive element that distorts our relationships within the world (Adams and Gruen 2014: 3). King highlights that intersectionality is a 'critical and political method used to reveal structures of oppression that operate within' (2017: 122).

This transformative approach draws on the 'feminine principle' (Shiva, 2015) based on the feminist idea that exposure to a more empathetic, caring and, crucially, loving pedagogical approach is central to nurturing a positive attitude towards Mother Earth and is reflected through the research and pedagogical design of this study. This draws on feminist approaches that argue that there is 'a profound connection between the dismissal of housework, the devaluation of nature, and the idealization of what is produced by human industry and technology' (Federici, 2018: 474). This research explores the relationship between care, interdependence, and sustainability. It explores the key elements of ecofeminist theory in

terms of healthier relationships, context over universal judgements, care alongside justice, emotion alongside rationality, and undoing the logic of material domination, ideas which inform specifically my analysis and approach. The blending of ecofeminism and Froebelian philosophy in this thesis intends to illuminate the broader discussions of climate justice, sustainability, and the circular economy through a child-centred participative approach. While both theoretical approaches share an understanding of the interconnectedness and interdependency of humanity and the environment, the two approaches differ significantly in emphasis with Froebel focusing on the importance of children and their education for cultivating sustainable approaches, while ecofeminists focus on the critique of patriarchy and capitalism and the need to move towards transformative, care-based, and sustainable approaches. Together they offer an innovative approach to the circular economy in the primary classroom.

1.4 Participatory Research Approach

The motivation for me as an educator to pursue this research and become involved in the AgroCycle research project emerged from a number of intersecting perspectives; as an activist on the issue of climate change, as a mother, and as an educator I observed children being excluded from conversations around solutions for tackling climate change, yet the damage that is escalating daily is, in effect, our legacy for them. This is a legacy that nobody would wish to inherit. No academic research has been published to date regarding the explicit inclusion of a circular economy concept for exploration in Irish primary schools. It is timely to proceed with this research to address this lacuna in the research. Cammarota and Fine highlight why participatory research is appropriate here:

Through participatory action research, youth learn how to study problems and find solutions to them. More importantly, they study problems and derive solutions to obstacles preventing their own well-being and progress. Understanding how to overcome these obstacles becomes critical knowledge for the discovery of one's efficacy to produce personal as well as social change (2008: 6)

A total of 91 children participated in the research across 3 schools. It was specifically stated at the outset of the process that we, the researcher, and participants, would engage together as co-creators and as explorers. I was not there as a teacher but a researcher who would accompany them on this research journey. The participants were encouraged to engage creatively using environmental solutions to environmental problems. They were told that the project intended to introduce and explore the concept of a circular economy and how this concept can assist in living sustainably in harmony with Mother Earth.

The workshops were designed so that some of the research would occur in an outdoor place carefully chosen and near each of the schools involved. This place-based pedagogical approach was vital to investigate examples of a circular economy in the natural world.

Place-Based Education (PBE) is an approach to learning that takes advantage of geography to create authentic, meaningful and engaging personalized learning for students. More specifically, PBE is defined as an immersive learning experience that “places students in local heritage, cultures, landscapes, opportunities and experiences, and uses these as a foundation for the study of language arts, mathematics, social studies, science and other subjects across the curriculum” (Vander Ark, 2016).

Sobel, in his work *Beyond Ecophobia: Reclaiming the Heart in Nature* (1996), cautions against making place-based education too political for children. He discusses how young learners are often too involved in the dark messages of all that is going wrong in the world and warns that when the focus is placed too heavily on ecological catastrophes such as extinction and global warming, anxiety occurs. It can induce ecophobia and turn learners away from ecologically favourable behaviours.

Sobel ethically suggests nurturing an affective relationship first with place, before focusing on the problems and issues. It is Sobel's view that if learners are asked to engage critically in ecological and political issues, they should first have the opportunity to explore, investigate, discover, and connect with place and the natural environment (1996). Hence in my research, the ethical focus is on love for the natural world, a celebration of the wonders of nature, such as the naturally occurring circular economies that are seen in nature.

The participants actively explored the content of the AgroCycle research project (2016-2020), a European Union (EU) and The People's Republic of China (PRC) Horizon 2020 Project. Its purpose was to understand the circular economy concept, the UN Sustainable Development Goals (SDGs), and other practices of sustainable development together. Consequently, the timeline for this research took place between 2016 to 2020. Content from the AgroCycle project was used to design a series of five workshops in each research site:

1. Introducing the circular economy.
2. Investigating the circular economy through the AgroCycle project.
3. The circular economy in the natural world.
4. Designing a circular economy system.
5. Create, innovate, discuss, reflect.

The five sessions were facilitated with active participation from all parties with an emphasis on collaboration. Further detail of the workshops and the approach used is outlined in Chapter Five, the methodology chapter.

1.5 The Contribution to ESD in Irish Education Policy and the IPSC

This research is set against the backdrop of the place of ESD, and the low-level emphasis placed on living more sustainably in education policy and school classrooms in Ireland. The

positioning of sustainable development in Irish policy and education is explored in this thesis by drawing on Bacchi's policy analysis framework (2009) to enable a critical exploration of the implication of policy discourses in this area. Bacchi analyses how policies are 'problematizing activities', intended to address a 'problem' to be fixed (2009: xi). Hence to analyse policy means to uncover the presuppositions, problems, and effects it represents (Osborne, 1997). This framework is used in chapter 3 to explore the positioning, discourses, and effects of key policies for ESD in the international and Irish context, before exploring its position in the IPSC.

In the IPSC, ESD is not outlined as a specific subject area. The broad parameters of the Irish Primary School Curriculum provide the space for integration of numerous subjects and thematic approaches including ESD. Gartzman, Issacs, and Wagreich highlight the advantageous nature of integration as 'developers of integrated curricula have long contended that their goal is conceptual learning. The networks of ideas in integrated curricula are thought to build children's understanding of the concepts involved' (1997: 184). It is stated in the introduction to the IPSC (1999) that teachers must ensure children have the opportunity to investigate ways in which technology and science have positively contributed to the use of natural resources (1999g: 91). The exploration of a circular economy concept here acts on this recommendation.

It is also recommended that children must be enabled to recognise the positive contribution of scientists to society, both in the past and present and also how the impact of human behaviour affects the quality of soil, water, air and the built environment (1999g: 91). Sharing the work of the AgroCycle partners and their scientific and technological contributions to society addresses this curriculum recommendation. Through the application of ideas and

innovative skills, this research applies the concept of a circular economy to an integrated experience within the primary classroom. Charlesworth and Lind (1999:18) encourage naturalistic experiences and informal learning experiences along with structured learning experiences. Mathematical and scientific concepts are developed through naturalistic experiences such as events initiated by children spontaneously throughout the school day and informal learning experiences initiated by an adult, all of which are encouraged and facilitated in the science curriculum (1999b). The circular economy concept can be perceived as a branch of ESD integrated with the Social Environmental Scientific Education (SESE) strand of the curriculum. The integrated nature of the circular economy concept also transverses other subject areas in the IPSC such as science, geography, and the arts. The concept also intersects with Social Personal and Health Education (SPHE), (NCCA, 1999) in relation to the strand *Myself and the Wider World*, and the strand unit *Developing Citizenship* (1999: 53). The IPSC is currently under review by the National Council for Curriculum and Assessment (NCCA). There are numerous avenues of exploration taking place, including consulting with adults and children. A report was produced in January 2018, and an executive summary of this report summarised the findings. It highlights the rationale for the redevelopment of the current IPSC:

The redevelopment of the primary curriculum provides an important opportunity to reduce the 'layers' that exist within the 1999 curriculum while being clear on what we ultimately deem to be important and essential for children living and learning in the 21st century (NCCA, 2018: 15).

Climate change is identified as the major planetary issue which already affects and will continue to affect children living and learning in the 21st century. Hosking et al. comment 'children are likely to be particularly vulnerable to the effects of climate change' and add 'the implications of climate change for children, given their particular vulnerabilities, are especially

concerning' (2011: 2). Therefore, the inclusion of ESD and tools of sustainability such as the circular economy concept are essential in the redevelopment of the IPSC. Unfortunately, there is no overt reference to sustainability, the circular economy or climate change in the executive summary of the upcoming curriculum. There is also no overt reference to the circular economy or climate change in the latest *Draft Primary Curriculum Framework* (NCCA, 2020). The new curriculum in development at present states it will hold five broad curriculum areas which are 'Language, Mathematics, Science and Technology Education, Wellbeing, Arts Education, Social and Environmental Education' (NCCA, 2020).

Under one of the five curriculum area headings, social and environmental education, it states that this curriculum area:

contributes to children's understanding and development of the interconnected historical, geographical and societal dimensions and processes of life. Social and Environmental Education supports children's awareness, appreciation and understanding of the world through learning about the rich diversity of peoples; their experiences, cultures, beliefs and environments in different times, places and circumstances. It also helps children to develop an understanding of the human and natural environments and the relationship between them. (2020: 14)

The NCCA have also outlined seven key competencies in the draft of 'being a digital learner, being mathematical, communicating and using language, fostering wellbeing, learning to be a learner, being an active citizen, being creative' (2020: 7). There are eight key principles of teaching and learning which they emphasise schools must be cognisant of in the pursuit of the curriculum vision. The eight principles are 'learning environments, inclusive education and diversity, engagement, assessment and progression, transitions and continuity, relationships, pedagogy, partnerships' (2020: 6). It states the principles illustrate the values in primary education and what is at the core of 'high-quality teaching and learning in the primary curriculum' (2020: 6). The NCCA highlight that the principles are 'broad in nature to

reflect varied school contexts and children's different circumstances, experiences and abilities' (2020: 6). Despite these multiple focal points, there is only a single mention of climate change in the draft where the importance of dispositions and skills such as 'resilience, creativity, innovation and critical thinking' are noted as vital in dealing with challenges such as 'climate change, human migration, geopolitical shifts and sustainability' (2020: 3).

However, this thesis would suggest that climate change is the overarching challenge of all of the ones mentioned. There is no planet B, as the young activists proclaim. Geopolitical landscapes are influenced and impacted by climate change, human migration is significantly impacted by climate change through the displacement of communities, and it will impact considerably more with rising sea levels for example. In discussing the key competencies, however, the draft curriculum states 'children also need to be able to interact and engage with the natural world around them and come to an appreciation of its value and their responsibilities as custodians of it' (2020: 7). So, despite lacking an explicit commitment to addressing climate change across the curriculum, a statement such as this can be seen to open the door to supporting the inclusion of sustainable development education and concepts such as the circular economy in the primary school classroom. The new curriculum is an area for further research as it is beyond the timescale of this thesis.

The NCCA assessment of the current IPSC state:

The voices of children have an important role in contributing to discussions on the type of curriculum needed for the next decade. This recognises children's agency and capacity to contribute as well as reflecting a growing recognition, at a policy level, of the importance of incorporating children's voices in decisions that affect them (2019: 3).

NCCA have taken several measures to ensure a particularly wide cohort of stakeholders are consulted and in various formats as redevelopment occurs. For example, large groups of

children and current teachers are being consulted. There are several focus groups, online submissions and online surveys and consultative seminars taking place (NCCA, 2020). However, will this consultation at policy level manifest as a genuine inclusion of children in increased ESD conversations in schools or increased allocation to this content on the official curriculum? Particularly interesting to this thesis is the suggested inclusion of the key competency ‘being an active citizen’ whereby it states ‘this competency develops children’s capacity and motivation for active and meaningful participation in society at local, national and global levels, and fosters their ability to contribute positively and compassionately towards the creation of a more sustainable and just world’ (2020: 8). Therefore, in line with the Froebelian principle of the rights of children as essential in the primary school, the child’s voice is being heard and children are being consulted, with their rights respected, in the development of the new curriculum. For example, when consulting with them on how they learn, the children reveal that learning through play is important to them, and not only for younger children. ‘In many instances, the child may not even have seen the playful event as a learning experience. Younger children mentioned enjoying play and games—possibly *Aistear* activities—and station teaching’ (NCCA, 2019: 12). Froebelian philosophy advocates for hearing the voice of the child, and this echoes over two centuries later by the NCCA’s emphasis on the importance of children’s voices in this discussion and decision-making (2019: 3).

Sustainability is referenced in the key competency of being an active citizen, where one of its attributes is identified as ‘developing capacity to make choices in favour of a sustainable future’ (2020: 10). According to the draft document, the key competency of becoming an active citizen ‘develops children’s capacity and motivation for active and meaningful

participation in society at local, national and global levels, and fosters their ability to contribute positively and compassionately towards the creation of a more sustainable and just world' (2020: 8). However, as research has shown regarding the SDGs, there is often a disconnect between policy and practice, for example with the commitments Ireland has made to the Paris Agreement which have not been achieved (UN, 2015). Despite its lack of focused attention on ESD, the central tenet of pedagogy in teaching of learning discussed within the draft curriculum resonates with the pedagogical approach of this thesis and presents potential for the insertion of the circular economy concept in the primary classroom. The new curriculum highlights that 'pedagogical strategies and approaches are the ways in which teachers tailor learning experiences' and 'different curriculum areas utilise particular strategies' (2020: 22). Depending on the pedagogy and/or strategy utilised, the new curriculum states that it can potentially emphasise 'environmental sustainability in the classroom and school context and supports children's responsibility for each other's wellbeing when learning together' (2020: 22). By practising a pedagogy of love in and through this research, this thesis intends to illustrate for educators how influential appropriate pedagogy can be in creating positive learning conditions for sustainability.

An important point that many stakeholders raise is the 'over loaded curriculum' (ECO UNESCO, 2007: 68), contending that:

ESF (Education for Sustainable Futures) should not be a subject, but rather comprise knowledge, skills and values which are embedded across the entire curriculum, promoted through active learning approaches, with an emphasis on cross curricular teaching. ESD should be a central message of education rather than an add on (ECO UNESCO, 2007: 68).

In the Irish primary school curriculum, there is still no specific time allocation or recommendation in the weekly school timetable regarding ESD. Some argue that ESD occurs

through the Green-Schools programme and similar outside agency programmes, but these are optional programmes and not adopted by all schools. Green-Schools is Ireland's main environmental management and education programme for schools. It aims to promote long-term, whole-school action for the natural environment. The onus and responsibility cannot be solely placed on isolated initiatives such as these.

Education systems in other countries reveal examples of what is possible using more holistic approaches. There is a history of policies and multiple organisations worldwide working towards a more sustainable way of life and some countries are embedding the circular economy concept throughout their curricula. For example, Finland and The Netherlands have, in their nationwide strategies, directed that the circular economy concept must be embedded at all levels of education and across society (as I discuss in chapter three). Unfortunately, Ireland lags behind in putting into policy and practice the recommendations of agencies such as ECO-UNESCO and the UN. At a UNESCO convention on sustainability in early years' education, it was discussed how embedding sustainability in daily lives can contribute to transforming society to a more sustainable and content society. One of the participants spoke about its importance:

Sustainability should not be considered an abstract concept but a common way of action of our daily life. The problem, then, is whether our education system can contribute to helping our citizens to develop the notion of sustainable development. I am personally convinced that, if we cannot spread the idea of sustainability, we will not succeed in establishing a sustainable and harmonious society (Qemuge in Pramling, Samuelsson and Kaga, 2008: 8).

Broader state support for ESD in schools is key. Wals suggests that 'governments can support ESD educators by stimulating the creation of "learning environments" at the societal level: creating spaces where ESD practitioners meet, learn from each other, join forces and

strengthen their individual activities' (2015: 103). A further challenge in the Irish context is that ESD and environmental education are not monitored in whole school evaluations in Ireland. The rationale for such evaluations is to assess the teaching and learning experiences of the school community, with the criteria clearly reflective of other priorities for the education system.

1.6 Role of the PhD student as Researcher on The AgroCycle Project

As mentioned above, this thesis emerged alongside the AgroCycle project, a Horizon 2020 funded research and innovation project addressing the recycling and valorisation of waste primarily from the agri-food sector. The AgroCycle protocol was to deliver a blueprint for achieving sustainable agri-food waste valorisation to address the EU policy target of reducing food waste by 50% by 2030. The protocol also aimed to contribute to the wave of change occurring in The People's Republic of China in relation to sustainability. The EU, through the AgroCycle project (2016-2020) funded a PhD scholarship. While the PhD research study and design is independent of the AgroCycle project, it would not have been possible to conduct this enquiry without that financial support. The content and ethos of the AgroCycle project which identified children as global citizens and as stakeholders in the circular economy conversation informed this PhD research. My role as researcher on AgroCycle was to introduce the work of the other partners made up of scientists, engineers, academics, sustainability experts, agronomists, and agricultural experts from industry, organisations, governments, and non-governmental organisations of the AgroCycle Project to school students as the research participants at the three research sites. My supervisor, Dr Máire Nic an Bhaired, was also a key researcher in the AgroCycle project.

The AgroCycle project explored how key sustainability concepts such as ‘no waste’ and ‘valorisation’ were explored. This was done through content such as potato pulp – the natural waste remaining after agricultural processes – being used to create bioplastics, coffee cups and plant pots.



Figure.1. The AgroCycle Kids with the bioplastic cups and straws explored at the research sites.

The process of valorisation was explored using rice bran, the hull of rice left behind after rice farming, which was used in baking items such as biscuits, breads, and edible straws. These processes and examples were examined in the school-based workshops with the participants. It was an exciting and fascinating experience for a researcher and for the group of young participants, positioned as the 27th partner on this novel EU/PRC project, as they explored transformative change towards greater sustainability through education.

The project therefore enabled, for the first time, a group of 91 primary school participants to research in an EU and PRC research project. The children who were identified as participants had the opportunity to analyse the work of the scientific adult partners as fellow participants. This is significant for the recognition of children's right to be active research partners in an EU project. It provided an opportunity to explore their efforts in working more sustainably, to minimise and valorise waste, and to create circular economy systems, while simultaneously minimising negative human impact on the environment – a vital and essential move in the battle against climate change. A section within the AgroCycle online platform is dedicated to children labelled *AgroCycle Kids* (2019). This is a child-centred online resource focusing on translating the scientific concepts of the AgroCycle project (2016) into accessible content for children, in English, Irish and Chinese. The outputs of this thesis and materials based on the qualitative research conducted at the three sites have formed this award winning AgroCycle Kids website. The resources were awarded first place in the Think BioBased Europe Awards 2019.

The AgroCycle project took deliberate steps to maintain gender balance throughout the duration of the project. The protocol acknowledged that traditionally the presence of females in the agricultural sector is limited. Therefore, analysis across all stages of the project to 'ensure that we maximise innovation by benefitting from our ability to consider the gender dimension and in catering for the needs, motivations and differences of females where possible' (2016:13) mattered. In relation to the consortium of partners, a specific effort was made to maintain an awareness of the gender dimension. There was a visible presence of female researchers, technologists, and industrialists, several of whom occupied senior positions in the project. It specifically stated in the AgroCycle protocol that 'this is important

in ensuring the education and training of the next generation of scientists, technologists and others needed in the EU and elsewhere in the next generation of the circular Bioeconomy' (2016: 13).

My role as researcher was to introduce the general rationale for the AgroCycle project to the school participants - which is to reduce waste, lessening the impact on the environment, thus reducing the escalation of climate change and to do this through a transdisciplinary pathway. Although scientific and experimental in nature, AgroCycle included an educational element which had not occurred in a Horizon 2020 project of this kind before. It is collaborations such as this which have enabled younger children to join the discussion created by an international research consortium. Opportunities like these provide a platform for ordinary citizens – in this case, young citizens – outside of professional scientific circles to develop their literacy in issues such as climate change and in finding solutions. They provide an opportunity for disseminating a certain level of eco-literacy, which is essential in addressing these issues. As

Capra predicted in 2002:

In the coming decades, the survival of humanity will depend on our ecological literacy—our ability to understand the basic principles of ecology and to live accordingly. Thus, ecological literacy, or 'eco-literacy', must become a critical skill for politicians, business leaders and professionals in all spheres, and should be the most important part of education at all levels— from primary and secondary schools to colleges, universities and the continuing education and training of professionals (2002: 201).

As Capra highlights, all levels of education must be included in the ecological conversation as it requires an immense worldwide response. O'Brien and Hochachka (2010) stress that if we want to effect change, we need to work in a space of change and transformation:

The link between the inner motivation and outer-world challenges, like climate change, is reflected in work on transformation, emphasizing shifts in consciousness and awareness, in beliefs, values, and worldviews, thereby challenging the individual to reflect on change itself (2010: 92).

As an educator, I consistently emphasise that education has the potential to generate understanding and through understanding, a space for change can emerge. However, other circumstances or factors can influence outcomes, such as timing. The timing of this thesis was fortuitous as it filled a funded position on the AgroCycle project, which supported engagement in independent PhD research. The project created an opportunity to investigate practices and theories around the issues of climate change, avenues of waste valorisation, sustainability, and the circular economy concept.

Hence, the content of the AgroCycle Project was at the heart of the research process and its scope and development is outlined in the chapters ahead. Below, is the video I co-created for the AgroCycle Kids section of the AgroCycle project website (2016). It is a video viewed by children, parents, and educators as an aid towards understanding the concept of a circular economy and how we can devise novel ideas to live more empathetically towards the natural world:

<https://www.youtube.com/watch?v=359ibQ4ozz0&t=165s>



Figure 1.2 The AgroCycle Kids Website: <https://www.AgroCycle-platform.com>

AgroCycle Kids (2020) embodies the SDGs of the United Nations (UN, 2015) and the circular economy concept. It was developed directly from the work of both the partners and the research in schools. Although beginning with agri-waste, the waste produced because of multiple agricultural processes, this content sparked dialogue around broad waste valorisation and minimisation in many systems from industry to home, with the participants in schools. From examining the technology of using waste such as potato pulp for bioplastic food packaging, (created by German AgroCycle project partners Fraunhofer Research Institute) to the children composting in their gardens and schools, the intersection of knowledge and skills quickly became apparent (this is described in more detail in chapters four and five).

As the only educational partner on the project, it was initially very unusual for some scientific and industry partners to have their work discussed with young children, and indeed to discuss it with educators. Considerable time was spent understanding the vocabulary around waste valorisation. In a summary paper addressing the context and overall objectives of the AgroCycle project, the Cordis EU Research Results highlight the impactful nature of working with primary school children on the circular economy content. It also noted a further output of the AgroCycle Kids platform, and how the circular economy content is reaching wider communities through its online presence:

Overall, life cycle assessment (LCA) methodologies have been developed that enable a holistic assessment of their impacts across a range of environmental and socio-economic perspectives. The AgroCycle Kids platform has made major advances in the education of the next generation (i.e. the youth) regarding the importance of the 'circular economy' and how lifestyles can have major impacts on the planet. The extensive social media engagements and feedback obtained show that AgroCycle has established a profile across the agri-food sector and wider community (Cordis EU Research Results, 2019: np).

This reflects the cohesive work of the AgroCycle partners including the Maynooth University partnership. The often complex concepts and content of the project would have to be translated to become more accessible for primary school children. Below is an example of a document shared by one of the AgroCycle project partners Fraunhofer Research Institute, regarding protein films. It was an example of teaching material relating to the biochemistry of their work in the valorisation of materials to give a sense of what was involved in the AgroCycle project. The diagram illustrates the scientific process and experiments which the scientists of Fraunhofer Research Institute conduct to examine intermolecular interactions between proteins (Figure 1.3).

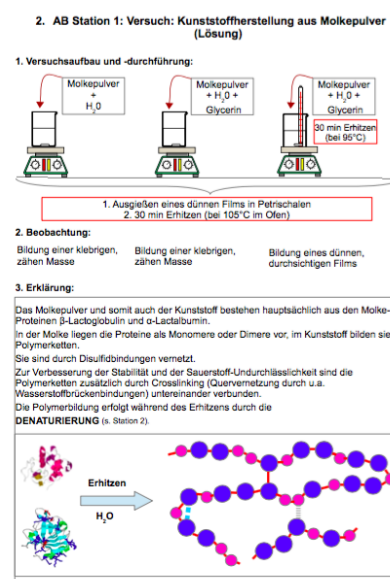


Figure 1.3 An Examination of Intermolecular Interactions between Proteins from Fraunhofer Research Institute

The following photographs are images of materials used at the research sites, to explain the work of the scientists of Fraunhofer Research Institute. The images illustrate how the complex science was brought to life with concrete objects and pictures, in order to make the content of the AgroCycle project accessible for primary school children. It was vital to take advantage

of having this scientific content available, and to be able to express and explore the science in an accessible way for this age level.



Figure 1.4 Potato peels and pulp for bioplastics

Potato peels and pulp such as illustrated in the photograph on the left, were shown to the children, followed by the actual petri dishes shared by the Fraunhofer scientists to show a further step in the waste valorisation process. It was discussed with the children how through scientific processes, what was once perceived as waste, can become something totally different and useful.

The openness of the partners in sharing their wisdom and knowledge with us, the educational partners was key. The following email demonstrates such cooperation and collegiality, and was a response received, again from one of the scientists of Fraunhofer Research Institute.

Dear Laoise,

to be quite honest, I love the idea to bring the concept of a Circular Economy to school kids. That is probably much more sustainable than a scientific paper. And of course I enjoy that it is based on one of our developments.

So please feel free to ask me all the questions you have. I will provide full support to you.

kindest regards,

██████

Figure 1.5 Email correspondence from Fraunhofer Research Institute on the AgroCycle project

Working as a partner and PhD researcher on such a multidisciplinary project and bringing children into the circular economy conversation, highlighted the interconnectedness of all of us with regard to the issue of climate change. Online meetings, email correspondence, conference attendance and face to face meetings were vital to stay informed of the work of the all partners. The level of cooperation from the other partners on the AgroCycle project was exceptional and extremely helpful in the dissemination of their work for a school-based audience.

As Lehtonen et al. (2019) highlight 'dialogical learning situations offer open encounters where adults and young people learn from each other and together construct pathways for a sustainable future. Hope, courage and trust are strengthened through embodied, shared experiences' (Lehtonen et al., cited in Cook 2019: 367).

1.7 Structure of Thesis

This thesis attempts to bridge the gap across disciplines from education to science and technology through the application of a circular economy concept in schools. Mauser et al. argues for environmental change research that would be 'designed and conducted in partnership with society to produce the knowledge necessary for societal transformations towards sustainability' (2013: 420). They highlight that recognising the Earth as an integrated system draws attention to the essential need for integration of knowledge. This is reflected in the thesis as part of a movement of integrating knowledge and learning to research how to tackle the wider issue of climate change. This is echoed in the chapter structure of the thesis.

In Chapter 2 the conceptual framework of Froebelian and Ecofeminist philosophies is outlined, describing how it has supported the research. This is followed by Chapter 3 which explores relevant literature regarding education and sustainability as well as presenting an overview of the Irish school context of policy and curriculum. Chapter 4 presents the research on ESD as circular economy, with Chapter 5 discussing the methodological process including the research design, the methods and analysis process, and the ethical implications. Chapter 6 illustrates and describes the findings emerging from the analysis followed by an in-depth discussion of the implications and significance of these findings in Chapter 7. Chapter 8 concludes the thesis, describing the contribution for education and learning about sustainability that it has made to the circular economy conversation and ESD in the Irish primary classroom.

2. Chapter 2

2.1 Introduction

This chapter provides an in-depth discussion of Froebelian and ecofeminist philosophies which comprise the theoretical framework for the thesis. By exploring key concepts of relevance, this chapter builds toward a comprehensive intersection of these theories that focuses on how a child-centred, participative Froebelian primary education approach can support the Earth's need for a more collaborative, and sustainable mode of living and learning through education – one rooted in an ecofeminist value of holistic caring, encompassing participative and democratic collaboration. This thesis argues that these qualities are key for the survival of humanity and the planet. Using a Froebelian ecofeminist philosophy as a theoretical framework allows me to maintain a holistic approach to sustainability and ensures that the voices of children are at the heart of this work. Ecofeminism is first discussed, exploring the elements of various approaches relevant to this work. These are drawn from sociological, spiritual, and ecological forms of ecofeminism including the work of Plumwood, Mellor, Shiva, Gaard and Gruen among others.

2.2 An Ecofeminist Understanding of Mother Earth

Ecofeminist research frequently draws on indigenous knowledge to describe how the name Mother is given to the Earth reflecting the life-giving nature of the planet. I explore this connection to indigenous thought first in order to situate the notion of Mother Earth better within ecofeminism. The Assembly of First Nations (AFN) is a national organisation which advocates and works to advance the aspirations and needs of individuals of First Nations and

communities of Canada regarding national and international matters. The assembly advocates on behalf of First Nations with regard to resources, indigenous rights, land and treaties (2021). The AFN explains how Mother Earth ensures life, as it is the only known planet where life can exist. These holistic approaches emphasise how Earth is the one home shared by all, where we are born, live, grow, eat, and play. Earth is the one Mother of all living organisms giving everything that is possibly required. The AFN discusses who Mother Earth is and the concept of Mother Earth in a way which is congruent with the vision developed in the thesis. It means exploring the skies, waterways, forested lands and all other forms of living things Mother Earth births, nurtures and sustains. The AFN describes the relationship of Mother Earth with us:

Mother Earth provides us with our food and clean water sources. She bestows us with materials for our homes, clothes and tools. She provides all life with raw materials for our industry, ingenuity and progress. She is the basis of who we are as “real human beings” that include our languages, our cultures, our knowledge and wisdom to know how to conduct ourselves in a good way. If we listen from the place of connection to the Spirit That Lives in All Things, Mother Earth teaches what we need to know to take care of her and all her children. All are provided by our mother, the Earth (Assembly of First Nations, 2021: np).

Ecofeminist theory, as it is supported by the wisdom of indigenous peoples with respect to Mother Earth, helps us to understand the reciprocity of the relationship Mother Earth has with all living things. Indigenous peoples demonstrate their reverence for Mother Earth by taking only what they need from her at a given time. The First Nations Assembly explains:

Environmental degradation affects the health and well-being of not only the First Nations people but all peoples of North America and the world in many ways. First Nations peoples do not yet know all the ways harmful man-made substances affects fish, wildlife, habitat, and human beings. However, First Nations people are aware that pollutants and contaminants, especially those originating from industrial development, have negative consequences for the health of all living things, including humans. Industrial contamination and disruption of wildlife habitat combine to reduce the supply and purity of traditional foods and herbal medicines (First Nations Assembly, 2021).

Indigenous peoples have a keen awareness of the interconnectedness of all things that Mother Earth supports and nurtures, and the reciprocity of her behaviours. Additionally, First Nations peoples understand that 'economic initiatives can be both profitable and sustainable for future generations'. They emphasise that it is indigenous ways of knowing that have given their people 'the tools to care for Mother Earth' and this knowledge can be now 'shared with industry for the betterment and survival of all' (2021). This dovetails with the concept of a circular economy whereby there is no waste created, reflecting the natural laws of Mother Earth, and only what is needed is included for use. Hence, the processes and values of indigenous knowledge is congruent with the circular economy concept and with the theoretical framework of this thesis. This is the concept of Mother Earth which is relevant to this work, and it is from indigenous ways of knowing that the thesis borrows this understanding. However, Robin Wall Kimmerer explains how current human behaviour towards the Earth is unsustainable and indigenous wisdom falls on deaf ears:

Ecological economists argue for reforms that would ground economics in ecological principles and the constraints of thermodynamics. They urge the embrace of a radical notion that we must sustain natural capital and ecosystem services if we are to maintain quality of life. But governments still cling to the neoclassical fallacy that human consumption has no consequences...Our leaders willfully ignore the wisdom and the models of every other species on the planet – except of course those that have gone extinct (2013 :308, 309).

Championing these views, among others, ecofeminists have had a long and varied history. Buckingham (2015) discusses how ecofeminism has developed since the 1970s and 1980s but has evolved with different elements emerging within the philosophy from socialism to spirituality. She also emphasises why it remains more relevant than ever: 'while ecofeminist organizations and alliances have gained some influence in international policy, it is also clear that gender inequality and environmental degradation continue and, in some cases, have

worsened, revealing the continued need for an ecofeminist analysis' (2015: 849). Many ecofeminists maintain a strong basis in feminist and spiritual ecofeminism with value placed on holistic and transformative perspectives. Shiva comments 'we are either going to have a future where women lead the way to make peace with the Earth or we are not going to have a human future at all' (cited in Daucey, 2015: 77). Shiva's position begins literally at grassroots – that is, soil and seed sovereignty in that soil, and is emphatic that:

the ultimate step in converting nature into a resource is the conversion of 'seed' – the source from which plant life rises again – into a 'genetic resource' to be engineered, patented and owned for corporate profit. Nature's ways of renewing plants are dismissed as too slow and 'primitive' (2014: 28).

Shiva discusses how 'economies based on greed and profits have exploited the Earth and women. It has created the illusion of limitless growth on a planet with limits' (Navdanya, 2016). Ecofeminism aids in examining possibilities and ecological living where the environmental and inheritance rights of all citizens can be respected and even honoured as is often done by indigenous peoples. Respecting the inheritance of Mother Earth and all she bears and protects is the essence of ecofeminism.

2.3 Ecofeminism – A Critical Overview

Ecofeminism, or ecological feminism, is a branch of feminism which examines the connection between nature alongside women and the oppression of both in a patriarchal society, as Plumwood discusses (1993). The term was coined by French feminist Françoise d'Eaubonne in 1974 (Phillips and Rumens, 2016). Ecofeminist movements emerged as a confluence of social movements such as ecology, peace, animal activism and feminist struggles of the 1970s. The theoretical framework of ecofeminist philosophy described below serves this thesis in supporting the potential for transformation towards greater sustainability. It presents an

opportunity to refine one's awareness of the values we hold regarding Mother Earth. Additionally, ecofeminism has the power to highlight the importance of identifying one's own values around these issues which is vital, given the disturbing issue of climate change. With increased critical reflexivity and awareness of one's values emerges greater possibility of transformative action. Adams and Gruen explain:

ecofeminism theory helps us imagine healthier relationships; stresses the need to attend to context over universal judgements; argues for the importance of care as well as justice, emotion as well as rationality, in working to undo the logic of domination and its material and practical implications (2014: 1).

Ecofeminism draws our attention to intersectional and relational elements of the world we live in and facilitates a caring exploration of the natural world. Adams and Gruen highlight:

Ecofeminists identify dualistic thinking (that creates inferior others and upholds certain forms of privilege as in the human/animal, man/woman, culture/nature, mind/body dualism) as one of the factors that undergirds oppression and distorts our relationships with the Earth and other animals (2014: 3).

The dualism specific to this thesis is the anthropocentric view of life which has focused western societies primarily on economic development over the good of the planet - culture versus nature. Ecofeminism rejects this positioning of humanity in opposition to nature, and as the oppressor of nature (e.g., Plumwood, Shiva, etc). Ecofeminist philosophy is significant, therefore, not only in critiquing the current imbalance originating from patriarchy and capitalism, but also in emphasising a myriad of possibilities for transformation. It offers an opportunity to firstly identify and foster one's awareness of exploitation such as that of the natural world, and then secondly also how to act on this awareness, through stewardship of the environment.

Merchant, throughout her ground-breaking work *The Death of Nature: Women Ecology, and the Scientific Revolution* (1980) contends that capitalism and specifically capitalist patriarchy, is the root cause of environmental problems. Merchant's work challenges the idea of

progress, particularly the idea of progress since the scientific revolution. Merchant questions who this progress is actually for, highlighting how we have framed the concepts of nature and scientific innovations along with intellectual and economic development. Merchant provides an 'ecosystem model of historical change' that 'looks at the relationship between the resources associated with a given natural ecosystem... and the human factors affecting its stability or disruption over a historical period' (1980: 42,43). Merchant's work (1980) was a turning point in the ecofeminist conversation and drew mainstream attention to environmentalism and feminism. It was integral to the repositioning of a patriarchal-only approach to science and 'progress' and demonstrated a critically reflective illustration of how gender and women are at the core of the environmental conversation.

Merchant states 'the future distribution of energy and resources among communities should be based on the integration of human and natural ecosystems. Such a restructuring of priorities may be crucial if people and nature are to survive' (1989: 295). This aligns with the approach of this thesis whereby it is addressing the current norms in schools and where sustainable development education has been left to sit in the IPSC and exploring alternatives. Through a pedagogy of love, it is disrupting the historical norms. In *Silent Spring*, Rachel Carson stated 'the history of life on Earth has been a history of interaction between living things and their surroundings... Only within the moment of time represented by the present century has one species-man-acquired significant power to alter the nature of his world' (1962: 5). Using Froebelian ecofeminism theory and working alongside the participants of this research helps to understand prior knowledge and experience and the future intentions of participants. Ecofeminism resists false binaries such as the notion of emotion versus reason, a position which is challenged by the pedagogy of love approach embedded in the thesis. The

love for the natural world that ecofeminist philosophy exudes is a strongly held value. Adams and Gruen emphasise that 'at a time when human violence and encroachment as well as climate change threaten to permanently alter the Earth, with devastating consequences for all the animals and plants that make this planet home, the insights of ecofeminists are more important now than ever' (2014: 4). The intersectional nature of ecofeminism is vital. Hay states 'intersectionality is more than a measure of oppression, however intersectionality is also a critical and political method used to reveal structures of oppression that operate within' (2017: 122). King argues:

The attempt to reconcile and improve upon the relationship between humankind and nature is central to *ecological feminist* thought, as is the belief (in some cases at least) that by applying the lens of intersectionality to analysis, one is better able to understand and assess the complex relationship between humans (specifically women) and the natural world (2017: 71).

The lens of intersectionality being applied in this thesis is one rooted in feminism with an ecological view of the world, and a Froebelian philosophical position to ensure children are invited to the conversation. Intersectionality also allows for its integration into the educational model used in the sessions in schools, and into the research analysis. In doing both, it facilitates an approach to knowledge – whether in teaching or research spaces – which sees knowledge as holistic, interdependent, and intersectional (this is in contrast to the modes of knowledge critiqued in chapter 3 and 5 in terms of the curriculum and research methods).

In her book *Earth Democracy: Justice, Sustainability and Peace* (2015) Shiva discusses how women must be visible in humanity, to actualise true gender equity. Shiva has focused considerably on the destruction and degradation of biodiversity and the natural world. She explains the essence of ecofeminism for her:

When we are simultaneously ecological and feminist, what we are trying to do is not look so much at what women are but how the dominant path perceives them and manipulates structures to exclude, violate, dominate, and to see how closely the attitudes to women are related to attitudes to nature and how violence against women and the ecological crisis mimic each other all the time (2012: 17).

Ecofeminist philosophy draws our attention to the oppression of Mother Earth and the relentless abuse of the natural world. It also illustrates the connection and analogy between women and the ecological crisis. Ecofeminist approaches supported me in questioning the feminisation of nature, such as viewing the Earth as the maternal archetype. Or, given that it could be argued that women are not afforded the same respect and reverence globally as men, literally or metaphorically, perhaps feminist concepts focus our attention on the implications of these power dynamics, inequalities, and omissions of patriarchal society. It is notable also that children are included as part of the family grouping who are aligned alongside women by patriarchal society.

Due to the current climate crisis escalating because of capitalist behaviours impacting Mother Earth, rebalancing the current patterns of patriarchal domination is foregrounded throughout this thesis. In her book *Woman and Nature* (2000) Griffin highlights that patriarchal man is driven to dominate all of nature including animals, specifically wild animals. Griffin compares the degradation of nature with the domination of women subjected to physical and physiological harm by patriarchal man (2000: 88). The domination of nature by patriarchal societies Griffin refers to continues today and contributes directly to climate change. Through understanding the exploitation of nature, it is a step towards understanding the domination of women in patriarchal societies and a step towards understanding the concept of ecofeminism.

The position of this thesis examines the feminist idea that exposure to a more empathetic, caring and, crucially, loving pedagogical approach is central to nurturing a positive attitude towards Mother Earth. Shiva calls us to observe the 'feminine principle' which she defines as 'a category of challenge which locates nature and women as the source of life and wealth, and, as such, active subjects, maintaining and creating life-processes' (1989: 46). Ecofeminism challenges the current unsettling position of nature and the female as unimportant and non-profitable categories or entities in the world, dominated and exploited in many cultures. Ecofeminism essentially marries ecology and equality with the inclusion of love - essential to life, embracing all genders, all life forms and highlights the feminist basis of this. Gaard (2009) outlines that there are well established, historically feminist foundations for feminist theorising in the areas of environmental justice and issues related to climate change. She argues that the issue of climate change and the overconsumption characteristic of capitalism are 'produced by masculinist ideology and will not be solved by masculinist techno-science approaches' (2015:4). To address this, ecofeminist philosophy offers an alternative approach by highlighting the constituent elements of forms and approaches to work that have been considered as feminised.

The care, service and relational work that is associated with women is essential for the interdependence of humanity and society. It is worth exploring what is addressed by Shiva et al. as the 'tragedy of the commons' - that is a shared resource negatively affected or depleted by individual users of the shared resource, driven by self-interest to deplete or degrade the shared interest, thereby affecting all other users (Navdanya, 2016). Again, this is an example of our over-consumption of collective resources at an unsustainable rate. The longer this

continues, the greater the destruction of Mother Earth. Connell and Pearse highlight in their work *Gender in World Perspectives*:

Today we are witness to an unprecedented period of environmental change. Since the industrial revolution, human populations, predominantly in the global North, have been burning fossil fuels, clearing land and consuming crops and animals at unsustainable rates. These biophysical changes signal that the earth's ecological and geological systems are shifting out of 10,000 years of relative stability into a much more unstable climate (2015:112).

Federici explains how history has shown that whatever is produced by man and technology is automatically elevated to a high status:

Human beings realise themselves through work. A measure of their self-realisation is their capacity to dominate nature and adapt it to human needs. And all positive transformative activities are thought in the masculine: Labour is described as the father, nature as the mother, the earth too is seen as feminine – *Madame la Terre*, Marx calls it, against *Monsieur le Capital* (2018: 474).

When that state of domination monopolises all common resources, for example the water system, the forests, and the land, and influences the educational system for the projected needs of the economy, there is little autonomy for citizens. Ecofeminism allows for a reimagining of how a society works. Federici, in discussion with Monteagudo, acknowledges 'we cannot bypass monetary relations and the state' (2019: 6) but stresses, in line with the rationale of this thesis that 'we should participate in the decision-making that affects our lives. We have been historically expropriated from land, but we have also been expropriated from knowledge that came with lands and resources, and we have been expropriated from the possibility of making decisions' (2019: 258).

Caffentzis and Federici (2014) reflect the popular work of ecofeminists as well as ecofeminist scholarship which drives communities of activism at grassroots level, such as Shiva's work. Caffentzis and Federici emphasise the key values of communities working together for change

and equity, and state those who 'belong to the common contribute to its maintenance: which is why (as we have seen) we cannot speak of 'global commons', as these presume the existence of a global collectivity which today does not exist...' (2014: 11). This illustrates an example of cooperation, where all voices can be included and active, reflecting the approach of this thesis in the democratic inclusion of children as active participants in the research.

The following sections will describe the elements of ecofeminist theory Adams and Gruen outline - healthier relationships, context over universal judgements, care alongside justice, emotion alongside rationality, undoing logic of material domination - to provide an overview of what ecofeminism contributes specifically to this thesis. I primarily focus my discussion of these elements on Val Plumwood's work *Feminism and the Mastery of Nature* (1993) as it brings these insights into conversation with the environment, criticising rationalist approach to knowledge and Descartes' idea of separating out both the human body and nature as entities to be controlled. She also highlights the reductive nature of hierarchies that this brings with it. For Plumwood, where there are hierarchies and dualities with humans at the apex, nature will always remain inferior. It is with countering these dualisms that the ideas expressed by Plumwood, Adams and Gruen and others are most useful. Their work finds resonance with many feminist thinkers (Belenky et al 1986; Gilligan 1982; Nussbaum, 1984) who are very critical of the falseness of the binary mind-body dualism that Descartes' notion of rationality promoted, and which has dominated since the Enlightenment and into advanced capitalism and sciences. These thinkers suggest it has created a false divide that splits mind-body-emotions in a very damaging and unsustainable way.

2.4 Key Ideas

2.4.1 Healthier relationships

Ecofeminist philosophy offers a possibility for nurturing healthier relationships with the planet. As described later in Chapter 6, the findings chapters, children in primary school contexts were enabled to and encouraged to cultivate healthy relationships with the natural world through various pedagogical activities. The idea of interconnectedness for ecofeminists contributes to cohesive and harmonious relationships with Earth. Plumwood (2001) discusses how ecofeminism pushes for establishing ethical relationships within the interconnectedness of all living things. She insists on an 'anti-dualist critical ecological feminism' (2001: 40). 'The overvaluation of rationality' Plumwood writes 'and its oppositional conception are deeply entrenched in western culture and its intellectual traditions' (1993: 24). Instead, Plumwood encourages exploring the relationality of all life as a way of creating change.

2.4.2 Context over universal judgements

Ecofeminist philosophy draws attention to long-held beliefs and consequent behaviours and disrupts the status quo. It is a feminist philosophy specifically in line with environmental care and respect for the planet. Ecofeminism draws attention to the need for rights of oppressed groups, similar to the rights of children, as discussed in the *UN Convention of the Rights of the Child* (1989), where specific emphasis is also placed on nurturing a respect for the natural environment through education. As the discussion of indigenous knowledge earlier in section 2.2 reveals, a connection with and deep appreciation of care of the immediate environment nurtures and sustains us.

2.4.3 Care alongside justice

Ecofeminist philosophy argues that reason and emotion are not mutually exclusive and does not subscribe to these dualities which have dominated Cartesian thinking. Logical approaches to solutions to climate issues can exist with care and love for the natural world. The thesis argues they must coexist in line with Plumwood's recommendation for embracing both feeling and logic (1993). The inclusion of a loving pedagogical approach in the thesis is congruent with ecofeminist theory on this account. Buckingham argues 'ecofeminism proposes that only by reversing current values, thereby privileging care and cooperation over more aggressive and dominating behaviors, can both society and environment benefit' (2015: 845). There is a constant leaning towards economic rationales in society, particularly western society with the monetary or exchange value of natural resources given precedence over emotional values and care of the natural world itself. Kronlid and Ohman explain how ecofeminism 'underlines how values of care, partnership, kinship, love, friendship etc. take precedence in human–non-human relationships' (2012 :10). This focuses our attention on interdependence and relationships within the natural world, including humans.

2.4.4 Emotion alongside rationality

Ecofeminist philosophy stresses, that emotion and love coexist with scientific rationality. This thesis, while exploring the concept of a circular economy using rational-critical logic and the benefits therein, acknowledges that emotional attachments to nature and honouring them is equally important. Plumwood (1993) discusses how environmental ethics must be in line with 'ethics of virtue' and 'feelings', with values such as gratitude, care, respect, reverence, sensitivity and friendship as essential. Plumwood argues that these feelings and values do not

foster the emotion versus reason dualism but rather facilitates both (1993). Ecofeminism presents therefore, an opportunity to research beyond the boundaries of a specific duality. As such this study weaves love and emotion through its approach, design and analysis, without losing sight of scientific rationality.

2.4.5 Undoing the logic of material domination

Ecofeminist philosophy highlights the normalised behaviour of a capitalist society where materialism dominates and where interdependence, care and love for the environment is rarely considered first. Historical materialism can be defined as ‘the Marxist belief that economic inequalities can be reproduced over time and across generations’ (Nayak and Jeffrey, 2013: 306) reflecting the nature of the normalised behaviour and continuous patterns of inequalities in society. Plumwood argues for a move away from this dualism of materialism versus emotionality, calling for a ‘critical ecological feminism’ that proposes equity for all (1993). Mies and Shiva draw attention to the exploitation of women under capitalist patriarchy and the parallel nature of this to the domination of nature for material and financial gain (2014). The philosophy of ecofeminism facilitates an awareness of the relationality between nature and women, but also an awareness of how both nature and the female are structurally positioned and perceived in an oppressed way in male dominated societies.

The ideas outlined above are woven through the discussion below and support this thesis in theoretically approaching research in primary schools. This approach facilitates an exploration of how feminist discourses and ways of thinking give a more holistic and

integrated way of understanding our interdependencies, relationships, emotions, and behaviours. This feminist approach to epistemology stands in contrast to the universality of truth claims underpinning western ways of knowing and being.

2.5 Critique of Ecofeminism

Ecofeminism has been critiqued and sometimes disregarded by scholars for a variety of reasons. One key line of critique has been the nature of the connection being claimed between women and the natural world by particular strands of ecofeminism. Foster discusses how affinity ecofeminism suggests women hold a “natural affinity” with the environment and spiritual forms of ecofeminism are positioned as a vehicle through which to position women as the supreme connection and knowledge holders of the natural world (Foster, 2021). ‘[C]ritiques centre on the essentialist/universalist assumptions and ethnocentrism underpinning the affinity brand of ecofeminism’ (Foster, 2021: 194). She adds that affinity ecofeminists argue the woman’s body is linked to Mother Earth. ‘This link is considered to be so fundamental and intimate that...the female body, or more specifically the maternal body, stands as a marker of planetary health’ (2021: 194). While it is important to identify insights of interconnection between the female and Mother Earth, critical reflection and analysis about the extent and type of connections being made between the maternal body and Mother Earth are needed.

The form of ecofeminism used in this thesis draws on many elements of ecofeminist philosophy, reflecting its diverse nature as a theoretical body of work. It has been influenced by ecofeminism that aligns most closely with socialist approaches, which critique the

materialist and patriarchal basis of the contemporary social order. Henshall-Momsen discusses how ecofeminists emphasise that unequal societies and a poorer existence occur, through allowing the oppression of women to happen, ensuring high infant and child mortality, exponential growth in populations, suffering economies, degradation of the natural world, inefficient and unsustainable agriculture in societies (1991). Focusing on what we have in common is our first step to achieve cohesion and reach our goal of improving sustainable practice and greater planetary health. Gaard and Gruen state we must however respect difference by 'building coalitions with a number of individuals or groups struggling against oppression' and 'in solidarity, these efforts to encourage dialogue across difference must emphasize a principled unity-in-diversity' (1993: 251). This drive for solidarity is also reflected in Froebel's principle of unity.

This thesis develops and nurtures the relatively new and novel potential of ecofeminism as a relevant theory for primary education. As highlighted above, ecofeminism encourages a deeper focus on concepts that are important for the primary education sector. These include healthier relationships, context over universal judgements, care alongside justice, emotion alongside rationality, and undoing the logic of material domination. It is important to address below the other theoretical contribution to the Froebelian ecofeminist theoretical framework created for this thesis that ecofeminist philosophy complements. Turning to Froebelian philosophy enhances the theoretical foundation for this thesis, and the discussion below will illustrate how some elements which lack emphasis in ecofeminism are enhanced by Froebelian philosophy. For example, focusing attention on the rights and participation of children in sustainable ways of knowing and being in the natural world. Additionally, Froebel's

philosophy is vital here as it is a theoretical position that emphasises education explicitly. It is to this that I now turn.

2.6 A Critical Overview of Froebelian Philosophy

To introduce the second philosophical component of the theoretical framework integral to this thesis, it is necessary to travel back to the 18th and early 19th centuries and to the work of Froebel. As a Froebelian educator myself, it was an organic and naturally responsive decision to embed Froebelian philosophy at the core of this work, as the link between Froebelian philosophy and sustainability is a clear one. Froebel held the natural world in a position of reverence, not dissimilar to an ecofeminist position. Froebelian philosophy pays attention to the unique nature of all participants involved in a natural context, as well as emphasising the interconnectedness of all things.

Froebel's educational work and legacy seem to be more relevant than ever in the contemporary environmental educational landscape. With the world in the grip of a climate crisis, it would appear to be vital for humanity to reconnect with the natural world, for nature and for the inner nature of the self to be at one. Hubbard (2010) discusses how Froebel's philosophy was one which started with the child as an innately pure, positive, natural being, a seamless inhabitant of a natural world.

Froebel had a personal understanding of the human condition and believed children should engage in games and free play in order to access their unity with the natural world. Tovey explains the place the natural world holds in Froebel's view 'the garden, Froebel believed,

offered an ideal environment for young children. Through gardening, exploration and play outdoors children develop an understanding of the natural world, begin to appreciate its beauty and learn to take care of it' (2019: 2).

Physical activity, creativity and play are paramount, facilitated and encouraged at every opportunity by adults. Froebel had an intense interest in his own perception of the divine, and Provenzo (2009) suggests that this can present a conflict or difficulty for contemporary educators. Provenzo posits that Froebel was interested in helping children to connect to spiritual concepts and beliefs, but parallel to this he was also intent on supporting them in understanding the relationships and connections between humanity and nature, and their individual selves regarding nature. It is the latter that is the most relevant aspect of Froebelian philosophy regarding this thesis. Provenzo highlights that 'such thinking nowadays resonates with our concerns for the environment, and we can read Froebel's attempts to connect children to nature and the world ecologically' (2009: 93). Therefore, Froebelian philosophy, specifically the principles outlined in this chapter, are significantly relatable to the ecological perspective of this thesis. The key Froebelian principles identified by Weston (2002), and which I take up further on, are:

Principle 1 – The Uniqueness of Each Child

Principle 2 – Unity and Interconnectedness

Principle 3 – Play

Principle 4 – The Integrity of Childhood in its Own Right

Principle 5 – The Rights of Children

Principle 6 – An Ecological Perspective of Humankind in the Natural World (Weston, 2002: 115).

Froebel was influenced by his predecessor Swiss-born political theorist, writer and philosopher, Jean-Jacques Rousseau (Welton and Fletcher, 1912). There was much Froebel

did not agree with in relation to Rousseau, but he held a profound respect and interest in his writings. Rousseau, like Froebel, believed in the innate goodness of people. He believed that if 'mankind was to improve, it could only be done through education and education to him was a matter of 'bringing out' rather than 'putting in' (Froebel, 1826 cited in Liebschner, 1992: 69). This thesis argues that in line with Froebel's position, it is important to 'draw out' the intrinsic interests and talents of children when working with them and invite them into conversation. Not unlike Froebel's focus on the person, Rousseau advocated for a social contract, where all living beings would be answerable to each other and for each other, for the greater good. As Dent explains, Rousseau positioned himself as an educational theorist mainly through his work *Émile, or On Education*.

According to Dent:

In this Rousseau favours what he calls 'negative education', where the child is not controlled, directed, admonished at every turn but instead provided with an environment and resources in which the naturally healthy and ordered course of development of their body, feelings and understanding is allowed to unfold at its own pace in accordance with its own proper dynamic and they are able to grow to maturity whole and happy (2005: 23).

As Rousseau looked at the true nature of a person, Froebel followed suit. Rousseau also influenced Froebel with respect to how he viewed the natural world. Rousseau wrote about botany and, according to Dent, he recommended that to see the world around you clearly and accurately, and to appreciate the miracles of the natural world, but yet still be aware of the self, one must study plants (2005: 35). Froebel was intensely interested in flora and fauna, forests, and the natural world. He was a philosopher, researcher, and naturalist, who also had a particular interest in the science of crystallography. 'Nature, the world of plants and flowers, as far as I was able to see and understand it, early became an object of my observation and reflexion' (Froebel cited in Welton & Fletcher, 1912: 6). Froebel spent approximately two

years as an apprentice forester at Neuhaus, where Welton and Fletcher outline, 'he spent much time alone in the silent woods, and love and reverence for nature became a veritable religion with him' (1912: 6). He believed that humanity was an integral part of the natural world, not a separate entity. Froebel observed that the natural world played a specific role in the emergence of one's understanding of the principle of unity, interconnectedness, and harmony of all things. He specifically emphasised the uniqueness of each child, just as any species exhibits a uniqueness in the natural world. Froebel highlighted the ecological perspective of humankind in the natural world: 'why does man, wandering through gardens and fields, meadows and groves, fail to open his mind, and refuse to listen to the lesson which nature silently teaches?' (Froebel cited in Welton and Fletcher, 1912: 33). These words, uttered over two centuries ago, still resonate today. Mother Earth is in the grip of a human-made/induced climate change which is so detrimental that it is this awakening of consciousness that Froebel alluded to which is urgently called for.

In addition, as Dent explains, Rousseau emphasised that one of the most obvious tenets of power within society is found in the agencies of the state, through the creation and enforcement of law. Rousseau theorised how the possession and exercise of political power could be beneficial for all citizens in a state and not just the chosen few (2005: 43). Froebel's philosophy was also a response to this issue of society, as he endeavoured to educate children for the greater good of society, much of which was rooted in observation of the natural world and honouring the cooperative systems and natural laws seen in nature. Louv reflects the sentiments and actions of Froebel in his work, *Last Child in the Wood* (2013):

Nature inspires creativity in a child by demanding visualization and the full use of the senses. Given a chance, a child will bring the confusion of the world to the woods,

wash it in the creek, turn it over to see what lives on the unseen side of that confusion (2013: 7).

Liebschner (1991) asserts that Froebel was eager to move away from rote learning and to encourage children to arrive at and cultivate their own ideas, something which was greatly enhanced through spending time outdoors. Coon et al. highlight that experimental research has revealed that mere views of nature can 'improve people's health and wellbeing' and provide respite from 'stress and mental fatigue' leading to further research suggesting 'physical activity in nature may have additional benefits above and beyond those experienced following a period of physical activity in an indoor environment' (2011: 1762). Sahlberg and Doyle in their work *Let the Children Play* (2019) discuss how in Finnish schools, children have a fifteen-minute outdoor free-play break every hour during every day regardless of the weather. They explain how children are energised and joyful when they return from the outdoors refreshed and ready for their activities.

Like few other countries on earth, Finland understands that constant exposure to physical activity, and nature, and fresh-air play, and an emotionally warm, collaborative teacher-student relationships are among the most basic foundations of childhood learning and well-being (Sahlberg and Doyle 2019: 223).

Froebelian philosophy is not without criticism, however. In much of his work, he insisted on the development and fostering of religious sentiment, albeit a religious sentiment arguably more rooted in pantheism and not the Lutheranism of his time. This was not an approach suitable for all who accepted and did not question church teachings and dogma of the time. Furthermore, in many of his writings, Froebel repeatedly used terms such as 'mankind' and 'the stage of boyhood' (1912). As a feminist this assumption of a patriarchal world makes for uncomfortable reading when females are omitted from the narrative, as they are so blatantly here. This was common practice at the time, however gendered and dated it is through a present-day lens. Hence, ecofeminism offers a counterbalance to this heteronormative

patriarchal perspective. In his key work *The Education of Man*, Froebel states 'in the family the child grows into boyhood and reaches the age for school' (1912: 79). Again, there is no mention of childhood or young girls in any parallel fashion and the term boyhood is referred to in much of his work on education. Another example of the elevated position Froebel and certainly society at the time gifted to the male gender was reflected in statements such as 'a father has many sons, yet each in his own self-conscious individuality expresses the nature of the father, though in a form modified by that of the mother. Yet a son does not diminish the spiritual life of the father' (1912: 87). The role of daughters is not noted, neither are they seen as having a connection to the spiritual life. Although Froebel appeared to be progressive in comparison to others in education circles and was in prominence at the time, he was not fully consciously aligned with feminism as we know it today. This is another area where ecofeminist philosophy offers a counterbalance by re-centering the female into the discussion and exposing the patriarchal dualisms upon which views of nature are based.

Rogers explains when discussing the educational opportunities for boys and girls in Europe during the 1700s in Germany:

by the 1770s and 1780s both Protestant and Catholic areas had incorporated compulsory education for both boys and girls. The acceptance of co-education within Protestant areas, in particular, expanded the school offerings available for girls...The professed goal of these schools was generally to produce good wives and mothers... (Rogers cited in Sidmanton, 2007:104).

Gender in education was viewed through a very different lens in comparison to today. Therefore, to claim Froebelian philosophy as flawless without any cause for critique would be naïve. Yet, while this thesis rejects this gendered view of the world which ignored the female experience it does ally itself to the most relevant and positively valuable contributions Froebel made which resonate with the contemporary primary school classroom and with

contemporary education, more generally. Through the principles highlighted above, I turn to a discussion of what these have to offer to current educational issues, particularly concerning environmental education.

2.7 Froebelian Principles

Froebel posited that it is in early childhood where education begins. He believed it is then that the mind demands as much care and attention than the physical body. Brehony (2010) reminds us that Froebel's enthusiastic efforts to nurture children as strong, independently minded people was met with hostility. The 'Kindergarten Verbot' or banning of kindergartens, was enacted throughout Prussia to maintain (political) control over the education of its young children. It is important to note that although Froebel offered principles, a Froebelian approach is not a prescriptive pedagogy. It is an approach that encourages an understanding of children, and of how they learn and develop which can guide teachers in how they interact with them and in how to facilitate their needs (Tovey 2013). Douglas states that Froebel 'was one of the most influential educational reformers of the 19th century' (2008: 27). Nolan describes how at a fundamental level, Froebel's 'educational theories resulted in child-centred curricula in which the emphasis was on self-activity, continuity, movement, creativity and happiness' (2012: 142). All of these concepts are embedded throughout the many methodologies and pedagogical approaches that are exercised through engagement with the IPSC today but also underpinned by a specific set of Froebelian principles, explained in finer detail below.

2.7.1 The Uniqueness of Each Child: Principle 1

Froebel insisted on recognising each child for their uniqueness and individuality, and every child as a vital member of humanity (Lilley, 1967:95). Every child is recognised as an 'independent, active, thinking and feeling individual, with the ability to see patterns and connections' (The Froebel Trust, 2013). The principle of uniqueness also encompasses the principle of respecting the rights of children, which is relevant to the child-centred approach taken here in this research. In *The Education of Man* (2005) Froebel compares the life and experiences of a young child to life and lived experience within the natural world. He reveres the space and facility we grant plants and animals but suggests the same facilitation is not always given to children. The adults and society around them are eager to mould them and shape them in a manner they deem or that society deems appropriate. Froebel discusses how 'we grant space and time to young plants and animals because we know that, in accordance with the laws that live in them, they will develop properly and grow well; young animals and plants are given rest, and arbitrary interference with their growth is avoided, because it is known that the opposite practice would disturb their pure unfolding and sound development' (2005: 8) but Froebel claims ironically, young humans are not afforded the same treatment.

Maintaining an acute awareness of the uniqueness of all children also forms the foundation for the art of differentiation. Bowen explains how Froebelian philosophy embraces the individuality of all children whereby he 'aims at so fostering, controlling, and directing the natural and spontaneous activity of the child according to its own inherent law that the purpose of nature - the complete development of the natural powers – shall be effectually fulfilled' (1893: 100).

2.7.2 Unity and Interconnectedness: Principle 2

Froebel's educational approach is built on a foundation of 'life unity,' whereby all human beings are viewed as part of the wider whole in their own human communities and in the natural world. The principle of Unity and Interconnectedness represents Froebel's intention of seeing the relationship of the child to not only family, but community, society, and culture in which he lives and to nature itself. Froebel asserts that the natural world is a guiding light in life for human beings, and to all stages of a child's development. He highlights that a young child has an intrinsic drive to 'know the inner nature of the thing' (1893: 73). This natural talent is a powerful tool. Froebel's point is further explained in Bruce (2012) whereby 'education is about the relationship between self, others and the universe. These elements make up a whole and lead to an understanding and respect for the unity that is in all things' (2012:7). The realisation of any of this is not possible without observation.

2.7.3 Play: Principle 3

The importance of play is integral to Froebelian philosophy. Froebel states 'play truly recognised and rightly fostered, unites the germinating life of the child attentively with the ripe life of experiences of the adult and thus fosters one through the other' (Froebel cited in Liebschner, 1992: 24). Play in a Froebelian sense is not an external activity that occurs outside of the child. It is an opportunity, a state of mind that must be facilitated to provide the opportunity in education for primary school children to attend to their inner nature, creativity and sensitivity particularly towards physical movement. Children of all ages explore areas of knowledge collectively and tend not to perceive areas of knowledge or subjects in isolation, but rather as a whole. Froebelian educator Whinnett emphasises the importance of taking a

holistic approach in education stating ‘observation of children in spontaneous play reveals their understanding. Young children do not conceptualise their learning into subject areas. Spontaneous self-chosen activity or play reveals what they know and their interests’ (Whinnett cited in Bruce, 2012: 134). Bruce goes further than this and explains that through play ‘children transform, vary, abstract, develop, imagine, create and innovate as they move into the future’ and that play carries children to greater levels of cognitive functioning (2012: 15). In examining climate change and solutions to issues contributing to climate change, greater and more holistic approaches to cognitive functioning for primary school children would certainly aid their investigations.

2.7.4 The Integrity of Childhood in its Own Right: Principle 4

Froebel was one of the first of his contemporaries to insist on celebrating and honouring the integrity and the period of childhood in its own right. Froebel argues childhood is not just a journey, children must navigate before they progress to the ultimate goal or achievement of adulthood. This was a very significant claim to make in the era and society in which Froebel lived. Bruce endorses this Froebelian view of childhood in its own right. ‘The ‘here and now’ of childhood learning is critical in our thinking. The values, attention, attitudes and investment in our young children and the qualities that are promoted through early learning experiences cannot be underestimated’ (2012: 41). Reminiscent of Freire’s critique of the banking model (1972) and the current emphasis on mindfulness and allowing children to simply be children and to be present, Froebel stated as early as 1826 ‘to have found one quarter of the answers [to his own questions] by his own effort is of more value and importance to the child than to half hear and half understand it in the words of others’ (1826: 86).

2.7.5 The Rights of Children: Principle 5

Froebel insisted on respect for the period of childhood and was an advocate for the recognition of the rights of children. Given that he was born during the Enlightenment, an era of intense intellectual activity concerning citizen rights, he was one of a small number of philosophers and educators who began to think about childhood differently at the time. Froebel was driven to promote the protection of children from harm of any kind. The conservation and fostering of their holistic well-being are key aspects of this principle. Long before organisations such as UNICEF were founded, as a champion of the rights of children, Froebel's work reflected the contemporary vision of the child that this thesis illustrates. He too viewed children as individuals and important members of families and communities who were worthy of being heard and active citizens in their own right.

2.7.6 An Ecological Perspective of Humankind in the Natural World: Principle 6

Froebel, having spent considerable time as a forester in Bavaria, had intensely observed the laws of nature, ecosystems at work, the geometry that is ever present in nature and the actual composition of living things in the natural world. He developed a deep respect and love for the natural world and the innate goodness of humankind. Tovey casts a contemporary light on Froebel's ecological principle, stating:

Today the notion of connectedness is fundamental to our understanding of young children's growth and learning. Humans are relational beings, born to connect with others. Such intimate, reciprocal relationships are vital for our sense of belonging and wellbeing throughout life (2017: 7).

Froebel insisted children should have a variety of learning experiences in nature; for example, gardening and adventurous play in the outdoors, both of which challenge children in a safe

context. 'Outdoor play stimulates wide learning – physical activity and exploration fosters curiosity and leads to those 'why' questions, so feeds into language learning' (Froebel cited in Bruce, 2012: 79). Therefore, Froebel's principles are integral to this work, particularly the principle of unity and interconnectedness of all things, along with the ecological perspective of humankind in the natural world and the rights of children. A Froebelian educator can inspire children to foster an ecological view of the world, a view where love and stewardship for the environment are core values worthy of nurturing. A Froebelian educator seeks to ensure children have their voices heard regarding the most serious issue of our time, one that directly affects us all, including children.

2.7.7 Bringing Ecofeminism and Froebelian Philosophy Together

The importance of nurturing a relationship with the natural world as the Froebelian principles outlined in terms of maintaining an acute awareness of the uniqueness of each child, the unity and interconnectedness of all things and the essential inclusion of play are all essential to this work. This thesis recognises the integrity and celebration of childhood in its own right, the honouring of the rights of children and finally, particularly relevant today in the current crisis of climate change, the cultivating of an ecological perspective of humankind in the natural world. Ecofeminism strengthens some key aspects of Froebelian philosophy. While both share an understanding of deep human interconnectedness with the environment, they differ significantly in emphasis. Froebelian philosophy embraces an emphasis on the importance of children and their education for cultivating sustainable approaches, which ecofeminists define further in ways that are critical of patriarchy and capitalism. As outlined, Froebelian philosophy is focused on unity and illuminates the interconnectedness of all things while

ecofeminism elaborates the connection between interconnectedness, care and love, in opposition to the materialistic world we occupy.

Together they offer an innovative approach to the circular economy in the primary classroom.

The blending of ecofeminism and Froebelian philosophy can illuminate the broader discussions of climate justice, sustainability, and the circular economy, and this can be done through a child-centred approach.

2.8 A conceptual framework of key concepts explored and used in the thesis

The following is an outline of the key concept of circularity which is central to this thesis. It is a concept under discussion and exploration using the theoretical framework of Froebelian ecofeminist philosophy. Through this, the concepts of child-centredness, care, social justice, and interconnectedness, essential to the research, are brought into view.

2.9 Circularity

This thesis delves into the worlds of alternatives - alternative choices, ideas, ways of thinking and seeing the world sustainably, to the mainstream narrative of patriarchal capitalism. It is built on the concept of circularity as a tool of sustainability. There is a strong rationale for the inclusion of primary school children in the circular economy conversation and offering them an opportunity to explore living intrinsically with greater circularity from a young age. Primary school children must be afforded the opportunity to care for the Earth in a way that acknowledges their rights and supports their unique creativity in the discussion around the globe. As Margaret Mead famously puts it: 'never doubt that a small group of thoughtful,

committed, citizens can change the world. Indeed, it is the only thing that ever has' (Mead, 1978 cited in Kirschenmann, 2010: 352). As outlined earlier, ecofeminist philosophy draws attention to women, from multiple viewpoints, such as how they are affected by climate change and to the feminine as a social construct today. Mother Earth and the transformative and care possibilities ecofeminism presents when we gain greater awareness of the issues around us, are discussed in the following sections. It is necessary to address the concepts of care, interconnectedness, love, child-centredness, and social justice as part of this debate.

This thesis is an opportunity to explore the idea that allowing the introduction of the concept of a circular economy and the notion of waste valorisation is a potential way for an integrated approach of ESD with other subjects of the IPSC (1999), which will be discussed more thoroughly in Chapter 4. It is based on an understanding that Ireland, like other nations, is treating Mother Earth as if her natural resources are infinite. The inclusion of a social justice lens and encouraging an attitude of deep care throughout the research in schools brings the theoretical framework to life and creates a transformative learning experience.

Transformation is essential but it will take a significant effort and considerable care to integrate many areas of knowledge such as ESD, science, indigenous knowledge, language and more. UNESCO emphasises:

...we have to recognize the dynamism of indigenous knowledge and its inherent capacity to adapt in the face of change. If we consider indigenous knowledge, not as static bytes of accumulated information, but instead as a vehicle for passing on social values and attitudes that reinforce resilience, then the announced demise of indigenous knowledge in the face of climate change is revealed for what it is: misleading and, in fact, seriously erroneous (2018: 12).

In 2020, as this thesis was emerging, the circular economy concept became more prominent

in political and media public discourse in the Irish landscape. The concept of circularity was emerging in mainstream conversation. In 2017, the Rediscovery Centre opened in Dublin, the only one in Ireland, an education and research center and an umbrella organisation for four social enterprises: rediscover fashion, rediscover furniture, rediscover paint and rediscover cycling. These enterprises use waste as their main resource and collectively they are eager to help people create value with their 'stuff' and move towards a circular economy, highlighting the interconnectedness of all things and actions. There are opportunities in the Rediscovery Centre to learn how to move towards a circular economy (The Rediscovery Centre, 2020). There has been a significant shift in mainstream society and in schools to work more sustainably and focus on the rhythms of Mother Earth. Awareness of this circularity and interconnectedness of all things has been significantly raised because of the climate crisis. Citizens are increasingly aware of the impacts their actions have on the planet and on other nations because of, for example, the over-reliance of disposable plastics in the western world.

The concept of circularity draws attention to the need for including children's voices in the conversation, as by including all ages in conversations to do with the love and care of Mother Earth, means that they participate in creating the futures that affect them. Chapter 4 delves more deeply into the essence of the circular economy concept, which in itself is, a concept of circularity. It will reveal that it is more than simply being about recycling and has the potential to address a number of stressors on the environment while ensuring valorisation in products or production processes. The policy directions of Finland and the Netherlands are discussed as revealing their dedication to ensuring the circular economy concept is embedded into education. They promote the idea that children and adults of all ages will have a voice in the

sustainability and the circular economy conversation. Conversations are coming full circle through generations. To explore circularity in the primary classroom and to open the discussions and research to the interconnected concepts, it is essential to engage in a particular pedagogy, suitable and complementary to the theoretical framework and the research paradigm. A pedagogy of love was appropriately chosen, given that a love for Mother Earth as well as the natural environment was encouraged throughout the research. The theory underpinning this pedagogy of love is explained below.

2.10 A Pedagogy of Love

Froebelian ecofeminist philosophy serves this thesis in encouraging a natural love for and connection to Mother Earth, and through this love, skills of stewardship are potentially fostered. Todd, Jones, and O'Donnell ask 'how might pedagogical practices be sparked and fed by ideas that are drawn from contemporary feminist and queer theory, in particular those that put contemporary philosophies of affect, materiality, the animal and the post-human to work in feminist and queer ways?' (2016: 2). The application of a Froebelian ecofeminist theoretical framework, emerges as a response to this question, serving as a spark to ignite a pedagogy of love.

In accepting and embracing love, and the manifestation of this through emotion and feeling towards Mother Earth, it becomes instinctive not simply to throw something away, not to destroy our natural world that we love, but to love nature as an extension of ourselves. It is not reductionist but sustainable in nature, it is flourishing in the truest sense, for humanity and for the natural environment. It is nurturing the love captured in the way young children

often move through a garden without prejudice or judgement, showing kindness and love towards Mother Earth. Research emphasises that contact with the outdoors ought to start during the formative years. Kals et al. (1999) discuss the feeling of love or affinity towards the natural world and suggest that it can be described as an emotion that is developed through direct experiences in nature during childhood. They discuss four aspects to this emotion: feelings of unity with nature, feelings of freedom in nature, love of nature and feelings of security in nature (1999). The reciprocal love and circular nature of relationships in nature seen by children of a primary school class observing living things in the natural world, is a demonstration of love in action. Similar reciprocity occurs when the same children breathe in oxygen that trees and seaweed give out during a nature walk. It reflects the love of Mother Earth in the reciprocity of interactions she enacts every day and night relentlessly. Gold comments on how love can be an effective motivator:

At times the reality of climate change can be overwhelming. In those moments, I have to keep my eyes firmly fixed on the reasons such a struggle is necessary and worthwhile. It takes all my reserves of hope and that belief instilled in me since childhood; there is no force more powerful than a love that knows no bounds. It is time to dig deep and remember the roar of the lioness who would stop at nothing to protect her cubs (2018: 53).

Thich Nhat Hanh, in his work *Fear – The Essential Wisdom for Getting Through the Storm* (2014), urges people to view all life as interconnected and to recognise that we can re-examine how we separate ourselves from the natural world and can instead expand our compassion and love in such a way that we take action to protect the Earth (2014). He explains throughout the work how in Buddhism, love is understood as limitless and always viewed alongside the following conceptual elements: no frontiers, compassion, joy and equanimity, loving kindness (2014). Hanh also discusses how people have the opportunity to continue to learn from one generation to the next, but now it is time for a specific kind of learning. He

believes it is time to learn how to love in a totally non-discriminatory manner. He emphasises we can do this because we are an intelligent species, but he also points out ironically, that although intelligent, we do not love enough (2014). Perhaps the form of intelligence we emphasise obstructs a more loving and feeling approach. This reflects a key message of this thesis, that a loving approach to exploring the issues facing us environmentally helps in investigating solutions together. Bell hooks reminds us of the transformative power of love whereby 'love will always move us away from domination in all its forms. Love will always challenge and change us. This is the heart of the matter' (2003: 137). Arguably, working through a pedagogy of love using a Froebelian ecofeminist philosophical framework can be perceived as an appropriate approach for exploring the circular economy with primary school children.

2.11 Conclusion

This thesis is questioning current societal norms, such as patriarchy, capitalist behaviours, the othering and destruction of nature, the unsustainable ways of living and the lack of awareness of the concept of circularity in our daily engagements with nature. It invites criticality and progressive thought into the primary classroom in relation to sustainable practice. McNair and Powell reflect a similar intention:

To swim against the tide of educational doctrines that promote reductive and transmissive views of young children's capabilities and signs of learning, demands the kind of courage that early Froebelian travellers have displayed and which contemporary Froebelians marshal in their everyday work. Embracing a revolutionary critical perspective engenders both challenge and opportunity: for creative progressive pedagogical approaches in collective, hopeful resistance to discordant regulatory mechanisms of twenty-first century educational systems; and activism in response to inequitable social structures (2020: 9).

Such an approach can create and support an awareness of solutions, such as a circular

economy, to environmental issues, and how we all are stakeholders working together in an effort to combat the pressing issue of climate change, even the youngest amongst us. The research in schools took place in the spring of 2018. In November of 2018, teenager Greta Thunberg started a global uprising, with children and teenagers as co-activists before adults joined them in the fight against climate change. A social movement originating from young people inspired schools globally into collective action that marked the need for global change.

This chapter has explored how the inclusion of feminist theory offers a powerful tool in analysing established gendered assumptions and norms in the world and seeks to overcome dualistic thinking. Combining both Froebelian and ecofeminist philosophies gives a theoretical basis to critically analyse the context of the problem and explain the findings of the research. The data gathered at the research sites will be examined through this theoretical lens, drawing specifically on the concepts of circularity and a pedagogy of love. Miller in his work *Love and Compassion: Exploring Their Role in Education (2018)*, argues for the importance of love as a motivating force for both students and teachers, encompassing a love of the aesthetic, compassion, self-love, and a love for learning. Miller is critical of the way we live in materialistic society, which rewards consumerism, individual achievements and measurement in education and the broader society (Miller, 2018). The chapter has explored the limits of the current emphasis on rational-critical or mechanistic modes of knowledge and learning and argues for a theoretical stance that emphasises a loving pedagogical approach. A Froebelian ecofeminist theoretical approach also highlights our power for transformative action, through our individual response-abilities in co-creating a more sustainable society. Grant and Osanloo explain how research begins with a blueprint that eventually will evolve into a house, as ‘the theoretical framework weaves its required elements into the building

process so that it becomes indistinguishable from the house itself. What you are left with is a home to call your own' (2014: 24). This research feels very much at home enveloped as it is by this Froebelian ecofeminist framework.

3. Chapter 3 - Policy Context

3.1 Introduction

Policies that underpin learning about sustainability in Irish education are explored in this chapter to give the background context for the learning potential of the concept of a circular economy as a tool of sustainability with primary school children. This chapter explores relevant literature on ESD and the circular economy in the international policy landscape as well as educational policy in the Irish primary school context. This exploration uses Bacchi's policy analysis framework (2009) to support this as it allows for seeing the connections between policy and curriculum development as problematising activities. The chapter analyses the international and national policy context for sustainability generally and the historical development of environmental concerns, current conversation and status of ESD. It then discusses the sustainable development goals in an Irish context, the Irish policy context, and the IPSC.

3.2 Bacchi's Framework – policy as a problematising activity

To facilitate this initial exploration of policy's impact on curriculum, the work of Bacchi (2009) will be employed as a framework to support critical commentary on policies and their implications for sustainable development education and the work of this thesis. Bacchi proposes a set of questions to support policy analysis. She frames the subject or content of policy in terms of how we think about or position it as a 'problem' or more specifically she asks 'what is the problem represented to be?' (2009: 48) Unlike the conventional meanings we apply to the word 'problem', Bacchi directs us to how 'problems' are presented to us in society through policy and highlights that 'policies are problematising activities' (2009: xi).

Osborne (1997) explains that policies are created to ‘fix things’ revealing an underlying epistemological belief that there is a ‘problem’ to be fixed in the first place. To analyse policy means to uncover the problems it represents. Bacchi reveals ‘in effect, we are governed through problematisations rather than through policies’ (2009: xi) and develops a framework to interrogate how and why these discourses have developed as well as exploring their implications. It is worthwhile foregrounding a set of specific questions proposed by Bacchi which are used to critically analyse policy on sustainable development in subsequent sections:

What is the problem?

What presuppositions or assumptions underlie this representation of the problem?

How has this representation of the problem come about?

What is left unproblematic in this problem representation – where are the silences and can this problem be thought about differently?

What effects are produced by this representation of the problem?

How/where has this representation of the ‘problem’ been produced, disseminated and defended, how could it be questioned, disrupted and replaced? (2009: 48).

This analysis enables a critical exploration of the differences in policies and contexts to assess their level of problematisation and power. For example, using the question ‘what is left unproblematic in this problem representation – where are the silences and can this problem be thought about differently? (2009: 48), we can explore the force of policies – if they are legislative requirements with implications for compliance or if they simply recommend action or provide guidelines with no actual power to enforce action.

It is essential to contextualise the Irish policy field in terms of international climate change policy to investigate the gap between policies and the problems they pose, on the one hand, and actual action on the ground, on the other hand. This can be done with the support of Bacchi’s question, ‘what is the problem represented to be?’. Defining sustainable development as a problem within the political sphere and remit of action helps to illustrate

how problems were defined and actions they came to form an important backdrop for Irish policy. I turn to give a brief account of the ways in which environmental concerns were initially problematised. The ‘problem’ had gained traction revealing unsustainable practices could not continue as they were at the time.

3.3 A Brief Political Timeline for Environmental Concerns

To begin from the perspective of political actors and political parties, considerable ground was covered in the 1970s as environmental concerns entered and gained traction in the political landscape. Focusing on environmental action as single action parties for the first time, the Green Parties were founded in the 1970s and started to make ‘political breakthroughs’ in the 1980s to take their first elected seats in European Parliament (European Environment Agency, 2011). The broader sustainable development movement was emerging on the international stage.

1960 A Silent Spring	1970s – 1980s Founding of ‘The Green Parties’ and election to European Parliament	1988 The Brundtland Commission/Report ‘Our Common Future’	1972 The UN Environment Programme	1987 The Montreal Protocol
1988 The International Panel on Climate Change	1990s The Conference of the Parties	2000 The Millenium Development Goals	2001 Green-Schools	2007 Eco-UNESCO discussion paper ‘Developing a National Strategy on ESD
2012 Our Sustainable Future – A Framework for Sustainable Development in Ireland	2014 The National Strategy on Education for Sustainable Development	2015 The Sustainable Development Goals	2019 Climate Change Performance Index	2020 The Department of Education – Education for Sustainable Development Newsletter

Figure 3.1 A Timeline of Events related to/of Sustainable Development

In 1972, the UN Conference established the United Nations Environment Programme (UNEP) (UNEP, 2021). This was followed by the 1972 UN convention, formerly known as the World Commission on Environment and Development, the Brundtland Commission (1987) discussed in Section 3.4 below. In 1987 the Montreal Protocol was adopted on substances that deplete the ozone layer to regulate the phase-out of ozone-depleting substances (Creech, 2012: 5) followed in 1988 with the establishment of The International Panel on Climate Change by the World Meteorological Organisation and the United Nations Environment Programme (UNEP) which aimed to ‘review scientific research and provide governments with advice on climate problems’ (2012: 5). The Conference of the Parties (CoP) annual conference of countries committed to voluntary actions and agreements on U.N. Framework Convention on Climate Change (UNFCCC) was also developed in the 1990s. Parties to this treaty have committed to take voluntary actions to prevent climate change and the first conference was held in Berlin, Germany in 1995 and has continued annually since ([Conference of the Parties \(COP\) | UNFCCC](#)).

3.4 The Brundtland Commission

The Brundtland Commission was a name for the World Commission on Environment and Development which the Norwegian Prime Minister Gro Harlem Brundtland chaired. The aim of the commission was to unify countries in a common goal for the pursuit of sustainable development (Mulvaney, 2011:15). The UN General Assembly worked with members of the Brundtland Commission to find solutions to stop the global deterioration of natural resources as a result of the impacts of human behaviour. The emergent document of this collaborative work was titled *Our Common Future* or *The Brundtland Report* (The Brundtland Commission, 1988 – hereafter referred to as the Report in this section). It highlighted an urgency and an

immediate need for an approach that would both protect the environment and its natural assets but at the same time, not compromise economic progress. This is a key factor in how sustainability was being problematised with a requirement to balance with economic concerns. The Report defined the concept of sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (1987: 41). The Report recommended that the concept of sustainable development would maintain economic prosperity but at the same time, minimise the impact of negative human behaviour on the planet - the urgency of which, Carson (1960) and other scientists had observed, and wrote about, years before. Brightman and Lewis explain the impact the Brundtland Commission made on society in the 1980s and how it emphasised the need for greater sustainability:

The decades leading into the 1980s brought greater recognition that increasingly intensive instrumentalism has created a range of problems not only for less powerful human groups, but also for non-human species and the material environment. When such anxieties about sustainability and ecological well-being began to coalesce, The Brundtland Report – Our Common Future, published in 1987, initiated a major international conversation about 'sustainability' (2017: 208).

The Brundtland Report (1988) highlighted many environmental issues and specifically the urgent need for more sustainable ways of living, framed as the 'problematisation' of the issue (Bacchi, 2008). However, Hummel and Argyrou argue that the Brundtland Commission was 'too lenient' as it did not establish 'strict and qualified limits to the economic growth no matter how important that same growth is to preserve nature and develop human society' (2020: 9). Drawing on Bacchi's model, the limitations of the Brundtland Commission report become evident in the lack of limitations on economic growth in its identification of the problem of sustainability. Hummel and Argyrou (2020) believed that the 'authoritative definition of sustainable development' presented by the Brundtland Commission in 1987

must now be reframed because of the increased infringements on 'planetary boundaries'. This also suggests that the Report was too narrow in its problematisation of globalisation and unable to encompass the growing global economic interdependence of transnational capitalism. The Brundtland Report identified a wide and broad range of issues requiring sustainable development, including social, cultural, economic, and political ones, and the commission is acknowledged worldwide for highlighting these issues on an international policy level. The report identified three fundamental elements to this: social equity, environmental protection, and economic growth. Holden, Linnerud and Banister (2014) analyse the environmental protection element in relation to the Brundtland Report and state:

The earth's natural base must be conserved. Human development tends to damage ecosystems, which reduces the number of species. The loss of plant and animal species can greatly limit the options of future generations. Therefore, the Brundtland Report argued that "sustainable development requires the conservation of plant and animal species" (2014: 10).

They also add that the report argued secondly that 'the case for the conservation of nature should not rest only with the development goals. It is part of our moral obligation to other living beings and future generations' (2014: 10). The Brundtland Report alerted the world to the interconnectedness of all things and conceiving the problem as intergenerational, explained how the nations of the northern hemisphere 'must help' the nations of the southern hemisphere. There must also be a clear connection through the generations within all nations. However, this emphasis was secondary in the report to the dominant focus on economic growth. The report acknowledged that the idealism and intuition exposed would be challenging. However, the commission was only guiding nations towards sustainable development. It was not made mandatory policy and although respected, the advancement of greater sustainable measures relies on individual nations' capacity to create such regulatory policy. Bacchi's question of 'how/where has this representation of the 'problem'

been produced, disseminated and defended, how could it be questioned, disrupted and replaced?’ (2009: 48) becomes crucial. The Brundtland Report was disseminated on the world stage, but it was the duty of nations to address it, question it and act on it. The next section explores Irish policy in the wake of the Brundtland commission.

3.5 Sustainable Development Goals in the Irish Context

Examining policy both nationally and internationally, it could be suggested that many policies are ‘silent’ as they are often guidelines or advisory documents and are not enforceable as legislation or resourced as policy implementation (Bacchi, 2009). In 2015, the United Nations (UN) devised the Sustainable Development Goals (SDGs) as a way of giving clear global targets and objectives. They were preceded by the Millennium Development Goals (MDGs) which ended in 2015. The original MDGs consisted of eight goals launched in the year 2000 to encourage progress in the areas of poverty, education, health, hunger, and the environment. The SDGs are a collection of 17 goals adopted by 193 member states of the UN (2015). These goals offer a vision for both the planet and humanity. The SDGs inform policy and will continue to do so until the year 2030. In comparison to the MDGs, the SDGs are much broader and include social, economic and environmental aspects of development.

The significant challenges of quality education, gender equality and healthcare are addressed by the SDGs and greater emphasis is placed on environment and climate change in comparison to the original MDGs. *Goal 13* specifically addresses climate action but many of the goals traverse the issue of climate change and correlate with many common issues (UN, 2015).



Figure 3.2 The Sustainable Development Goals of the United Nations (2015)

The goals of relevance to this thesis and the topics covered in the research with the children are: 4. Quality Education; 5. Gender Equality; 9. Industry, Innovation, and Infrastructure; 11. Sustainable Cities and Communities; 12. Responsible Consumption and Production; 13. Climate Action; 14. Life Below Water; 15. Life on Land; and 17. Partnerships for the Goals. These directly relate to the concept of a circular economy and ESD. Unfortunately, the targets for the SDGs are not always met and Ireland particularly has performed very poorly in certain areas. Bacchi’s question pertaining to presuppositions and assumptions reemerges again when she asks ‘what presuppositions or assumptions underlie this representation of the problem?’ (2009: 48). There may be an assumption that the recommendations of the SDGs will be met by the Irish government when certain results and statistics are presented publicly. However, Bacchi cautions against presuppositions and assumptions and to be mindful of how a policy is represented as representations can be ‘dangerous’ (Bacchi, 2009; 48). Such danger is indeed reported in *The Sustainable Development Goals Index and Dashboards Report* (2020) in Ireland, which found that ocean protection measures are very poorly attended to by Ireland. This highlights the tensions between sustainability aspirations and economic needs, as reflected by the decades long tensions between industry and government policies. This is

also evident with regard to oil and gas exploration in Ireland, exemplified in the Shell to Sea campaign in the 2000s (Ó Donnabháin, 2014) and in the exploratory oil and gas wells off the Kerry coast (Green News, 2019).

This serves as another example of the complex and often contradictory history Ireland holds with enacting the SDGs which the government agreed to do, on the one hand, and their inaction due to government interests from an economic point of view, on the other hand. The poor engagement with measures of sustainability in Ireland are, also, perhaps a measure of our anthropocentric behaviours and attitudes embedded in our education system and society in general. In the overall *Sustainable Progress Index* which is an aggregate across all 17 goals for each EU country that agreed to attend to the SDGs, Ireland is in eleventh place on a list where fifteenth is the worst performing country.

3.6 Irish Policy Context

Irish policy developed both general sustainability policies and those in relation specifically to education that were directly in response to the Brundtland Commission. Investigating the national policy landscape is an important step in exploring how sustainable development is positioned in the Irish primary school education system. I begin here with an examination of key national policies about education's role in promoting sustainable development. Again, drawing on Bacchi, the question of how sustainability has been problematised, its effects and what other ways of conceiving of it is of utmost importance here.

ECO-UNESCO published a discussion paper titled *Developing a National Strategy on ESD in Ireland* (2007), in response to mounting concern regarding the impact of human development on the natural world. ECO-UNESCO, Ireland's Environmental Education and Youth Organisation is affiliated to the World Federation of UNESCO and works to empower young people and conserve the environment. ECO-UNESCO focuses on understanding the environment and sustainable development, raising awareness of environmental issues and promotes practical environmental action projects through the ideals of UNESCO in Ireland. ESD was framed in this discussion paper to encompass care of the environment but also other aspects of education such as peace, human rights, citizenship, intercultural, and development education. The objectives put forward from the discussion paper are firstly, that ESD would be embedded at every level of education. Secondly public awareness of ESD would be essential in order to ensure the knowledge, skills and values across individuals, businesses and organisations needed to support a sustainable and just society, environmental care, and responsible global citizenship. Thirdly, capacity building in support of ESD would have to be promoted. Finally, high standards of environmental management in education institutions must be promoted (ECO-UNESCO, 2007).

Although the objectives suggested are logical and potentially transformative, Bacchi's question 'what effects are produced by this representation of the problem?' (2009: 48) highlights that although these objectives represent possible solutions, by not naming a body charged with leading these solutions they remain aspirational. There is no official authority mentioned in the document with the power to affect the changes recommended; it thus appears to be an aspirational rather than a policy document with clear targets, direct political action, or power to enact change.

ECO-UNESCO emphasises that although environmental education is embedded in the 1999 Irish Primary School Curriculum (IPSC), ESD is not a dedicated subject area within the IPSC (2007: 23) and there is therefore always a risk that it is not dealt with as part of larger environmental curriculum. We can see how sustainability, by being not named explicitly, is seen to be absorbed with environmental education and as such becomes invisible. Without a dedicated place in the IPSC, it is difficult to 'represent' let alone 'question' and 'disrupt' as suggested by Bacchi (2009).

Outside education, the national strategy on sustainable development, *Our Sustainable Future - A Framework for Sustainable Development in Ireland*, was developed and published by the Department of the Environment, Community and Local Government (DECLG) in 2012. This emerged in a context where wider media and public attention was focused on sustainability, pushing governments across the EU including the Irish government into action. The DECLG state 'sustainable development' can be defined as 'development which meets the needs of the present without compromising the ability of future generations to meet their own needs' (2012: 10). It emphasises that it is a continuous process of social, economic, and environmental change in order to support and promote citizens' well-being now and in generations to come. Additionally, sustainable development must include a 'resource-efficient' economy founded on a balanced society, respectful of the ecological limits of the natural world (2012). The DECLG devised *Our Sustainable Future* to create 'effective implementation mechanisms' in order to develop sustainable development measures comprising seventy avenues or ways to incorporate sustainability into society, including through education, climate change, research and innovation, and skills and training (2012:

22). The DECLG highlight that the commitment to meeting the objectives in the national strategy is monitored by the Cabinet Committee on Climate Change and the Green Economy of the Irish Government (2012: 6). This drives, echoes and implements European policy reports and commitments on sustainability. Ireland is required to commit to this strategy, given their poor performance thus far.

The current *Climate Change Performance Index (CCPI)* (UN, 2019) was compiled by Burck et al (2019) outlines the efforts of all countries signed to *The Paris Agreement* (UN, 2015). *The Paris Agreement* (UN, 2015) strives for all nations participating, to reach a common goal of combating climate change, adapt to its effects and assist developing countries to do so also (UN, 2015). It is in itself a good indication of sustainable development endeavours. Burck et al., (2019) highlight that Ireland, although marginally improved with regard to addressing issues that are contributing to climate change, since its position in last place of all EU countries last year, still ranks among the worst-performing countries in Europe. Ireland is ranking third from the bottom of all EU countries regarding lowering greenhouse gas emissions (UN, 2019). The report indicates that internationally, Ireland has on previous occasions called for fewer demanding targets 'due to claims regarding the economic importance of the agricultural sector' (2019: 22). Reverting to Bacchi's question regarding how the problem can be questioned, disrupted and replaced, the problem was clearly questioned and was disrupted through creating policy. However, the problem is still present if Ireland is still ranked remarkably low in comparison to other countries and to alleviate it, lower targets were requested previously on economic grounds.

Following the DECLG paper (2012), there was a need to specifically address sustainable development with specific regard to education. Consequently, in 2014 *Education for Sustainability - The National Strategy on ESD in Ireland, 2014-2020* (DES, 2014) was presented as a strategy paper for the progression of ESD in Ireland.

The *National Strategy on ESD (2014-2020)* specifically aims to ensure that the education system attend to sustainable development. The strategy discusses the difficulties regarding the inclusion of sustainable development education in the education system. This paper reviews practice across all sectors of education, and although acknowledging some progress is being made, it highlights that greater leadership and coordination is necessary. Additionally, considerable support is essential for learners so that they can acquire the knowledge and skills to enable them to live out sustainable values and choices and then carry these skills and values throughout the community. The key principles of the *National Strategy for ESD (2014 – 2020)* are to:

- balance environmental, social and economic considerations.
- promote lifelong learning.
- be locally relevant while also linking the local to the national and international.
- engage all sectors of the education system, as well as the non-formal education sector.
- be interdisciplinary and recognise interdependence and interconnectivities across other sectors.
- use a variety of pedagogical techniques that promote active and participatory learning and the development of key dispositions and skill.
- emphasise social justice and equity.
- focus on values and promote active democratic citizenship and inclusion as a means of empowering the individual and the community.
- be an agent for positive change in reorienting societies towards sustainable development (2014: 4).

As the climate change discussion is becoming more present in mainstream media and conversation, it is evident that the education community is representing this problem (Bacchi,

2009), by addressing it more explicitly at policy level. The key objective of the national strategy aims to ensure that:

education contributes to sustainable development by equipping learners with the relevant knowledge (the 'what'), the key dispositions and skills (the 'how') and the values (the 'why') that will motivate and empower them throughout their lives to become informed active citizens who take action for a more sustainable future (2014: 3).

This marked a shift to politically empowered action as part of the focus on active citizenship in European policy. However, as a guidance document without power to implement, no action or focus on ESD may occur in a school unless an individual principal, teacher or school is specifically interested or intent on delivering and exploring ESD content in the primary classroom. Consequently, the document makes huge assumptions about the position of ESD in the classroom. Returning to Bacchi's question (2009) outlined at the beginning of this section, it can be accepted that the Department of Education are acknowledging there is a problem, which they have represented in policy, however, there is no obligation on primary school communities to question, disrupt or engage in specific actions to find solutions to this broad problem. As Bacchi (2009) asks, there are 'presuppositions' and 'assumptions' being made in terms of assuming teachers will represent and engage with the problem and that schools are a suitable site for this activity.

The essence of this national strategy is to strongly encourage primary school teachers to weave a thread of ESD content into all aspects of the IPSC to foster conscientious global citizenship (DES, 2014). In terms of the assumptions being made about policy implementation, it is informative to look at how other national strategies were implemented in Irish schools. The *National Strategy to Improve Literacy and Numeracy among Children and Young People 2011–2020* (DES, 2011) was a national strategy to enhance literacy and

numeracy which emphasised the importance of problem-solving skills development in real world contexts. However, the *Literacy and Numeracy Strategy* (DES, 2011) holds significant weight in schools, due to its considerable legislative force and resourcing in the primary school system and in all schools. This contrasts with the sustainable development strategy, which does not receive comparable resources. Numeracy and literacy form part of prominently defined subjects such as Maths, Irish and English in the IPSC (1999) as well as being cross-curricular in scope with clearly defined aims and resourcing over the last decades.

Kennedy (2013) explains that the development of the *Literacy and Numeracy Strategy* (DES, 2011) was influenced by several factors. This included 'performance on international and national standardised tests of literacy, the literacy achievement of children in disadvantaged contexts, the findings from evaluations of education policy and curriculum implementation...' (Kennedy, 2013: 3). It was also influenced by the creation of The Teaching Council which Kennedy explains formalised 'development of a framework for teacher education across the continua from pre-service to induction to continuous professional development' (2013: 3).

Bacchi's (2009) thoughts on what is silenced and what is not gives useful illustration here. ESD remains out of view, hidden amidst a range of other education policies and curricular areas, while more explicit attention and extensive investment has been made for literacy and numeracy in schools during the past decade. This is allied with the existing high levels of recognition afforded to English and Irish language along with Maths in the IPSC including greater time allocations (1999). This further promotes these subject areas above concepts such as sustainability and ESD in the primary classroom. Key targets are identified in the *Literacy and Numeracy Strategy* to improve our attitudes to literacy and numeracy, to improve outcomes at early childhood level, at primary school level, and at post-primary level

(2011: 5). It specifically states that actions will be 'implemented over the period 2011 to 2020' to ensure that the targets are met. Therefore, in comparison to the aspirational nature of the sustainable development discussions and papers, these are solid actions, obligatory in nature rather than recommended. Hence, Bacchi's question about 'what effects are produced by representation of the problem' (2009: 48) reveals how the different approaches to literacy and numeracy development were addressed through targeted action and resources in all schools across the island of Ireland from 2011 onwards. In contrast, the nature of ESD policies are aspirational and recommended.

Bacchi's question resurfaces again illustrating that the National Strategy is highlighting what is needed, through the final principle that youth will become agents of positive change. If the strategy is not adhered to educational planning and sustainable development education is not deeply embedded in curriculum, how can there be any positive effects? Why do we leave the hope to another generation to become the agents of positive change rather than current educators and policymakers?

The following sections are an exploration into the curriculum policy spaces along with pedagogical responses to the curriculum. Given the emphasis on curriculum and thus teaching and learning in the National Strategy, it is worth exploring the implications of the pedagogical approaches being encouraged. Moreover, given this backdrop of limited problematisation or implementation of ESD policies in Irish education, it is important to explore the current IPSC to gain an insight into the educational landscape and possibilities in the primary school regarding sustainable development education and the inclusion of the concept of a circular economy.

3.7 The IPSC – Social Environmental and Scientific Education (SESE)

The concepts under analysis here would be compatible with the curricular area of SESE in the IPSC and worth examining here. Regarding the SESE curriculum, the general objectives are:

- to enable the child to live a full life as a child and to realise his or her potential as a unique individual.
- to enable the child to develop as a social being through living and cooperating with others and so contribute to the good of society.
- to prepare the child for further education and lifelong learning (1999c: 34)

Analysing Irish curricular content pertaining to the SESE subjects particularly, it is evident that ESD correlates and intersects with many aspects of the current curriculum but are not prominent or elevated enough at explicit levels in primary education courses. The IPSC (1999) has extensive content to choose from in the area of Social, Environmental and Scientific Education (SESE) that is directly relatable to ESD. This curricular area consists of three subjects, which are Geography, History and Science and is strongly supportive of ESD. It is a curricular area of considerable content encouraging creativity, innovative thinking, exploration of skills, and investigative attitudes – all techniques and skills directly relatable to the application of a ESD to the enquiry of this thesis. Much of the content of the SESE curriculum gives rise to the possibility of cultivating an appreciation of the interconnectedness and interrelationship of all living organisms and their environments, and strongly encourages children to be active agents in the preservation of environments for future generations (1999c:4).

The SESE curriculum seeks to enable the child to come to an understanding of the physical world, the relationship of humans with their environment, and the historical process through which that relationship has grown. In developing this understanding, the curriculum helps the child to acquire open, critical and responsible attitudes and to live as an informed and caring member of the local and wider communities (1999c: 49).

Additionally, the curricular area of Social Personal and Health Education (SPHE) intersects

with this intention of the SESE curriculum. The following is an outline of the suggested minimum weekly time frame for each subject of the IPSC (1999). Analysing the hours allocated, it is clear how the weight of hours dedicated to languages and maths, for example, is significantly higher which represents them as more important, in comparison to SESE where ESD sits. It is striking that religious education and arts education are allocated similar amounts of time as the three subjects of science, geography and history combined.

Suggested minimum weekly time framework

Curriculum areas	Full day		Short day [infant classes]	
	One week		One week	
	Hours	Minutes	Hours	Minutes
Secular instruction				
Language				
L ¹	4	00	3	00
L ²	3	30	2	30
Mathematics	3	00	2	15
SESE	3	00	2	15
SPHE	0	30	0	30
PE	1	00	1	00
Arts education	3	00	2	30
Discretionary curriculum time	2	00	1	00
Total secular instruction	20	00	15	00
Religious education (typically)	2	30	2	30
Assembly time	1	40	1	40
Roll call	0	50	0	50
Breaks	0	50	0	50
Recreation (typically)	2	30	2	30
Total	28	20	23	20

Note: Some modification of this framework may be necessary in the context of the outcome of the pilot project on modern languages.

Figure 3.3 The Suggested Minimum Weekly Time Framework for the Irish Primary School Curriculum (1999: 70)

The minimum time recommended for specific subjects tends to reflect the value placed on these subjects. This would indicate that if attending to the issue of sustainability through the medium of SESE, it leaves little time for much else in the SESE curriculum. In terms of its values and potential, the SESE curriculum outlines how:

Social, environmental and scientific education (SESE) provides opportunities for the child to explore, investigate and develop an understanding of the natural, human, social and cultural dimensions of local and wider environments; to learn and practise a wide range of skills; and to acquire open, critical and responsible attitudes. SESE enables the child to live as an informed and caring member of local, national, European and global communities (1999c: 2).

Linkage is also a vital component of the overall SESE curriculum. Linkage occurs when connections are made within a subject area. This can also occur within integration, and problem-solving activities with children. As UNESCO explains, integrated problem-solving is ‘the overarching ability to apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive and equitable solutions that promote sustainable development, integrating the other competencies’ (UNESCO, 2017: 10).

Both linkage and integration of content and concepts can be very successful in exploring sustainable development of education. The whole of the IPSC (1999), and additionally the proposed new curriculum (from what has been revealed so far), is compatible with integration and sustainable development education. The Draft Curriculum Framework (NCCA, 2020) states that the competency of ‘being an active citizen’ includes children’s ‘capacity and motivation for active and meaningful participation in society at local, national and global levels, and fosters their ability to contribute positively and compassionately towards the creation of a more sustainable and just world’ (2020: 8)

The aims of the SESE curriculum are to enable the children to take ownership of their role as an individual, a family member, and a member of local, regional, national, European, and global communities. The SESE curriculum states that as children mature, they start to identify that there are different ways of looking at the world and different ways to organise human

knowledge, further endorsing the idea of inviting children to the table to offer their specific perceptions of the world (1999c: 5). Hence the interconnected nature, inclusive approaches, and child-centred approach of SESE curriculum resonates with the ethos and values explored by the ecofeminist Froebelian approach of this research. This is just one curricular area of primary schooling where sustainability is relevant and features.

3.8 Science Curriculum

There are specific possibilities regarding the science curriculum in primary schools to increase the awareness and understanding of youth around sustainability, for example, the technologies of plastic production and the profound impact plastic waste has on the natural world. The aims of the science curriculum encourage the child to develop, explore, and apply scientific ideas and concepts through various strands and strand units of the curriculum. For example, in fifth class children should be enabled to 'become aware of the importance of the Earth's renewable and non-renewable resources' (1999b: 90). Therefore, this is an ideal opportunity for exploring the concept of a circular economy and related concepts such as the 5Rs as discussed later on page 155. Another aim is to foster the child's natural curiosity, thus encouraging independent enquiry and creative action (1999b:11). Within the broad objectives of science education in the IPSC, like the aims, students are encouraged to become actively involved in the discussion, exploration, and resolution of environmental issues (1999b: 12).

The science curriculum seeks to encourage children to acquire open, critical, and responsible attitudes and enables the child to live as an informed and caring member of local, national,

European and global communities (1999b: 2). To engage with sustainable development education, a certain level of maturity and criticality is required for authentic engagement. Through the strand of 'environmental awareness and care' (1999b) and the strand unit of 'environmental awareness' children are encouraged to cultivate an appreciation of activities, such as forestry, agriculture, mining, and fishing. The curriculum encourages an awareness of the ways in which these resources are utilised. It also emphasises an awareness of the importance of the Earth's renewable and non-renewable resources, including the use of water, fossil fuels, wind, or nuclear energy to generate power, and the production of raw materials for manufacturing purposes. As discussed later, this is an opportunity to explore the processes and materials used in services and manufacturing and how a circular economy concept can ensure there is no waste created in these processes. Visual examples of these explorations are found in figure 1.1 and 1.4 using potato peel, bioplastics and recyclable coffee cups and straws. The curriculum aims to engage children with the science curriculum and encourage an appreciation of the environment. However, the problem with the lack of explicit attention to ESD and how it is framed as an element within other subjects, reflects the risk of omitting it from day-to-day teaching and learning in the primary classroom. The *NCCA Teacher Guidelines* for science state 'an experimental and investigatory approach to science in the primary school can make a unique and vital contribution to the holistic development and education of the child' (1999e: 9). Using enquiry-based learning whereby problems were discussed and worked through, using the workshop processes of the research to design for a circular economy demonstrates how the NCCA Teacher Guidelines above can be achieved.

3.9 Geography Curriculum

Within the geography curriculum, the strand 'environmental awareness and care' and the strand unit of 'environmental awareness and caring for the environment' are similar to the SPHE and science curricula, whereby children are encouraged to 'come to appreciate individual, community and national responsibility for environmental care, explore concept of custodianship and its implications, become familiar with concept of sustainable development...and appreciate the need to protect environments for present and future inhabitants' (1999a: 84). In the geography curriculum, pupils are also invited to explore suggestions for environmental improvement, and to suggest possible ideas or actions for this to take place.

The geography curriculum states children should have the opportunity to 'study the impact of environmental conditions on the lives of people in the locality and in other areas and come to appreciate some of the ways in which humans use, modify or influence their environments' (1999a: 14) and 'develop aesthetic sensitivity to the natural and human elements of the environment and to the repercussions of human actions' (1999a: 15). Interestingly, many of the aims of the geography curriculum also reflect the holistic focus towards environmental sustainability (which this thesis also explores), whereby consciously engaging with this curriculum can help the children to 'foster an understanding of, and concern for, the total interdependence of all humans, all living things and the Earth on which they live' (1999a: 5). The reciprocal love and circular nature of relationships in nature can be seen by children and their teachers and be discussed at length while observing living things in the natural world during the teaching and observation of natural circular economies in the outdoors. See section 2.10 for further discussion.

The geography curriculum also aims to ‘foster a sense of responsibility for the long-term care of the environment and a commitment to promote the sustainable use of the Earth’s resources through his/her personal lifestyle and participation in collective environmental decision-making’ (1999a: 5). This aim resonates with the decision of this research to include primary school children in the circular economy conversation during the research in schools.

3.10 Social Political Health Education (SPHE)

As discussed earlier, the Social Political Health Education (SPHE) curriculum encompasses citizenship development and environmental awareness and care. The strand ‘myself and the wider world’ and the strand units ‘developing citizenship’ and ‘environmental care’ are key elements of the SPHE primary school curriculum (1999d: 21). Children are encouraged under the strand environmental care to ‘appreciate and respect the environment and learn that there is an individual and community responsibility in caring for the environment and protecting it for future generations’ (1999d: 56). As discussed later, the Talk to an Adult worksheets were integral in creating a community and intergenerational learning opportunity whereby the circular economy concept and process of learning and researching, can be discussed beyond the classroom. See section 5.13.3.

Also, in the SPHE curriculum for senior classes and intersecting with similar content here, the children are encouraged to ‘appreciate the environment and develop a sense of individual and community responsibility for caring for the environment and being custodians of the Earth for future generations’ (1999d: 65). A key objective of the SPHE curriculum is also to

‘respect the environment and develop a sense of responsibility for its long-term care’ (1999d: 10) also reflecting the development of stewardship skills and attitudes.

Hence these curricular areas of science, geography and SPHE all give extensive potential space and support for a connected, integrated, and empowering approach to ESP in the IPSE curriculum. However, crucially for ESP it is one potential element fighting for attention amongst the myriad of other aspects in curricular strands of these subjects.

3.11 Sustainability in the context of the IPSC

In the NCCA publication *ESD: A study of opportunities and linkages in the primary and post-primary curriculum* (2018), the IPSC (1999) is analysed in relation to sustainable development education in the primary classroom. Interestingly, it states ‘the general objectives provide no obvious opportunities for pupils to encounter anticipatory, strategic and critical thinking competencies’ (2018: 21). This suggests that the actual objectives of the policy do not actually facilitate opportunities for competencies to be developed.

The NCCA aims for opportunities and linkages in the educational experiences of children in the Irish primary classroom, with the second aim resonating the most with the ‘spirit and intent of ESD’ (2018: 20). This aim reflects the potential for active participation in movements needed to be more sustainable such as the circular economy concept or movement that is the focus of this thesis. However, the same document emphasises that more evidence of ESD aligning with ‘high level curriculum frameworks and subject specifications is the optimal situation’ (2018: 21). There is an apparent tension here, where sustainable development education is being leveraged into a siloed, subject specific approach which does not reflect

the holistic experiential aims of sustainable development education espoused elsewhere in the IPSC. The IPSC (1999) supports ESD, but the question remains whether schools are explicitly being guided and supported in enacting sustainable development education at primary school level. Is there sufficient time to even enact this content? Given that we are in the grip of a climate crisis, ESD has become a priority for creating opportunities to live more sustainably. The publication of regular editions of the *ESD Newsletter (DES, 2020)* highlights for teachers that the Department of Education are beginning to place greater emphasis on sustainable development education. However, there is no regular mandatory in-service training currently, for Irish primary school teachers in the area of ESD. This research therefore opens the conversation regarding the inclusion of the sustainable development concept of a circular economy and an increased awareness of the concept of circularity reflective of the behaviours of Mother Earth in the primary school.

3.12 Extra-Curricular: The Green-Schools - ESD in the IPSC

The Green-Schools initiative 'is a student-led programme with involvement from the wider community. The programme is operated and co-ordinated by the Environmental Education Unit of An Taisce (FEE member for Ireland)' (Green-Schools, 2020). On their website, the Green-Schools organisation state they are Ireland's leader in the field of environmental management and education programme for schools. Specifically, they promote the 'long-term, whole-school action for the environment', with schools working towards the green flag award by taking a number of measures to aid the environment, as they prepare their students to become the next generation of environmental leaders (Green-Schools Ireland, 2020). The Green Schools initiative reveals some of the key issues with sustainability programmes in

schools. The *Science in the Primary School Inspectorate Evaluation* (2012) report, which assessed the teaching of science in the primary school, suggested that activities in the local environment and participation in projects such as the Green-Schools should be clearly linked in the school plan with particular curriculum objectives (2012: 21). Outlined below are the themes or objectives followed by the programme to support environmental stewardship. The Green-Schools programme complements the Social Environmental Scientific Education (SESE) curriculum (1999), through its thematic approach. The eight current themes the Green-Schools programme focuses on are:

- Litter and Waste - This theme focuses on waste and litter and strives to foster a sense of responsibility in students. It is the first theme of the programme.
- Energy - This theme focuses on ways to reduce the energy consumption of the school and tries to raise awareness of climate change.
- Water - The objective of this theme is to develop an awareness of water conservation and how to manage this vital resource in schools.
- Travel - This theme strives to increase the number of people carpooling, the use of public transport, scooting, walking, and cycling to school.
- Biodiversity - Biodiversity is addressing how to increase awareness in schools about the importance of native plants, animals and habitats.
- Global Citizenship - Litter and Waste - An extension of the first theme, this is an opportunity for schools to explore how working on the programme has positively influenced the wider global community.
- Global Citizenship - Energy - Global citizenship: Energy facilitates revision of energy and looks at issues surrounding the use of energy globally.
- Global Citizenship – Marine Environment: This marine theme raises awareness of marine eco-systems and the efforts being made to save them (Green-Schools Ireland, 2018).

Through the thematic approach it employs, it attends to current local and global environmental issues in schools. Kavanagh highlights how 'green schools has a proven track record in creating a more sustainable culture but if it is to tackle the issue of climate change it needs to be supported and funded properly' (2008: 85). Reading through Bacchi's (2009) lens which highlights where power is located in policy and its initiatives, its power is limited regarding the promotion of system-wide change, due to funding and to the fact that it is an

optional programme in schools. Green Schools meetings are often attended to by a committee including a teacher and students, guiding the school initiatives, and as such are not central to the curriculum.

Kavanagh cautions that all teachers must recognise they have a role to play, not solely the teachers involved in the Green-Schools programme, and it is the responsibility of all involved in the education of young people to have an understanding of the issues surrounding climate change (2008: 80). This reflects the issues raised by Hargreaves (2008) who explains how a whole institution approach is one of the optimal methodologies for effective ESD and for realising policy. It requires all parties involved in a given institution adopting the sustainable development principles within, in addition to disseminating those principles to the local community (Hargreaves, 2008).

The Green-Schools initiative has been the main route for policy to be brought into practice in primary schools, that is, the primary schools which have chosen to adopt the Green-Schools programme. Therefore, it has bridged a gap in some schools, but it has allowed for the wider system and national curriculum not to fully attend to climate change education or education for sustainable development by virtue of its presence. Another area which bridges comfortably between the early years sector to the primary school sector is the Aistear Curriculum Framework which is discussed below.

3.13 The Aistear Curriculum Framework

UNESCO defines the early years as ‘the period from birth to eight years old, a time of remarkable growth with brain development at its peak. During this stage, children are highly influenced by the environment and the people that surround them’ (UNESCO, 2018). *Aistear* is the early childhood curriculum framework for children from birth to approximately six years. It is a thematic and cross-curricular framework created in 2009 in Ireland in order to enable quality early childhood education experiences (NCCA, 2009). Although the research in schools was conducted with older children, *Aistear* is a fundamental part of the school policy context, which is important to explore here. Within the *Aistear Curriculum Framework* at junior level, interaction with junior and senior infants (ages 5-7 years typically) in ‘a respectful, playful, enjoyable, enabling and rewarding way’ and an opportunity for educators to ‘build on children’s abilities, interests, experiences, cultures, and backgrounds...’ is encouraged (2009: 3). Although many children experience *Aistear* in the formal setting of the primary school, arguably not enough have the opportunity as it is not embedded in all schools.

Many still solely experience the subject based ISPC at infant level. *Aistear* is unlike other separated subject areas in the primary school, in that it works within a holistic thematic framework. However, contrary to the guidelines of the *Aistear* curriculum framework, it is often integrated as an *Aistear* power hour or activity stations for thirty minutes on arrival at school. There are four specific but interrelated themes of Exploring and Thinking, Well-being, Communicating, Identity and Belonging (2009:5). Therefore, it could be suggested that this is the first experience of integration for young students in the primary school setting and as outlined, sustainable development education lends itself very well to an integrated educative experience. As the linkages and opportunities report affirms:

When the broad aims of each of the four Aistear themes are mapped against UNESCO's cross-cutting key competencies for sustainability, it emerges that the framework provides opportunities for babies, toddlers and children to gain all the key competencies for sustainability, albeit in age appropriate ways (2018: 18).

An opportunity for intersectionality of subjects is available through the medium of *Aistear*.

There are also four sets of guidelines in place which encourage good practice and support the integrated approach of the programme. They are building partnerships between parents and practitioners, learning, and developing through play, supporting learning and development through assessment, and learning and developing through interactions (2009:5). The *Aistear Curriculum Framework* is based on 12 principles of early learning and development, which are presented in three groups of four. The first group is based on children and their lives in early childhood. The second group concerns children's connections with others. The third group is concerned with how children learn and develop. The adult's role is one of support in the child's development and early learning through the 12 principles. Of the 12 *Aistear Curriculum Framework* principles the following are connected to ESD:

- equality and diversity
- children as citizens
- parents, family and community
- the adult's role
- holistic learning and development
- relevant and meaningful experiences
- communication and language
- the learning environment (2009: 7).

It is engaging with these principles and living out the values embedded in these principles which can offer pupils an embodied, transformative, educational experience. The *Aistear Curriculum Framework* recognises the importance of children, their right to be heard and their valuable contribution to make, if they are given a chance:

Children are citizens with rights and responsibilities. They have opinions that are worth listening to, and have the right to be involved in making decisions about matters

which affect them. In this way, they have a right to experience democracy. From this experience they learn that, as well as having rights, they also have a responsibility to respect and help others, and to care for their environment (NCCA, 2009: 8).

3.14 Conclusion

To identifying the 'problem' of unsustainable behaviours negatively impacting Mother Earth, from depleted ozone layer problems to climate change issues, there was considerable political change particularly from the 1970s onwards. This chapter reviewed how, sustainability in education was 'questioned, disrupted and replaced' in the Irish context with the creation of a national strategy on ESD. However, without a dedicated space in the IPSC and resources, it often remains aspirational. While The National Strategy for ESD (2014-2020) aims that education equips learners enough to ensure they are motivated citizens for a more sustainable future, it has no clear means or resourcing for implementation. Although well-intentioned, as this research has highlighted, without a key figure or figures in individual schools authentically implementing this strategy, there can be a lack of rigour and consistency on actions across the country in schools.

The research has illustrated that ESD has a place within certain subject areas of IPSC but now in a climate crisis it needs greater elevation than to be simply embedded within other subjects at policy and curriculum level. I would revert to Bacchi's question of 'where are the silences and can this problem be thought about differently?' (2009: 48) and suggest it is time to think about the problem differently and allocate specific time and resources along with embedding ESD in subjects such as SESE at a legislative level, as was done with the numeracy and literacy

strategy. The following chapter will delve into research on ESD and explore this with regard to the circular economy concept and its potential in education.

4. Chapter 4 - Circular Economy, Learning Through Nature and Children's Meaning Making for Transformation

4.1 Introduction

As discussed in Chapter 2, the core of a circular economy is the concept of circularity, reflective of the circularity of nature and the rhythms of Mother Earth. While there is an emphasis on caring for the environment and recycling when possible in the current IPSC, the circular economy concept goes further and has significant potential in education. The circular economy is more than simply another version of recycling, as it has the potential to attend to economic, ecological and social stressors while valorising every link in the circular loop. It is a regenerative approach utilising every element of a product or production process.

While John T. Lyle of the Lyle Centre for Regenerative Studies is credited as initiating progressive ideas around regenerative design in the 1970s, there is no definitive author or creator of the concept of the circular economy. Lyle posited that a circular economy approach could be applied to all systems, when up to this point the concept of regeneration had been mainly connected to agriculture. Many others have contributed to the field of environmental studies from different disciplines since then including related ideas and technologies from different fields such as Cradle to Cradle, Performance Economy, Biomimicry Industrial

Ecology, Natural Capitalism, Blue Economy, and Regenerative Design (EMAF, 2018), which are discussed in the following sections.

In 1976, Walter Stahel with Genevieve Reday, in writing a research report to the EU titled *The Potential for Substituting Manpower for Energy*, included the vision of a looped system or circular economy, highlighting the positive impact it could make on employment, monetary competitiveness, preservation of resources, and forestalling of waste (EMAF, 2018). Stahel (2013) posits that the concept of a circular economy should be presented as a framework, a broad concept making use of several disciplines which are all connected by a common group of principles as evidenced by the different approaches discussed below. Through this work, Stahel founded the 'Product Life Institute' (Stahel, 2013) in Geneva, Switzerland in 1982 which has four specific objectives: waste avoidance, longevity in goods, extension to product-life, and reconditioning activities (Stahel, 2013). This knowledge has greatly contributed to furthering the circular economy concept.

When circumnavigating the globe, observing the natural world was inspirational for sailor Ellen MacArthur (2018) but also significantly thought-provoking and cemented her view for the necessity of a circular economy. Acutely aware of the need for developing this concept further, MacArthur founded the Ellen MacArthur Foundation (EMAF) which maintains a strong online and outreach presence internationally. MacArthur (2018) highlights that companies operating in a circular economy system return products and materials back into the processing system, retaining them in circulation. Waste materials are viewed differently. The term 'by-product' has evolved into 'co-product'. A by-product is not a specifically planned product but occurs because of a process, for example, the ethanol produced as a by-product

of the sugar industry. A co-product is produced as a result of another main product in production, but both are equally important.

4.2 Cradle to Cradle

The term and certification process known as Cradle to Cradle was trademarked by chemist Michael Braungart and architect William McDonagh (Braungart and McDonagh, 2009). This is a circular design philosophy acknowledging all materials within commercial and industrial processes. It is based on three principles. Firstly that, everything is a resource for something else, with the “waste” of one system becoming food for another, as biological nutrients or re-utilised as technical nutrients. A biological nutrient is capable of continuing growth, cell division and other complex functions which can biodegrade and return to the soil. Technical nutrients are materials also in a closed loop system, reused and maintaining their value. The second principle calls for the use of clean and renewable energy in many forms (such as solar, wind, geothermal, gravitational energy and other energy systems). The third principle calls for humanity to mimic the natural diversity evident in geology, hydrology, photosynthesis and nutrient cycling which adapts to their locale and needs (Braungart and McDonagh, 2009). They seek to reframe design as a positive, regenerative force. The most relatable aspect of the cradle-to-cradle concept regarding this thesis, is that in its design, nature is the principal guide.

4.3 Biomimicry

Biomimicry is popularised by the biologist Janine Benyus in her work titled *Biomimicry: Innovation Inspired by Nature* (1997). Benyus outlines that ecologists have recorded hidden likenesses among the most complex interwoven systems in the natural world with a ‘canon

of nature's laws, strategies and principles' (Benyus, 1997) serving the science of biomimicry and beyond. Benyus reminds us:

Nature runs on sunlight. Nature uses only the energy it needs. Nature fits form to function. Nature recycles everything. Nature rewards cooperation. Nature banks on diversity. Nature demands local expertise. Nature curbs excesses from within. Nature taps the power of limits (1997: 7).

Benyus stresses that as humans we are not exempt from ecological law, even though we appear oblivious to its presence:

We are still beholden to ecological laws, the same as any other life-forms. The most irrevocable of these laws says that a species cannot occupy a niche that appropriates all resources—there has to be some sharing. Any species that ignores this law winds up destroying its community to support its own expansion (2009: 7).

Biomimicry is another one of the technologies that contributed to creating the circular economy concept. As discussed in Chapter 6, the findings chapter, the AgroCycle animation film which I co-created as part of the thesis, explicitly refers to biomimicry and its relation to the circular economy (AgroCycle Kids, <https://youtu.be/359ibQ4ozz0>).

4.4 Industrial Ecology and Natural Capitalism

Experts in the field of natural capitalism, such as Hawken, Lovins and Lovins (2010) adopt an industrial ecology approach where waste is utilised and perceived as a co-product rather than a by-product. This is a concept embedded in the AgroCycle project (2016) whereby the focus is on valorising products that were once sent to landfill. The term natural capital refers to the natural assets of the planet – all living things, water, land and air. The acceptance of natural capital as an integral part of economies worldwide is key, as a deeper understanding of this helps humanity to arrive at smarter ways in working with nature while at the same time, minimising the damage. Helm refers to natural capital as 'the fabric of our planet' (2016: 240). This fabric can be woven and created but with minimal destruction.

4.5 Blue Economy and Regenerative Design

Gunther Pauli submitted a report to the Club of Rome (Club of Rome, 2018), an organisation made up of several individuals with a shared concern for the future of humanity, where he emphasised that resources should be utilised in such a way that waste produced becomes the catalyst in the production of a new product thus giving rise to new revenue. *The Blue Economy*, emerging from the report also emphasises that the local environment and its ecological component parts should be the foundation of the concept and the principal source of energy should be gravity. Like Benyus, Pauli observes nature and states:

All players within an ecosystem make their modest contributions dependent on the availability of nutrients, energy, and the impetus to respond to basic needs. Everything evolves and when crises occur, everyone adapts. In natural systems no one has a license to remain out-of-step for too long. Natural environments have no big players dominating the field (2010: 233).

This regenerative design echoes similar principles to the circular economy concept, where processes or products are modelled on nature, and strive to be efficient with little or no waste produced.

4.6 The Circular Economy as an Educational Response to the 'Problem'

The concepts discussed above reflect the transdisciplinary approaches to sustainable development and the circular economy. Where one process ends, another one follows, increasing efficiency and presenting greater levels of innovation. There are elements of behaviours of Mother Earth present in each of these concepts. For example, in Cradle to Cradle, making every effort not to produce waste, is reflective of the natural world's processes of regeneration. Biomimicry is heavily linked to the natural world and observes phenomena in the natural world, which was also done during the research in schools as discussed in later

chapters. Industrial Ecology and Natural Capitalism also draw attention to elements of a wider circular economy concept, whereby they are interacting with the natural resources of Mother Earth emphasising respect and caution rather than plundering these valuable resources. The Blue Economy and regenerative design also illustrate the wisdom of nature. Pauli states ‘... in natural systems no one has a license to remain out-of-step for too long’ (2010: 233). The positively double-sided nature of the circular economy concept is evident here. On one side, lies the care and preservation of the planet, but on the other side, the economic advantage for those who are addressing issues sustainably, is not to be underestimated. The circular economy is a concept and arguably, a movement, of design and innovation with sustainability at the core. The circular economy concept that has been greatly progressed by Ellen MacArthur through the EMAF beyond the design and business world (EMAF, 2018). The *Waste and Resources Action Programme* in the UK defines a circular economy on their online platform as:

an alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life (2018).

All these areas of knowledge and technology have a part to play in the manifestation of a circular economy concept and this is explored in the following sections in terms of how they are reflected in content in the primary classroom, specifically through ESD.

4.7 Integrating the Circular Economy Concept into the Curriculum

As the previous chapter discussed, ESD and sustainability policy has struggled to be clearly articulated and applied in the primary education space in Ireland or even Europe. However, Sustain-Europe produced a series of guides based on ESD and how to incorporate it into daily teaching. They state:

ESD means including key sustainable development issues into teaching and learning; for example, climate change, disaster risk reduction, biodiversity, poverty reduction, and sustainable consumption. It also requires participatory teaching and learning methods that motivate and empower learners to change their behaviour and take action for sustainable development. Education for Sustainable Development consequently promotes competencies like critical thinking, imagining future scenarios and making decisions in a collaborative way (Sustain-Europe, 2020: 6).

Again, the circular economy concept is not specifically stated but related concepts such as sustainable consumption, biodiversity, climate change, disaster risk reduction, biodiversity, poverty reduction along with behaviour directly connect with a circular economy concept are discussed. In the international arena, Finland is now the leader in the inclusion of the circular economy concept at all levels of education. Sitra, the Finnish innovation fund, whose aim is to secure the sustainable well-being of future generations, is an independent organisation ensuring that Finnish people look ahead and become pioneers in sustainable well-being. Sitra states 'the right question can make all the difference' (Sitra, 2018). They begin with an issue, such as waste, and look for sustainable solutions. Students as participants, are encouraged to look at issues through a completely different lens to previous experience. These questions or issues soon evolve into a plan and a solution is sought (Sitra, 2018). As Cook et al. highlight, during the reform of the Finnish curriculum in 2016, sustainable development, environmentalism and global thinking were flagged as areas which needed to be substantially strengthened (2018: 409). Thanks to Sitra and curriculum reform in Finland, the circular economy has become embedded in the education system in a holistic way from the early years upwards which is explained on the Sitra website:

Circular economy education starts in day care, where children think about reducing food waste and learn how to sort waste correctly, and it continues through primary and secondary school all the way to higher education. Along the way, children learn about materials, business activities, the significance of art and about using personal skills and knowledge when enacting the change towards a circular economy society (Sitra, 2019).

Cook et al. highlight that there are defined values in the Finnish curriculum, one of which is a 'necessity for a sustainable way of living' (2018: 402).

Sitra describes a circular economy as one that:

strives to maximise the circulation of products, components and materials and the value bound to them as much as possible in the economy. In a circular economy, production and consumption create the smallest possible amount of loss and waste. Material efficiency leads to environmental benefits that a world striving to distance itself from overconsumption needs in order to ensure sustainable development. A circular economy also offers economic and social benefits. Added value is often created for products by means of services and digital solutions based on intelligence (Sitra Studies, 2016: 9).

Therefore, the idea is that through engagement with the concept of a circular economy, it is possible to truly develop a sustainable society with minimum impact and multiple benefits for economies. A linear economic model is a take, make and dispose approach whereas the circular economy approach strives to create processes which are circular and close the production loop, where everything is used, regenerated and fed back into a cycle.

However while circular economy is increasingly embedded in the technological and design narrative driving behavioural change, where policies and designing for looped systems are slowly being adopted at government and industry levels, its wider impact is slower. In a report *The Pro-Circular Change Model (P-CCM): Proposing a framework facilitating behavioural change towards a Circular Economy*, the EC highlighted that 'a number of circular economy business models, initiatives and product ideas have developed over recent years. These however still remain niche and require mass adoption' (2018: 137). This is explored through this research in terms of primary education. In setting the context for this, the next section explores key processes of learning for circular economy.

4.8 Learning Through Nature

Ecofeminism highlights how we are 'within' and belong in wider ecosystems, organically connected to Mother Earth where for example, we have the wisdom and skills to know the tides, the moon, and her phases, and have a considerable level of ecoliteracy pertaining to the natural world. As globalisation and especially urbanisation increased, researchers demonstrated rising social problems with Louv stressing that 'long-standing studies show a relationship between the absence, or inaccessibility of parks and open space with high crime rates, depression and other urban maladies' (2010: 36). This reflects the essential nature of making use of the local outdoor environment or amenity. Louv also emphasises that being outside promotes creativity and imagination, builds confidence, is stimulating, encourages a responsible attitude, invites thinking and learning but naturally reduces stress and tiredness as it takes place outdoors in the natural environment (Louv, 2013). It could be suggested that children themselves have an intrinsic need to be outdoors for all the points Louv refers to and connected to the biophilia hypothesis. Seymour explains the biophilia hypothesis, which is suggested humans possess:

an instinctive aesthetic preference for natural environments and subconscious affiliation for other living organisms' and findings in related research include humans' preference for situations dominated by natural elements and improved cognitive functioning through connectivity with nature (2016: 2).

Outdoor learning spaces can often offer a genuine respite from the confined space of the physical indoor classroom, nurturing their holistic development that cannot be met in the often-stifling indoor classroom. The sheer physicality of getting outside cannot be underestimated either, as children can spend an inordinate amount of time in a sitting position during the primary school day as highlighted in the Children and the Outdoors report (2016). Through physical activity and exploration in the outdoors, curiosity is stoked, leading

to *why* questions, which stimulates language and overall development (Read cited in Bruce, 2012: 79). Breatnach, Moloney and Pope emphasise how 'children love to explore, particularly in the outdoor environment where they overturn stones and soil to see what lies beneath. Bugs, insects and their habitats fascinate children' (2021: 82).

Tovey in emphasising the importance of being outdoors with children, cautions 'in a contemporary climate often regarded as 'risk averse' the value of children learning the skills to do things safely and of developing a 'can do' attitude is increasingly important' (2019: 11). Such activities in the outdoor environment, Froebel posited, would encourage children's curiosity, problem-solving, persistence and respect for nature (Bruce, 2012: 72).

A personal acknowledgment of responsibility is needed with individual change made. As Leinfelder stresses 'knowledge-based sustainable "gardening" must supersede the prevailing overexploitation of nature; it should also form a reflexive basis for personal behavior' (2013: 26). The disposable mindset that has insidiously crept into western society must be usurped and replaced by a circular way of life, in order to protect ourselves and Mother Earth. Opportunities must be provided for children to make meaning of the world around them and make observations outdoors. There must be time in the school day for children to pause, engage with and critically question the world around them.

A key dichotomy is nature/human in the issue of climate change and the need for greater sustainable development. Foster explains a way around this tension:

employing the idea of interconnectedness to erode human/nature binaries and its attendant hierarchies may well be a better starting point to achieve environmental sustainability. That is not to reject the role of technology in contributing to environmental efforts, but to call for more mindfulness around the ways in which it is used (2021: 202).

This is reflective of the position of this thesis, whereby the technology of a circular economy solution is embraced, but without negative impact on nature. In a primary school setting, much of this explorative work can be done in the outdoors. Ernstman and Wals (2013)

describe:

ESD essentially starts with and revolves around re-embedding SD in life and the act of living. Instead of depending on scientific and abstracted descriptions of what SD should mean to people, learning for SD lies in processes that incite communities to yield their own context and time specific interpretations of sustainable development (2013: 6).

The natural environment provides opportunities for communities of learning in schools to yield their own context and interpretations of sustainability through observation of and interaction with the natural outdoors. Green (2017) argues for free exploration in natural settings so that children can experience and develop their sensory engagements with place.

The term 'classroom without walls', emerged in the 1950s in a different context, but it has gradually become embedded across the humanities. Marshall McLuhan, who is credited with coining the phrase and discusses it in his work *Classroom Without Walls – Explorations in Communication*, insists that education needed to be open to the new popular media of the time, which was mainly television. He argued how education was still cemented in the traditions of the 1800s and needed to be reassessed. This term then evolved into describing learning in the outdoors representing the world itself as an extended classroom (McLuhan, 1957). In a 2019 report on natural outdoor classrooms, it was found that regular time spent in a natural outdoor classroom positively supports peaceful, calm and problem-solving behaviors in children (2019: 28). Reasons such as this guided the research in schools in embedding the outdoors as a key aspect of the experiences at the research sites, as outlined in later chapters. Mutz and Müller highlight that regular daily life can add hassle, from

pressure to perform, work, environmental disturbances and more. They suggest it can also stem from the hectic pace of life, but during a trip in the outdoors 'these types of stress are usually reduced or even completely omitted. Hence, it can be assumed that outdoor adventures may have beneficial effects on the demand and worry components of stress' (2016: 107). In additional work focusing on a comparison of outdoor versus indoor environments about physical and mental wellbeing, the researchers found some evidence that physical activity in an outdoor natural environment and may bring additional positive effects on measures of mental wellbeing that are not seen when participating in similar physical activity indoors (2011: 1767). Research by Wells (2000) highlights that when a child's home environment is improved in relation to greenery and nature, the child's cognitive functioning improves after relocating. Wells with Evans (2003) note that children who live near nature had greater ability to cope with stresses of life and psychological well-being improves in children when more time is spent in natural environments. Additionally, the work of Davis, Rea and Waite (2006) whose research suggests that when children spend time outdoors, they are more likely to develop positive attitudes towards nature. Gold states:

we are far less likely to destroy something we love deeply, something we see as part of ourselves... in the sense of a deep love and connection for the natural world. If we really appreciate something, we do so not out of entitlement, but because we recognise it as a gift. We treasure it. We cherish it (2018: 113).

Louv (2015) highlights that to love the natural world, it is essential that time is spent in the outdoors to cultivate skills of stewardship and he discusses how this can manifest the environmentalists within us. Engagement and experience in the natural world, with particular emphasis on empathy and love, and engaging all senses are paramount throughout this research.

As will be discussed in Chapter 7 – the discussion of findings, the outdoor amenities offered the participants an opportunity to feel the Earth between their fingertips and inhale the scents of nature. Kimmerer, of the Citizen Potawatomi Nation, reminds us:

Recent research has shown that the smell of humus exerts a physiological effect on humans. Breathing in the scent of Mother Earth stimulates the release of the hormone oxytocin, the same chemical that promotes bonding between mother and child, between lovers. Held in loving arms, no wonder we sing in response (2013: 236).

The outdoor sessions used in this research which are described in the findings chapter were guided carefully by Cornell's five recommendations when sharing nature with children:

1. Teach less and share more.
2. Be receptive.
3. Focus the child's attention without delay.
4. Look and experience first; talk later.
5. A sense of joy should permeate the experience (1979: 12).

Learning outdoors and spending time outdoors offers children and educators opportunities to observe the concept of a circular economy in nature. The outdoors can often be an untapped holistic, educational resource on the school grounds or nearby. Williams (2017) in her work *The Nature Fix*, highlights how being in nature and the smell of trees strengthens one's immune system.

It is not only the context and environment of learning that is important to consider, but the psychological and social basis of meaning-making in learning, which is explored in the following section in terms of how children make meaning and engage with these holistic and transformative ways of learning. This section intends to give a grounding in the theories of meaning-making and transformative learning that can inform this research.

4.9 Children's Meaning Making for Transformation

This section will address young people's meaning making, initially through the developmental stages of meaning making and learning in theories of meaning making before considering how learning that aims to transform, such as in the case of ESD, occurs. This thesis from the outset, has critically questioned social and educational norms, and the values that an economically driven society endorses through its education systems. It is vital to address how children make meaning and engage with content that is explored in schools, specifically regarding the area of sustainable development education and how they become accustomed to, but equally can challenge, existing social and educational norms. Within this critique, multimodal understandings of meaning-making, critical literacies, and contextual learning situations with regard to potentially transformative learning in sustainable development education will be discussed.

The International Transformative Education Forum founded in Geneva in 2010, identified twelve key principles for transformative education. In the *Journal of Sustainability Education*, Gorman lists them as:

- Human Rights
- Sustainability
- The Importance of Value Systems: Morality, Ethics and Spirituality
- Diversity
- Economic and Social Justice/Equity
- Peace Education and Conflict Resolution
- Holistic Education
- Community-Based Learning and Indigenous Wisdom
- Simulation/Experiential Learning
- Incorporating New Brain Neuroscience and Skills of Critical Thinking
- Use of Technology for Greater Connection not Alienation
- Sanctity of Human Learning and Life (2015: 3).

Several of these principles are significantly connected to this research and to the pursuit of transformation on behalf of humanity and on behalf of Mother Earth. Gorman explains the

twelve principles define a way of education focusing on ‘developing conscientious global citizens with the ability to problem-solve complex issues for a more equitable world and sustainable world’ (2015: 3). It is education such as this rooted in social justice and sustainability that is needed for a more loving society. These twelve principles highlight the importance of community-based, holistic, experiential learning that resonates with the conceptual framework of this thesis.

To increase the likelihood of a transformative educational experience occurring, significant effort and planning must take place, including an ethical and theoretical foundation, a specifically tailored pedagogical approach, and the inclusion of relevant content for the learning experience. It is essential to develop an understanding of how children learn and make meaning of the content we investigate with them as teachers. Gorman explains transformative education with specific regard to sustainability:

Education then for true sustainability would teach us explicitly caring ways that visibly manifest in all our actions towards others and thus potentially transform the world around us in ways that lessen conflict and human suffering, create more diplomacy of caring and equity and heal the planet that sustains all life, around us. That indeed would be the most visible, coherent and important heartfelt metric of that shared goal to preserve and sustain life on this planet for all (2015: 2).

To that end, the educational experience regarding sustainability is actually transformation in itself as one is transforming oneself because of the embodied experience, developing a greater awareness of held inner values and outer values of society. The more one learns, the more one is likely to interact with the world differently. Therefore, it is transformative both inside and outside of oneself, informed by a social justice and equity agenda. The citizen who has the opportunity to experience transformative learning has the potential to become an agent of change who will share this knowledge and care with their wider community. It is this

community who in turn has the potential as a unit, to create change through these ‘explicitly caring ways’ (Gorman, 2015: 2).

Exploring the circular economy concept in the primary school classroom offers an opportunity to reimagine the role that primary school children could have in the sustainability and circular economy conversation. In turn, this provides a lens into the common world, but also possibilities in making a positive difference through the avenue of sustainability and transformative educational experiences.

The Global Institute for Transformative Education (GITE) states ‘education must move away from its traditional focus and toward providing young global citizens an education better suited for interconnected competitive global economies while sustaining natural resources’ (GITE, 2020). Having highlighted the potentially transformative experience that can occur through ESD, the following section considers theories regarding knowledge assimilation, in relation to transformative experiences and how meaning making occurs within these transformative experiences.

4.10 Critical Roots of Transformative Education

This thesis explores the possibility for children in Irish primary schools participating in the ESD conversation on a more prominent level. Specifically, by teaching and learning about circularity and a circular economy, this further develops ESD in the primary school community. Critical education theorists such as Paulo Freire alert us to the necessity for an ethical pedagogy for social change. Freire rejects the idea of objective knowledge devoid of political influence, emphasising that since teaching and research are political acts ‘it seems

fundamental to me to clarify in the beginning that a neutral, uncommitted and apolitical educational practice does not exist' (1998: 39). Hope and Timmel in discussing the work of Freire, outline the objective of education as the radical transformation or even liberation of unjust structures – in economy or in society or both. They state 'much education has tried to ignore human feelings and concentrated only on reason and actions. But Freire recognises that emotions play a crucial role in transformation' (1995: 17).

Freire critiques the traditional form of education, naming it as the 'banking concept' whereby students are not taught to think for themselves or to question, but to digest the information that is given to them in a uniform system (1996: 23). Given the absence of critical reflection for students in such a system, there can be little or no praxis occurring, little opportunity for students to act on the world. Freire's theory highlights that for people to make meaning in education, a very different approach to a traditional didactic one would be essential.

Shor and Freire (1987) discuss their theory of transformative education through and highlight 'the creative disruption of passive education is an aesthetic moment as well as a political one, because it asks the students to re-perceive their prior understandings and to practice new perceptions as creative learners with the teacher' (1987:28). This research seeks to engage with Shor and Freire's call to 'practice new perceptions as creative learners with the teacher' (1987:28) through its workshop structure (discussed in chapter 5). It is important to critically explore theories of meaning-making below in terms of the concepts and ideas from their work which was influential to the transformative intentions of this research.

4.11 Constructivist Meaning Making

Constructivist theories of learning and meaning making have been influential in alerting educators to the importance of students as makers of their own meaningful experiences and creators of their own understanding. Piaget (1896 – 1980) provides a comprehensive account of cognitive development which has been very influential in education, particularly for child-centered approaches in nursery and infant schools, for maths curricula in primary schools and for the science curricula at secondary school level across Europe (Pound, 2018). Piaget asserted that children make sense of a new experiences by reflecting on their own experiences to make meaning. Piaget suggests children think in a very different way to adults and view the world from a significantly contrasting perspective. Smith et al. maintain that at the very heart of this child-centered approach towards education is the idea of active learning in order for them to make meaning in the world around them (2008: 412, 413). This is congruent with the approach which has informed this thesis, whereby the child is the most important participant in the meaning making experience and should be front and centre of his or her own educational experience to make his/her own individualised meaning. Bruce explains:

Froebel's important contribution is to show the importance of the child's autonomy and intrinsic motivation in this. He calls it the self-activity of the child. The child is learning to think for him or herself, to know how to get the help needed when needed, to willingly accept being taught directly when it makes sense (2012: 11).

Smith et al. describes how constructivists theories posit that the teacher must create the conditions for learning to best take place, as the aim of education is to promote questioning, to explore experiments, and analyse, rather than accepting information unquestioningly (2008: 413).

Smith et al. stress however, the importance of individualisation and differentiation in the

classroom. They state that children should be viewed as individual learners and in view of the vast array of activities and interests that are present in a class of children, tasks must embrace differences and attend to relevant levels of understanding (2008: 414). This is in line with the teaching and learning methodologies in Piaget's framework that are constructed in relation to age and skill appropriate curricula to meet specific needs and capacities of children at different levels of development. However, Piaget's theories have been criticised for their lack of attention to issues related to policy, power, culture, and agency. While his work contributed a valued emphasis on children as meaning-makers of their experiences, his model has also been challenged in recent times. Smith et al. state:

More recent researchers have found that children can perform tasks either earlier than Piaget predicted (for concrete operations), or later than he predicted (for formal operations). His stage model has clearly been 'stretched' well away from its original periods (2008: 411).

Smith et al. suggest Piaget's theory may be relevant in the assimilation of knowledge but only if certain abilities occur simultaneously, connected by particular processes of thinking. Furthermore, Pound cautions that there are other common criticisms of Piaget's theories. It is said there is often too much emphasis on mathematical thinking and logic at the expense of considering the role of feelings. Also, his theories place insufficient emphasis on the importance of emotional and social aspects of thought. Additionally, his description of the children is heavily criticised as being essentially male which then marginalises female behaviour (2018: 50) This *weltanschauung* is not compatible with this research. While Piaget and others discussed here have merit in educational psychology, they do not facilitate this research. It was therefore necessary to create a new and dynamic theoretical framework that fully supports sustainable development educational research, teaching and learning. As educators, and although respectful of long standing contributors regarding the cognitive

development of the child, we must be mindful not to treat these theories as the only point of orientation.

4.12 Zone of Proximal Development

The 'zone of proximal development' suggested by Lev Vygotsky's (1896 – 1934) offers a framework of understanding meaning making in learning and one that can complement the Froebelian Ecofeminist theoretical framework. Vygotsky explains that his zone of proximal development embraces a concept of readiness to learn, putting emphasis on upper levels of competence. These upper limits are continually changing and transforming with the increasing independent competence of the learner. Vygotsky asserts that what a child can do today with assistance, will be something the child can do independently tomorrow, therefore preparing the child further. These abilities could be called the buds rather than the fruits of development according to Vygotsky. To clarify, the specific developmental level characterises mental development retrospectively, and the zone of proximal development characterises mental development prospectively (Vygotsky 2012).

4.13 A Spiral Approach

Jerome Bruner's (1915 - 2016) work suggests that a learner even of a very young age is capable of learning and make meaning of any material so long as the instruction is organised appropriately, in contrast to the beliefs of Piaget and other stage theorists (McLeod, 2012). Bruner outlined three areas of cognitive development, the modes of representation, made up of enactive representation which is considered action-based; iconic representation, which is considered image-based; and symbolic representation which is language-based (1971). He

highlights ways in which we store information or knowledge and encode into memory the modes of representation. Like the heavily integrated IPSC (1999), where the subjects traverse each other, link and overlap; these modes, according to Bruner are also integrated and often overlap, unlike the definitive aged stages that Piaget introduced. The areas of development are enactive (0-1 year), iconic (1-6 years) and particularly relevant here is the area known as symbolic (7 years onwards). The symbolic area of development is where information is stored in the form of a code or symbol, such as language. This is the most adaptable form of representation, for actions and images have a fixed relation to that which they represent.

Although Bruner's theory was brought to light in the early 1960s, it has relevance in this research. Through meaning making and learning throughout the qualitative research, the children have the potential to be the cultural and behavioural change-makers. Bruner states that students are active learners who can construct their own knowledge, building and building, in a constructivist way, on what they know already and make meaning in the world (McLeod, 2012). In contrast to Piaget's idea of readiness, Bruner argues that schools waste valuable time trying to pair the cognitive stage of development of the child to the complexity of the subject material (McLeod, 2012). Bruner adopted a very clear view on the capabilities of children in that he did not see limitations for children and was dismissive of age as a constraint. 'We begin with the hypothesis that any subject can be taught effectively in some intellectually honest form to any child at any stage of development' (Bruner cited in McLeod, 2012). The approach at the research sites is reflective of Bruner's spiral curriculum approach. He asserts that complex ideas can be taught at a simplified level firstly, and later, these complex ideas can be returned to in more detail as children make meaning from one time to the next. Bruner was one of the theorists with whom the term scaffolding is associated.

Scaffolding is fundamentally building on and developing what has been previously introduced to make meaning in the world. It is relatable to Vygotsky's zone of proximal development and both concepts are often mentioned in parallel. In terms of ESD, both a spiral approach and the use of the zone of proximal development are complementary to the content of ESD.

4.14 Influential Factors on Meaning Making

Bronfenbrenner's (1917 – 2005) bioecological systems theory (1979) recognises the influence of the wider community including parents and schools on children's academic and social development. If social development is harmonious, learning and meaning making can occur.

According to Hayes, O'Toole and Halpenny:

Bronfenbrenner saw the need for a developmental framework within which to consider psychological theories of learning and theories of educational practice. This required a level of complexity to accommodate the variety of factors influencing learning while, at the same time, providing a framework within which these factors can be considered, reconciled and responded to in pedagogical practice, policy and planning (2017: 5).

Bronfenbrenner's theory serves as a reminder that the wider community, society, and culture in which children are living can influence how they make meaning and assimilate knowledge. Hence, this research was influenced by these constructivist approaches. Vygotsky's zone of proximal development was particularly relevant when composing developmentally suitable material for participants to explore during the research and to support them in meaning making. Bringing primary school children to the circular economy conversation and meeting them appropriately, gave the research a starting point. Bruner's theory was particularly relevant as each session developed what was done before at each research site always using a spiral approach. Bronfenbrenner's theory supported transformation in meaning making processes by the children in this research. Education has been heavily influenced by these

concepts and frames from developmental psychology and human development theories. This has resulted in practices focused on ensuring learning is guided within specific contextual learning situations and stages/zones of development.

In schools there is often a tension between teachers who wish to push ESD exploration and a lack of openness or perhaps a resistant culture to realising the relevance of ESD at the level of the institution in the local culture, and even at national level. With this tension, the opportunity to make meaning of sustainable development educational content may not often occur. For the research in schools, it was important to have an awareness as a researcher, of the various theories, to take into consideration, how children make meaning and learn in order to truly engage in an educational conversation and exploration for transformation. It is essential to support the possibility of children using their voices. This is influenced by constructivist and transformative theories to ensure that all participants have the opportunity to authentically 'participate' and be heard in ESD. It also emphasises the essential importance of a collective effort which is reflected in the involvement of school communities in the circular economy conversation and the inclusion of all voices who wish to participate particularly the voices of children discussed ahead. The important psychological approaches used in education have been discussed here but the more holistic, interdependent, and connected nature of Froebelian ecofeminist philosophy have been revealed also. By doing this, the tension between both emerges. One of the main criticisms of psychological theories has been their lack of connectivity or appreciation of the broader social context with Bronfenbrenner as one rare exception at times. This greatly supported the need for a new theoretical framework in the form of Froebelian ecofeminist philosophy.

4.15 Children's Voices, Participation, and Rights

With the increase in mainstream awareness of climate change, much of which has been created by youth in recent years, by using their democratic voices, the focus of this thesis on the circular economy commencing in 2016 was timely. The idea of younger participants in the climate change conversation has gained more traction than ever. Teenager Greta Thunberg was named as *TIME* person of the year 2019 because of her relentless activism and her school strikes (Alter et al., 2019). Thunberg spoke at the UN climate summit in December 2018 directly to world leaders:

Many people say that Sweden is just a small country and it doesn't matter what we do, but I've learned that you are never too small to make a difference and if a few children can get headlines all over the world just by not going to school then imagine what we could all do together if we really wanted to? (Thunberg cited in Democracy Now, 2019).

She also stated:

For 25 years countless people have come to the UN climate conferences begging our world leaders to stop emissions and clearly that has not worked as emissions are continuing to rise. So I will not beg the world leaders to care for our future. I will instead let them know change is coming whether they like it or not (Thunberg cited in Goodman, 2019).

Her emotional speech drew the attention of millions around the world. Undoubtedly Thunberg and her followers young and old, have contributed to an upsurge in attention to the issue of climate change and the demand for behavioural change at all levels of society. As noted, it was the 'voices of young people who stood out' during the open day of negotiations at the Conference of the Parties 24 (COP24) with the United Nations Framework Convention on Climate Change (UNFCCC) in December 2018 (O'Sullivan, 2018). There have been other children's voices who have drawn attention to environmental issues through the ages, before Thunberg such as Severn Cullis-Suzuki, who in 1992 addressed the world at Earth Summit as

a 12-year-old, calling attention to the unsustainable destruction of the planet. However, the extent of the power of social media was not available to activists during this time. It also raises the issue of how such advocacy and campaigning can be sustained to become an enduring social movement and force for change. The efforts of these child advocates, impact classrooms around the world. Children see themselves in Thunberg and Cullis-Suzuki and listen to what they are saying. This in turn increases the focus on and frequency of ESD in the primary classroom through conversation and enquiry.

Sterling states 'education *for* change concerns the role of education in bringing about change in the person or society. It is about change sought or achieved *through* educational practice' (2001: 34). This thesis is not suggesting that parents, guardians, and the wider society would be relieved of responsibility around stewardship of the planet, and that it would be in the hands of the education system alone. Nussbaum contends:

What we can agree about is that young people all over the world, in any nation lucky enough to be democratic, need to grow up to be participants in a form of government in which the people inform themselves about crucial issues they will address as voters and, sometimes, as elected or appointed officials (2010: 9).

Children cannot operate as full members of global society if they are not given a democratic voice. If the climate change crisis and excessive waste is explored differently by including young children in the conversation more often, with commensurate policy enactment, positively different outcomes may emerge.

Research indicates that children are often not perceived to be as capable as they are or given fair credit for their capacity to make decisions and interestingly, their capacity increases according to the opportunities on offer to them (Alderson & Goodwin, 1993; De Winter,

1997). In traditional school systems, children were passive in educational settings and still today, some do not experience opportunities for democracy during the school day. Mitra highlights the importance of ensuring students have a voice and opportunity to question in an educational setting to improve teaching and learning:

as practitioners, researchers and policymakers continue to ask questions about the process and influence of student voice in school reform, knowledge of the implications of student voice will continue to grow. Through further research, it will be possible to deepen theoretical and empirical understandings regarding the possibility of student voice for altering the dynamics of schools and improving teaching and learning (2003: 302).

Dialogue and listening are essential to this two-way process of democratic communication where children can ask questions, listen to each other, educators listen and question. Lundy raises a logical point:

the obvious starting point would be to ask children themselves whether the matter affects them. In spite of this, decisions that an issue does not affect a child without having first sought the child's view as to whether or not they consider that it will have an impact on them appear to be commonplace (2007: 931).

While scientific discourse is meeting industry and economic discourses in many research projects, the element of student voice and educational experience has only begun to emerge as key (for instance in the AgroCycle Project). Science and industry search for ways to adapt practice and alleviate the burgeoning stresses on the environment which are contributing to climate change. Inviting education, specifically primary school education, into the research conversation to discuss the concept of a circular economy is an innovative move and it lends itself to ensure the voices of children are heard. This is not a common occurrence in the circular economy conversation or in discussing possible solutions to climate change. This was an opportunity to open a discussion based on a global issue, in the primary classroom with our youngest citizens. Harmon cautions that in order to:

counteract against climate change, our education system is called; to educate children's minds about it; to invite children to become active citizens in effecting change through action; and to help children discover a renewed love and awareness for the gift of the natural world, our common home (2022: 245).

Climate change affects all citizens, and until recently, the opinions of children, their concerns and their potentially innovative ideas regarding solutions were not always heard. Kwauk, Cooke, Hara, Pegram (2019) suggest there is a critical gap in the strategies that challenge climate change, as 'climate strategies are ignoring girls and overlooking the role of children and youth' (2019: 12). Kwauk et al. discuss how education is too often positioned as a vehicle for 'awareness raising' and 'training' but this vague positioning in turn, creates a loophole. It leaves individual countries to take ownership over how they talk about climate change issues and perpetuates a 'missed opportunity for countries to link their sustainable development and climate agendas by creating space for coordinated investments in education across sectors' (2019: 20).

The *UN Convention of the Rights of the Child* (1989) adopted by the United Nations General Assembly in 1989 is concerned with the rights of children. Although the principles and provisions of this agreement are not written into domestic law in Ireland, and the voice of the child is practically unheard of within the Irish constitution, the Irish government signed this agreement. A referendum on children's rights was carried out in 2012 and signed into law in 2015. There is a total of 54 articles in the Convention, with four general principles. Articles 12, 13, and 29 are particularly relevant to the rationale for the inclusion of children in the circular economy conversation here. For example, part of article 12 states that 'parties shall assure to the child who is capable of forming his or her own views the right to express those views freely in all matters affecting the child' (2010: 15). As Lundy reminds us:

There is need for a greater awareness of the fact that respecting children's views is not just a model of good pedagogical practice (or policy making) but a legally binding obligation. As a minimum, those working in the education sector need to know that Article 12 exists, that it has legal force, and that it applies to all educational decision making (2007: 930).

In article 13, it states that children 'shall have the right to freedom of expression; this right shall include freedom to seek, receive and impart information and ideas of all kinds, regardless of frontiers, either orally, in writing or in print, in the form of art, or through any other media of the child's choice' (2010: 15). Like the previous article, opportunities should be created for the voices of children to be heard, whether it is through print, art or any other media. Finally, in article 29 regarding the aims of education, it specifically states the importance of 'the development of respect for the natural environment' through education (2010: 28). With reference to the articles which highlight the rights of children, the four general principles note 'that all the rights guaranteed by the convention must be available to all children without discrimination of any kind', 'that the best interests of the child must be a primary consideration in all actions concerning children', 'that every child has the right to life, survival and development' and 'that the child's views must be considered and taken into account in all matters affecting him or her' (2010: 2). It is giving a voice to children regarding situations or issues that will and already do affect them and it is creating a new transdisciplinary community of voices. This thesis would suggest, by giving a voice to children, there is a far greater chance for transformation. Samuelsson and Kaga (2008) address the democratic nature of ESD in schools and justify the need for their inclusion:

Nurturing respect for, and appreciation of diversity cannot be realized without adhering to democratic values and practices. Democracy is one fundamental value embedded in sustainable development, and a requisite for a just society where everyone's participation in the social, cultural, economic and political life is valued and counted. Learning about democratic values and practices can and should start in the smallest unit of society – the family – at birth, and should also be part and parcel of an early childhood education programme (2008: 13).

To summarise, it was important to address here, how children make meaning in the process of transformation. Exploring transformative theories and ethical questions around value and pedagogy for social change gives us a further insight into the conditions needed to authentically engage in ESD beyond policy level aspirations. Addressing a constructivist meaning making approach illustrates how young children make meaning in ESD. The inclusion of theories such as the zone of proximal development, a spiral approach, and influential factors such as cultures in which children live, demonstrate how primary school children learn and assimilate knowledge. It was important to have an awareness of this when creating the methodological approach at the research sites. Finally, the voice of the child was essential at the core of this research of introducing the circular economy concept to the primary school. It was vital the participation of children was facilitated, while at the same time, ensuring their rights were met.

The qualitative nature of the research allowed the children and me as researcher to explore the circularity in the natural world and how this could guide citizens in producing a product or service. This was performed through a transformative constructivist lens incorporating the voices of children in Irish primary schools. Chapter 5, the methodology chapter will demonstrate how the voices of the children were heard, and how they illustrated their thoughts and contributions to the circular economy conversation.

5. Chapter 5- Methodology

5.1 Introduction

This thesis asks:

How do young people engage with sustainability and the circular economy concept through arts-based methods?

What is the impact of these approaches on the children's engagement with the circular economy and sustainability?

To address these questions, and by working through a pedagogy of love, the circular economy concept is introduced and explored in three Irish primary schools using a qualitative research frame and arts-based methods.

5.2 Overall Methodology, Research Purpose, and Aim

Finley highlights, when venturing into the world of arts-based research, that in order 'to avoid comparison with scientific inquiry or evaluation by the standards of science, arts-based researchers must undergo a radical break from science as a standpoint for understanding' (2003: 289). Derry reflects a similar sentiment in highlighting that artistic representations in arts-based research have been 'seen as a challenge to prevailing modes of discourse' (2004: 40). The multimodal nature and aesthetic criteria of arts-based research were congruent with the embodied and holistic approach to sustainability at the heart of this research. Exploring circular economy possibilities has the potential to give the participants this break with dominant scientific modes in schools by using an aesthetic and embodied way of looking at the world and for the facilitating teachers, an alternative frame of approaching aspects of ESD in general.

The rationale for conducting the research in schools through a pedagogy of love and arts-based methods, was an effort to foster sustainable practices and values with the participants by using research methods which are congruent with these values and processes. The researcher, the teachers, and the children who participated in the project at all three sites, are identified and treated as co-participants throughout the process. Bagley reminds us that qualitative research in the form of critical arts-based methods in education can:

function as a means to legitimise, empower and promote the voices of the educationally and socially marginalised; evoking an experiential and sensual means of feeling and knowing by which researcher and researched may co-recover, interrogate and enrich an anti-colonialist critique of the dominant social order (2013: 1).

The research in the three chosen schools, by virtue of the content under investigation, intends to encompass elements of social justice, as the content would highlight the essential nature of a peaceful co-existence with a common goal of treating the planet more positively. An element of social justice involves critically examining the actions of western society and how they impact on other regions as climate change increases, thus impacting on livelihoods and health there and elsewhere. This was an opportunity to invite young participants to the table, to ask them to think creatively and to participate in a global conversation usually reserved for adults. Hansen, Ramstead, Richer, Smith and Stratton state:

... we wish to point out that in order to conduct democratic and collaborative research we must first recognize the constraining realities of the social context in which the research takes place. While a context such as school surely exacerbates the problems of unequal conditions of participation, we believe that many of them also exist, to a greater or lesser extent, in all social settings (2001: 318).

In a sense, therefore, it could be stated that any democracy in a primary classroom setting is a pseudodemocracy, beginning with the social construct of the power balance between adult and child in the first place. However, as described by Hansen et al., recognition of the

constraints of established realities is a good starting point which will be discussed here.

Hansen et al., stress:

Many of the problems of pseudodemocracy cannot be easily overcome, but recognizing their existence at least prompts us to consider the best way to minimize them. In order to promote true participatory research in schools, the first step is to raise awareness about the possibility of teachers and students collaborating to identify and research issues of mutual concern. In the participatory ideal, the dependence on the expert researcher should eventually be eliminated (2001: 318).

In line with the points made by Hansen et al., it was essential that the child participants felt that they were valued and contributing participants in the research process. Every effort was made to acknowledge collectively, the issue of excessive waste with the help of the AgroCycle partners. Given that this is a contributing factor to greater environmental issues, we accepted it was an issue of mutual concern.

Combining Froebelian philosophy with ecofeminism empowered my approach as a participative researcher. The participatory role the children adopted ensured they were a core part of a process. When we are participatory, we are effecting change within ourselves. This gave rise to a participatory experience for all, embracing the feelings which emerged when consciously positioning ourselves as embedded within the natural world, not outside of it. Donovan (2019) discusses how some philosophers no longer recognise the subject-object dichotomy which traditionally has dominated Western knowledge but emphasise a rather subject-subject unity. One such philosopher is Skolimowski, who, inspired by the work of McClintock, suggests a new ethical science where 'we have to make a transition from objective consciousness to compassionate consciousness' in order to lay the foundation for a "participatory science" (Skolimowski 1994: 165). The child participants were central in the

process, and it was essential that they were facilitated in exercising autonomy over their own ideas and learning experiences.

A researcher in this way must maintain a role of a balanced participant as described by Savin-Baden and Major (2013), where the researcher strives to find a balance between the role of insider and outsider, participating occasionally but not fully (2013). In the act of balanced participation, the researcher joins in activities along with others but does not participate in all. Fetterman explains the researcher ‘combines participation in the lives of the people being studied with maintenance of a professional distance that allows adequate observation and recording of data’ (1998: 34-5). It requires the researcher to remain aware of the balance to be achieved as insider and outsider simultaneously. Bergold and Thomas highlight:

participatory research methods are geared towards planning and conducting the research process *with* those people whose life-world and meaningful actions are under study. Consequently, this means that the aim of the inquiry and the research questions develop out of the convergence of two perspectives—that of science *and* of practice (2012: 1).

Although a key focus of the research is the circular economy concept, it was also, as Bergold and Thomas point out, an opportunity to reflect as participants on our meaningful actions in real life experiences in the world.

5.3 Sustainability and a Transformative Paradigm

Selby and Kagawa remind us that ‘sustainability education requires a ‘lively and messy... emotional, imaginative, and creative entanglement with the world’ to facilitate a ‘transformative educational experience’ (2015: 278). This chapter explores this messy entanglement in terms of how, with this awareness, it can be explored in research about how the concept of a circular economy can be used in the Irish primary classroom as a pedagogical

tool for a transformative educational experience. To support this, significant effort and research planning took place, including a theoretical foundation, careful research design, a specifically tailored pedagogical approach, ethical considerations, and the inclusion of relevant content for the learning experience. Gorman's explanation of transformative education regarding sustainability discussed earlier highlights how it can 'teach us explicitly caring ways' that can potentially transform the world around us (2015: 2).

This is based on a transformative learning research tradition which influenced the research and pedagogical design of the sessions at the heart of this research. It draws on a Freirean critical education approach, recognising that 'emotions play a crucial role in transformation' (Hope and Timmel, 1995: 17). Freirean modes of transformative education emphasise a critically engaged pedagogy of transformation that encourages research participants to think critically, to reflect, to design, and to engage politically with norms in society, through a pedagogy of love in a primary educational space throughout this research.

O'Donnell et al., (2018), in their work *The Enquiring Classroom* identify the possibilities in an educational space and outline how it offers an opportunity for children to make sense of the world around them, the common world. This reflects the methodological processes of this thesis, whereby exploring the circular economy concept in the primary school classroom, reimagines the role that primary school children could have in the sustainability and circular economy conversation. O'Donnell et al., posit that through:

asking students to face historic and contemporary injustices and conflicts, educational spaces can also become spaces in which we come to understand why the world is how it is and imagine how it might be otherwise. Each new generation can thus come to take on the task of reimagining and renewing our common world. (2018: 3)

The contemporary injustice relevant to this thesis is the destruction and overconsumption of natural resources by humanity, causing the overarching issue of climate change. Kivunja and

Kuyini explain:

paradigms are thus important because they provide beliefs and dictates, which, for scholars in a particular discipline, influence what should be studied, how it should be studied, and how the results of the study should be interpreted. The paradigm defines a researcher's philosophical orientation (2017: 26).

The paradigm at the heart of this thesis is a transformative paradigm informed by a theoretical framework of Froebelian ecofeminism and a pedagogy of love. Mertens describes the ontological assumption of the transformative paradigm which:

holds that reality is socially constructed, but it does so with a conscious awareness that certain individuals occupy a position of greater power and that individuals with other characteristics may be associated with a higher likelihood of exclusion from decisions about the definition of the research focus, questions, and other methodological aspects of the inquiry (2007: 216).

This paradigmatic frame fits the effort of this research to draw out attitudes and intentions of stewardship of Mother Earth in the participants and examine a sustainable solution such as the circular economy concept and how this fits in the Irish primary education system. Monroe et al. describe the function of critical theory, which has informed this research, as an approach where researchers 'assume individual constructions of reality are shaped by differences in power, hence an emphasis on transformative or emancipatory perspectives in their research' (2019: 5). Monroe et al., comment that researchers drawing on a critical theory paradigm consider power dynamics in society and 'deliberately links to political and social change agendas' (2019: 5). Transformation is key in the critical theory paradigm keeping hope central which can embrace the pedagogy of love and emotional dimension of loving Mother Earth emphasised in this thesis. Robinson-Morris describes the transformative

power of love as:

more than a feeling; it is an action, an act of the will to love—a choice. Even more, love is an ethic; it is an ethical, social, political, cultural responsibility and commitment to truth, to overcoming domination, oppression, and subordination. Love is, perhaps, the most powerful force in the Universe (2019: 27).

Therefore, mobilising and working through a pedagogy of love provided the opportunity for a transformative educative experience for participants. As Taylor and Cranton confirm ‘by recognizing the interrelationship of cognition and emotion, we can give greater attention to what is most necessary: ways to facilitate the transformative experience’ (2012: 567). The transformative paradigm therefore guided me in choosing an appropriate methodology but also, a methodology that would appeal to young participants who could make meaning from their experiences through a critically reflective and an arts-based approach.

5.4 Qualitative Methodological Approach

Qualitative research approaches are utilised to ‘explore behaviour, perspectives and experiences of the people they study’ (Halloway, 1997: 25). In this study, a qualitative approach is intended to illuminate the thoughts and attitudes of participants in their exploration of the concept of a circular economy and ESD through these workshops. A qualitative research experience highlights the subjective perceptions and meaning making of its participants which resonates with the emphasis in this thesis on the inclusion of the children’s voices to be heard and honoured. Kennedy and Montgomery (2018) discuss how qualitative research offers greater reflection of natural or ‘real world’ circumstances (2018). This resonates with the real-world nature of this thesis and offers participants opportunities to make meaning throughout the lived experience of the research. It also allows for contrasting experiences to be voiced by participants, and for the different meanings they have

made, to be heard. This is reflected in the data sets presented in Chapter 6, the findings chapter. Savin-Baden and Major (2013) emphasise there is no single definition for qualitative research, with its methods described as a 'complex, changing and contested field' and not a 'single entity but an umbrella term' (2013: 115). Hammersley (2013) describes how a critically reflective awareness of subjectivity must be foregrounded throughout to ensure reliable, meaningful, and valid findings. Given the qualitative nature of the research, assessment and observation of the data is directed towards illumination and evocation of the opinions, understanding and knowledge of participants in collaborative and creative ways. This is facilitated using arts-based research activities which lie at the centre of the methodological approach and are described below. Eisner states that 'the arts provide a kind of permission to pursue qualitative experience in a particularly focused way and to engage in the constructive exploration of what the imaginative process may engender' (2002: 19).

5.5 Arts-based Methods

Pedagogically using arts-based activities during my time as a primary school teacher, I observed the transformative power of these activities for primary school children, which illuminated thoughts and manifested ways of knowing that were often completely unpredictable. O'Donoghue highlights that similarly arts-based research 'will bring to research... very different ways of seeing, imagining, understanding, articulating, and inquiring, which leads to better questioning and more robust inquiry practices' (2011: 649). The inclusion of art as a research method facilitated an opportunity for the participants to engage in a learning experience which welcomed their emotional perceptions of the content being explored and facilitated exploration of meaning making. This allowed the emotional

and subjective aspects to be revealed. Van den Bergh explains how effective art can be in revealing different ways of addressing issues and ways of knowing Mother Earth:

Can art pretend to save the planet? No. And it doesn't. But if we believe in the power of art as a purely humanistic act, enriching people with non-materialistic values, art is able to tap into a different instinct, rationale and emotion than political rhetoric, corporate sales-pattern or even scientific data (2015: 3).

Thus, arts-based research methods give rise to greater understanding of the nuanced, emotional, and embodied experience of the participants. Prosser and Loxley (2008) suggest that this experience can be felt through the images created in an artistic process, and these images are often evocative, allowing access to many different parts of human consciousness. Ellsworth expresses 'some knowings cannot be conveyed through language' (cited in Cahnmann-Taylor and Siegesmund, 2008: 156).

The learning potential of arts-based research emerges through the emphasis on process and the emergence of questions arising from engagement with this kind of research method. As Savin-Baden and Major state 'what is critical to remember about arts-based approaches is that they are essentially designed to introduce more questions than answers, both for the researchers and those viewing the 'findings'' (2013: 300). The children, therefore, had the opportunity to make meaning from the discussions, from the experiences through art they did themselves, and through discussion of the art around them, where emotions were welcome. Laininen emphasises:

School culture must provide experiences that provoke an emotional response and support the origin of intrinsic values, meaningfulness and the development of new worldviews built on existential understanding. Students' genuine participation and influence on common issues must take place inside and outside of the school (2019: 195).

Laininen's words reflect the theme which emerged organically. Love and emotion claimed their own place throughout this thesis journey, including at the research sites. Eisner concedes that 'the arts are not typically seen as a valued resource for re-conceptualizing educational work' (2008: 2). However, this thesis purposefully included visual arts processes to see what they can teach us that other ways of researching may not reveal, particularly in exploring a circular economy concept in the Irish primary classroom. When engaging in arts-based activities, there is often a change of pace experienced in the classroom environment. The sensibilities of participants change in a visual art setting as they engage in a more embodied way of using different senses. The interactions with their peers, with the researcher, with the materials, contrast with the other subject interactions in a school day. Eisner states that it 'is the character of the interaction that defines our experience' (2008: 2). He also emphasises, that 'education can learn from the arts that surprise is not to be seen as an intruder in the process of inquiry but as a part of the rewards one reaps when working artistically' (2008: 3). Visual art is a catalyst for the imagination to take flight.

In education, the arts can be marginalised to prioritise what is seen as the core subjects such as language and maths. The presence of art can facilitate an opportunity to create different modes of perception, communication, and learning, thus enabling us to know and learn in different ways. Eisner reminds us that art teaches us 'there are no separate parts in a whole. What, for example, a color looks like depends upon the colors around it. The same is true in teaching. We call this interaction' (2008: 2). Diaz et al. contend that the integration of art is an 'investigation of curricular content through artistic explorations. In this process, the arts provide an avenue for rigorous investigation, representation, expression, and reflection of both curricular content and the art form itself' (2006: 14). The visual art curriculum explains,

art is a chance for an artist to 'express ideas, feelings and experiences in visual form and with imagination, enjoyment and a sense of fulfilment' (NCCA, 1999f:10). The focus in schools can be placed on creative solutions to help Mother Earth, with participants authentically exploring predominantly through arts-based activities. As there was a broad cohort of participants across the three research sites, this allowed for the possibility of having a rich and large collection of data. Observing and journalling these observations and comments from the participants were a logical progression that provided more reflective possibilities in this qualitative methods approach.

5.6 Journalling and Observations

The methods of journalling and field observation took form and provided opportunities for me to peer into what the participants thoughts were on the current challenges that face Mother Earth. With the inclusion of more than one qualitative method of research, it presented an opportunity for greater richness and validity in the data findings discussed in chapter six. Honorene explains:

A single method can never adequately shed light on a phenomenon. Using multiple methods can help facilitate deeper understanding. By combining multiple observers, theories, methods, and empirical materials, researchers can hope to overcome the weakness or intrinsic biases and the problems that come from single method, single-observer and single-theory studies (2017: 91).

Gauntlett describes the use of creative methods as investigative and 'the use of visual and creative methods can generally facilitate investigating layers of experience that cannot easily be put into words' (2007: 42). By mixing methods such as arts-based research methods along with the journalling of oral presentations of the children's art and design projects, the opportunity for such layers of experience presents itself. The work and activity of the children

was visually and aurally observed, and journaling took place in order to record this data. A researcher's journal for the recording of observations, anecdotal remarks, responses to both closed questions and open-ended questions enriched the qualitative data gathered from the arts-based activities. A reflective journal facilitates the inclusion of an authentic and continuous record of the position of the researcher, and their feelings and ideas throughout the research. It also provides an opportunity to record interesting and noteworthy comments and remarks made by the participants that otherwise may go unrecorded. For example, see the discussion recorded in the journal that occurred regarding energy and the production of same, but with no waste production as a result during the presentation of the design projects:

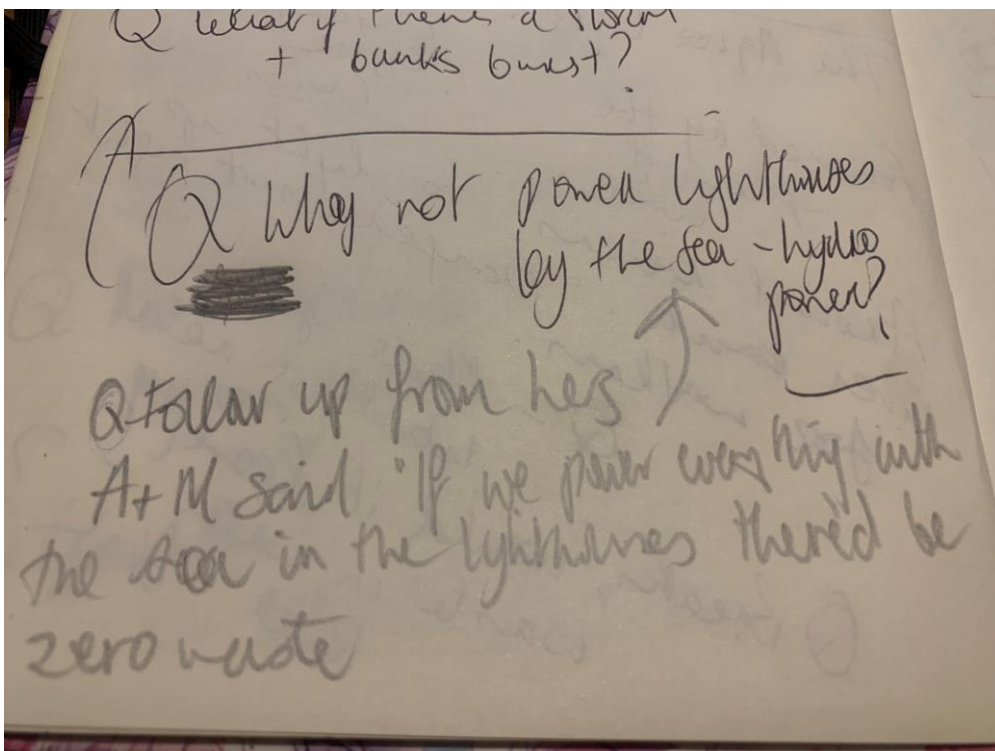


Figure 5.1 Researcher's journal transcribed questions and noted observations

One of the children asked during the presentation of a project regarding lighting along riverwalks, why lighthouses aren't hydro-powered. After some discussion from the river group and others in the room, she added with her partner that every aspect of every

lighthouse was powered by the sea alone, there would be zerowaste right on the sea itself from the lighthouses.

The researcher's journal was a supplementary source of data to complement the data specifically created by the participants, which included their artwork and design projects. The journal observations were key opportunities for reflection before, during and after the sessions in schools. Researcher observation is vital, with Adler and Adler describing observation being the 'fundamental base of all research methods' (1994: 389). Given that researcher observation is qualitative in nature, an awareness of the necessity for reflexivity in the role of the researcher was essential. The action of reflexivity as creating a 'self-conscious awareness of the effects that the participants-as-practitioners-and-researchers are having on the research process' (Cohen et al. 2007: 239). I developed patterns of thinking, writing, reflecting and reviewing throughout all stages of the research, both about my own thinking and actions as a researcher and observing the engagements with and responses of the participants in the research environment throughout the process. This type of reflexivity illuminates how 'values, attitudes, perceptions, opinions, actions, feelings etc. are feeding into the situation being studied' (Cohen et al. 2007: 239). It gave me an important space to record these through journaling and reflect and review their impact in the research on an ongoing basis.

The journal was always at hand during the research, as sometimes the richest data occurs when it is least expected. For example, when the inventor of the dock leaf plasters responded to a very smart question about whether they are waterproof or not. The response given was yes they are waterproof as another plaster would not be necessary because we are refusing instead of just thinking about the 3Rs. This illustrated a developing awareness on his part of

the 5Rs. My thoughts are in pencil below the recorded question and answer during session, followed by reflection by researcher in pencil. See below:

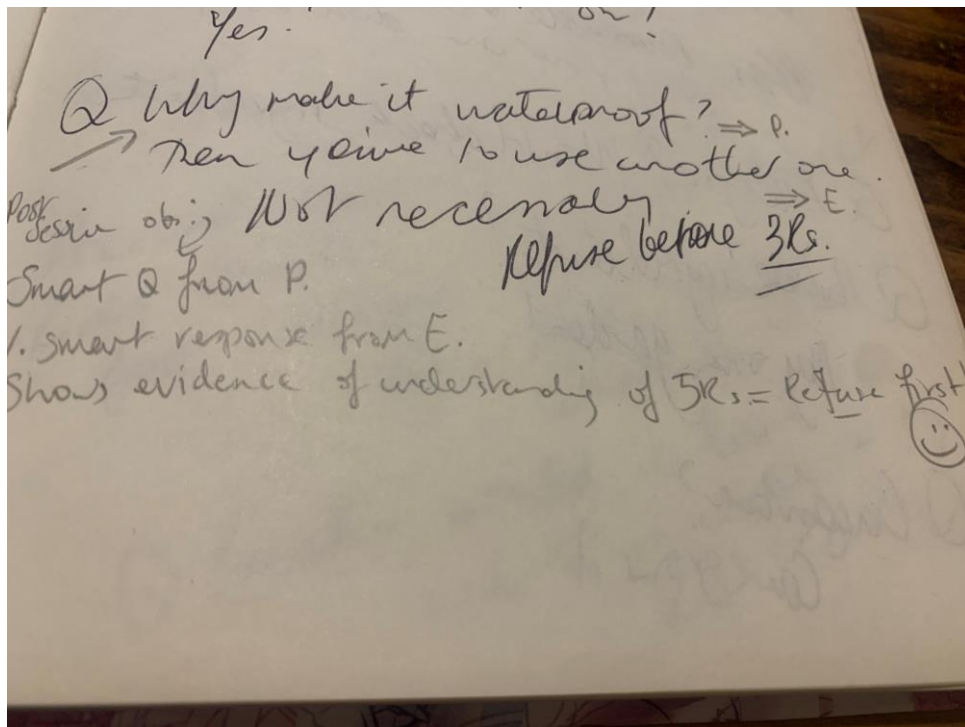


Figure 5.2 Researcher's journal transcribed questions and noted observations

This use of journaling from a research perspective is also echoed by its use for pedagogical reflectivity. There is always an element of spontaneity bubbling under the surface in schools and the journal facilitates capturing specific moments. The NCCA stress that 'observations occur spontaneously as children engage in learning activities and those observations may be recorded' (2007: 46). Additionally, the NCCA emphasise that 'by recording details of what a child says, does or makes, and, more importantly, how the child says, does or makes things the teacher can gather important information about a child's learning' (2007: 46).

This was applied here, particularly given that this research occurring through the sequential

phases of the workshops. To facilitate writing of observations and to ensure that a structure was in place in writing observations, a minimum of two observations were written at every session from participants. This reflective practice aided in the identification of absences and things that were not present in the session, such as a lack of knowledge about particular concepts or different senses of what it means to live sustainably. This highlighted the possibility of whether there is a disparity in what we believe the school community is hearing and what is actually heard.

Savin-Baden and Major also emphasise how journaling can support research and analysis about the role of nonverbal or symbolic communication. This may be through observation, and/or listening to the talk between participants including body language and intonation. They also recommend that the researcher who is observing the participants, considers the observations, their significance and relevance to the research holistically but specifically regarding the research question itself (2013: 399). Hence, recording observations though in the researcher's journal ensured greater understanding of the lived embodied experience of participants in the holistic flow and environmental contexts in which they occurred throughout the research. The following section will explain the selection of research sites and participants before outlining the methodological journey at the chosen research sites.

5.7 Selection of Research Sites

The timescale of this research thesis occurred between 2016 to 2020. Three schools were purposively selected as the sites for this research. Therefore, the research focus was on the whole school, using a purposive sampling of schools who were actively engaged in

sustainability and had outdoor amenities to support the participants in connecting with the natural world, giving potential to examine the natural zero waste systems present in nature and offering participants concrete experiences of natural phenomena. The school sites offered the participants the chance to witness a circular economy system in operation organically. The physicality of movement from the schools to the natural amenities (the sea, the river, and the forest) and the inevitable movement at the amenities themselves, was a welcome departure from the constraints of the desk and chair, and a recognition of the significance of movement and embodied learning. Cornell remarks 'physical movement shifts awareness from mind to body; it calms habitual over-thinking, the greatest hindrance to the spirit of play' (2017: 92). It was vital that the content of the research in the three schools was perceived by the participants as possibilities in tackling environmental issues rather than difficulties.

The North Wicklow school was a coastal school with the sea offering an opportunity for concrete experiences of a natural amenity. The Dublin school had a river running near the school grounds which also answered the need for accessibility to a natural amenity. The Galway school was specifically chosen as it is known for its outdoor classroom, a small forest reserved for the school community, accessible at the rear of the school yard. They also have their own source of energy which supplies the school with electricity and have a keen awareness of renewable energy. These contrasting natural environments were key criteria for the selection of schools, as the possibilities for discussion and observations differ depending on the natural amenity. The conversation and observation that can take place on a riverbank compared to within a forest or on a beach are similar at times with natural commonalities but also considerably different. Making use of the outdoor environment and

observing nature was a vital element of the research.

The three schools chosen to participate also had a proven record of commitment to the Green-Schools programme. It was thought that this could indicate a level of sustainable development educational experiences. However, it could also be perceived as a potential limitation as it was narrowing the research to schools which were already in possession of green flags. Nonetheless, it could be argued it was a positive step to include schools that had a record in environmentalism and stewardship of the planet and therefore more likely to be open to engaging in the arts-based pedagogies and sustainable development goals emphasised in the research objectives.

With established engagement in the Green-Schools programme (2020), the participants had a very positive starting point in grasping the sustainable development content of the research. To explain to the children what exactly the research entailed, a meeting with each of the three classes to discuss the research before the sessions began was arranged. A formal recruitment process was used where five schools fulfilling these two criteria were originally approached by sending an introductory email to the school followed up by an informal phone call to investigate the possibility of discussing their potential participation in the research. There were two schools in Munster, two in Leinster and one in Connacht. The Leinster and Connacht schools accepted. The three school communities in Counties Wicklow, Dublin and Galway expressed a willingness to become involved in the research and correspondence between me and the principals of each school ensued. Detailed written documentation was sent in response to their expression of interest. A meeting was then arranged to meet the principal of each school in person, along with the class teacher to fully explain the research and the

outline of the sessions. The research was then discussed with the prospective participants in all three schools, and it was agreed that fifth and sixth class level were the most suitable levels for the sometimes complex content involved. Notably, the Dublin school was a Gaelscoil - an Irish speaking school, specifically chosen to lightly explore if the research content was limited to English speaking participants, and exploring whether language was a barrier, considering the sometimes complex content.

Each school became a research site and information sheets outlining consent, assent, voluntary participation, anonymity, and withdrawal from the research at any stage in the process were explained to all potential participants. Each child was individually invited to assent to participate, and emphasis was placed on the full cooperation from the researcher should they wish to withdraw at any time. All who were invited chose to participate. The class teachers and principals stated that the children and many of their parents were very curious and eager to explore the research.

5.8 The Research Participants

At the Wicklow school there were 26 children participating and 1 adult present in class full-time. In Dublin there were 27 children participating and 1 adult present in class full-time. In Galway there were 31 children participating and 2 adults present in class full-time. Two of the schools were multigrade with both fifth and sixth class present. The third school provided an opportunity to work with a single sixth class. Each of the principals was also an indirect participant, given that their observations and comments were recorded in the researcher's journal with their permission.

5.9 The Auxiliary Participants (Teachers/Special Needs Assistants/Principals)

There was a total of three class teachers and one Special Needs Assistant (SNA) welcome to participate in the research. There were three principals who were fully aware of the research and visited on occasion throughout the sessions and imparted opinions and made observations. The adult participants are referred to as auxiliary participants as they played a more peripheral role than the children themselves, although very motivated by the research. They were reluctant to intrude on the research space although invited. Each of the three teachers exercised every effort to support the work of the researcher and the participants and were open, welcoming and extremely facilitative. The auxiliary participants assumed a supportive role assisting the children in their investigations, planning and designing. They also provided insights and opinions and added a richness to the learning experiences at the three research sites and were generous with their thoughts and reflections.

5.10 Research Design and Pedagogical Activities Overview

The researcher designed a series of workshops which were held in the participating schools. Through the sessions described below, the intention was that the participants would become aware of the work of the AgroCycle project and specifically, the global partners, all working towards the common goal of valorisation and developing micro-circular economies. They were working to find value for something that was otherwise worthless in systems, thus making the processes more sustainable (AgroCycle, 2016).

There were five workshop sessions in each school, ensuring fifteen sessions across the three research sites, where content was explored with the participants. The material was designed and tailored to be age-appropriate and non-threatening to mitigate potential causes of eco-anxiety. By inviting young participants to participate in this structured series of workshops, the research in schools ensured democratic and transformative learning opportunities were available for all participants. We discussed from where we were starting, how much we already understood about sustainability and the environmental care concept of the 3Rs – Reduce, Reuse, Recycle. All the participants then worked through the five sessions to gain an understanding of the 5Rs: Refuse, Reduce, Reuse, Repurpose, Recycle, extending the 3Rs concept. The different worksheets, templates and resources designed which were used during the workshops are discussed in the following sections and included in the appendices.

From the outset, through exploring the content of the AgroCycle project, investigating the concept of a circular economy, followed by designing for a circular economy, the participants consulted, conferred, questioned, posited, and democratically made decisions about their own ideas, work, and designs, and developing the curricular skills of the IPSC at the same time. Accepting and encouraging a love for Mother Earth, with her best interests at heart, was the baseline for all that was done. The participants were invited to work in groups or otherwise. They had full autonomy over their choices. They were made aware – through repeated invitations – that they themselves had ownership over their work and decisions around their work. Participants freely conferred with each other in all sessions. The act of conferring and decision-making together, over their circular economy designs, reflected the theoretical framework of Froebelian ecofeminist philosophy. Decisions of participants were

informed by how their actions impacted on the natural world in all they did, and at all three research sites.

The participants were encouraged to be playful and open minded with their ideas, which they expressed through art. They were agents of their own creativity and were encouraged to add text to their artwork if they deemed it necessary, for conveyance. Froebel's words emphasise the importance of play; 'play is the highest expression of human development in childhood for it alone is the free expression of what is in a child's soul' (Froebel cited in Dent, 2005: 210).

5.11 The Workshop Sessions

The graph below illustrates the original plan for the sessions in schools (figure 5.1). The individual sessions were developed and related to the AgroCycle project website and are explained in greater detail in the individual sessions.

The Sessions

Session 1	30-60 mins	Introduction and explanation. Eliciting what the children know already, their attitudes around sustainability and their green schools achievements thus far. There will be a video presentation of sustainable systems and talk and discussion, games and group work.
Session 2	30-60 mins	Further exploration of the concept of a circular economy. Plan for session three – our classroom without walls session outdoors.
Session 3	60 - 90 mins	An outdoor session in a wood or coastal setting that is a walk away from the school grounds. The objective of this session is for the participants to witness an example of a circular economy in the natural world.
Session 4	30-60 mins	The fourth session will be an opportunity for much discussion and reflection. The participants will then be invited to look in their own environments – their homes or in the school setting or their own suggestions, and to design an example of a circular economy or zero waste model.
Session 5	30-60 mins	Presentation of the work of the children. Dissemination of what has been understood after the 5 sessions. Debriefing and feedback.

Note: All materials needed for the research project will be provided by me and there will be no financial costs for the school in relation to this research.

Figure 5.3 The initial outline of each of the five sessions in schools

The content was sensitively and carefully discussed with the participants, who were encouraged to discuss the sessions with significant adults in their lives throughout the research journey, making connections to waste the participants themselves were aware of in their own lives, or homes. A safe space was created, a culture of acceptance and a loving attitude towards Mother Earth encouraged. The inclusion of qualitative research methods exercised through arts-based activities had a significant part in manifesting these attitudes.

Hayley and Iyer define art as:

ecological outside and spiritual inside. As it plays out, art is a manifestation of the spiritual connection between human beings and the environment. In its core, art incorporates an intuitive and embodied awareness of all life and engages a relational view of person to planet, inner to outer landscape, and soul to soil; of the oneness that celebrates its ability to be diverse (2009: 27).

5.11.1 Session One

The first session involved meeting the participants and eliciting from them what they knew regarding sustainability and their Green-Schools (2018) achievements. The participants were invited to talk and discuss the circular economy concept as a tool in sustainable development. The concept of 'waste' as waste was examined. The question of whether waste is ever waste at all was then posed. In the first session the extended 5Rs – Refuse, Reduce, Reuse, Repurpose, and Recycle were unpacked with the participants who were more familiar with the commonly held 3Rs embraced in the Irish primary school – Reduce, Reuse, Recycle. Collectively we arrived at the terms together after some discussion. Participants were encouraged to discuss each session at home and to bring any further knowledge, thoughts or questions to the next session, building and constructing knowledge from their findings. The children were invited to engage in visual art to illustrate what they knew about sustainability thus far, what they wanted to know more about, after the discussion, and to illustrate the new information they may have learnt. If they had chosen not to illustrate or sketch, that was perfectly acceptable too, with no pressure on any participants. From session one onwards, when references were made to the 3Rs, this was subtly extended to the 5Rs concept, as outlined below (Figure 4.2).

Concepts for review and investigation

The 3 Rs
Reduce
Reuse
Recycle

Moving towards ...

The 5 Rs
Refuse
Reduce
Reuse
Repurpose
Recycle

Figure 5.4 Moving from the 3Rs to the 5Rs

5.11.2 Session Two

This session provided an opportunity to further explore the scientific concept of waste valorisation through arts-based activities. The work of the researchers on the AgroCycle project (2016) was introduced and the circular economy concept further investigated. A deeper understanding of the difference between a linear economy and circular economy was developed. The terms biological nutrient - a food or a nourishing substance assimilated by an organism, and a technological nutrient – a substance made of highly stable materials that can be used repeatedly in closed loop cycles of manufacturing (Braungart and McDonagh, 2009) were investigated and examined. A game was played whereby, the participants were invited to draw their chosen nutrient and following a discussion, the participants had to find the

group to whom they belonged, as they moved around the room with their art. The official term 'valorise' was also introduced - whereby something that was once seen as waste is now used for something else which automatically adds value to the material (Garcia-Garcia et al., 2018). It was outlined to the participants that although the priority is that the environment is cared for and supported, and that human behaviour which impacts negatively on the environment was actively discouraged; through the research as an integral aspect of the AgroCycle project (2016) content was that of economic reward. The added advantage from multiple perspectives when value is found for something that was once worthless and resigned to landfill was explained and realised. Participants were invited to think critically about the world and about how our human behaviour impacts on Mother Earth, albeit positively or negatively.

Experiences such as these sessions were intended to transform how they viewed the world, how they viewed processes and to hearing about concepts such as planned obsolescence, possibly for the first time. The groups then co-planned for session three which was the outdoor session in line with Froebel's emphasis that outdoor play stimulates broad learning experiences.

5.11.3 Session Three

The outdoor session was an opportunity to cultivate curiosity, problem-solving, respect and also a love for nature. The inclusion of the outdoor environment was a vital element of the research sessions ensuring participants experienced the magic of the natural world during their school day, other than the prescribed recreation periods which children usually spend

outdoors. Froebel insisted that the outdoor environment offered opportunities for thinking and reflection as well as work and activity. Here, participants had the opportunity to position themselves in the closest natural environment to their research site, where only naturally occurring examples of a circular economy were present. At the Wicklow school by the sea, coastal ecosystems were explored. At the Gaelscoil in Dublin, river ecology on the riverbanks, was investigated. At the Galway school, a nearby forest was explored by the participants. This session provided an opportunity for mindfulness in nature, observation and reflection. The session began with a mindfulness exercise making use of all senses, observing the moment and then observing the natural world around them. Acknowledgement of humanity as part of the natural world was emphasised and time was taken to be still and present. The participants had the opportunity to engage in the activities of a classroom without walls and to observe biological nutrients in the outdoor classroom. We became nature detectives, examining natural aspects of the outdoor environment such as leaves, rocks, surfaces, biodiversity, textures etc. This used a place-based pedagogical approach to investigate examples of a circular economy in the natural world. Place-Based Education (PBE) is an approach to learning that takes advantage of geography to create authentic, meaningful and engaging personalised learning for students as discussed on page 19. The groups fully extended their understanding of the linearised concept of reduce, reuse, recycle to the 5 Rs – refuse, reduce, reuse, repurpose, recycle - through exploring nature firsthand and observing the work present within ecosystems.

Examples of a circular economy in the natural world were observed. Attention was drawn to any waste present as it was important to determine if the waste present was due to human behaviour or something else. The participants were invited to draw/paint what they saw in

situ. Discussion and Q&A followed at the natural amenity and continued when the group returned to the indoor classroom. Participants shared and reflected as a group on the outdoor art and mindfulness session. Questioning was encouraged and welcomed, reflecting on a questioning approach recommended throughout the IPSC (1999).

5.11.4 Session Four

The classroom without walls session of the previous week was discussed and participants completed the art they were creating if it was required. The gallery was introduced, where participants were invited to move around the room to examine the art created by each participant and discuss it. The gallery exercise facilitated expansion of their concentration and analytical skills and stimulated their visual skills with regard to art appreciation and conveyance of meaning. What was now known of the circular economy concept was discussed, including the efforts of the AgroCycle partners, the UN, and relevant agencies. The UN SDGs (UN, 2015) were introduced, and the participants were invited to identify the goals specifically relevant to the circular economy concept. The design for a circular economy task was explained and discussed and the participants planned individual or group design projects that would illustrate a proposed product or service in a circular economy system. There was no pressure on the groups to physically make a model of their design, but they were invited to draw/paint/create it on paper or an alternative of their own choice. It was clarified that I, the researcher, through their teachers, would be available to all participants between session four and five should they need assistance, ensuring they felt supported in their roles as designers and researchers.

5.11.5 Session Five

In line with the approach of the IPSC (1999), where acquired knowledge is expanded and developed in a spiral fashion, we too as participants, built on what was assimilated and created in the previous four sessions. It was important to ascertain what was known by the participants at the end of the research in comparison to what they knew in the beginning and if any tangible transformation occurred. If they had moved from the initial baseline point of not knowing or having heard of the circular economy concept in the first session, to now understanding, discussing, and confidently speaking about it.

Participants displayed and explained their circular economy designs. Approximately five to six minutes was allocated to every design and the participants stood at a focal point of the room in order to be visible to all, as they discussed their efforts. They shared and reflected on the five sessions. The participants then outlined their designs and noted the elements of sustainability which were embedded in the designs. There was ample time allocated for all to question fellow participants. When all participants had presented and revealed the details of their designs to the wider audience, and appreciation was expressed to all who participated, the final task was introduced to the groups.

At the beginning of the research, the participants were consulted about what they did *not* want to do as part of the research experience. There was one request common to all participants across all schools, and that was a request to have no written homework at all over the five sessions. This wish was copper fastened as a key objective of the research whereby the participants would be agentic throughout the process. However, it was essential that the children would have an opportunity to share their new skills and knowledge with the

wider school community should they so wish. The *Talk to an Adult* worksheet was sent home to the families of the participants, therefore. The participants were encouraged to share with a significant adult in their lives what they did, what they learned, what they discovered over the five sessions. This voluntary feedback added to the rich qualitative data collected.

To conclude, the artwork and designs created by the participants serves as content for analysis. It was vital that there was no additional pressure on the children to 'perform' or to ensure everything was 'correct' or they felt under scrutiny in any way. To remove a possible pressure that their work was being 'tested' in any way, it was put to them succinctly, that I would be asking 'if it was ok to look at their work during and after the research'. If this was 'ok and they were comfortable with this', then perhaps I could 'show their pictures in my work and talk about it'. The participants agreed to this, and I was given permission to reproduce, discuss and analyse the data in this thesis. The following section will explain how the three schools came to join the research journey.

5.12 Research Ethics

When working with children, ethical approval, and ethical behaviour on the part of the researcher must be at the core of the research journey. These are discussed below in subsections on the key ethical issues of informed consent, power and position of researcher, confidentiality and anonymity, and translation.

5.12.1 Informed Consent

The 'bedrock of ethical procedure' is how Cohen et al. describe the importance of informed

consent (2007: 52). Diener and Crandall (1978) describe informed consent as ensuring that participants are provided with the facts that may influence their decision to participate. To adhere to ethical procedures, formal consent and assent was sought from all participants to partake in all activities. The letters and information sheets the families and schools received, were clear and informative about the research sessions and provided applicable information to ensure they were enabled to make informed decisions.

Informed consent was sought in line with the BERA guidelines (2018) and Maynooth University Research Guidelines (2020). However, consent is not a moment in time; it is continuous and must be monitored. There may have been participants who wished to withdraw from the research at any time and for any reason. This was respected as an elemental right in the research. This research abided by BERA guidelines that state 'researchers should recognise the right of all participants to withdraw from the research for any or no reason, and at any time, and participants should be informed of this right' (2018: 13). Written consent was obtained from parents, teachers and school management. 'Informed assent' (Department of Children and Youth Affairs, 2012: 2), was sought from the children, and an opt-out clause at any time, was included to ensure they were aware they could opt out at any stage. A risk assessment exercise was carried out at each school/research site indoors and outdoors, before the commencement of any outdoor time and the third session at the local natural amenity.

5.12.2 Power and the Position of the Researcher

The research may be perceived to wield, consciously or unconsciously, a certain power imbalance which could influence the results of the research. It is important to repeat to child participants frequently, that their participation is always voluntary, and it has no impact on their place in a class or their relationship with a teacher or researcher. To that end, I remained cognisant of the possible power dynamics between myself, and all participants throughout the research, and every effort was made to reduce these potential issues in order to prevent bias or skewing of data produced. I confirmed assent to carry out research in classrooms with children and consent from the adult participants at every opportunity. I maintained an acute awareness of body language and discussions at the research sites, to ensure participants did not feel threatened or under pressure to participate in order to please the adult researcher. Through journaling and noting observations regarding the participants and our interactions, it served as a constant reminder of possible power dynamics between adult researcher and child participants. It ensured a practice of critical reflection daily.

As a primary educator and researcher, I also reflected on my positionality in both realms through this research journey, cognizant of how learning in my research supported me to develop my pedagogical approach and vice versa. Specifically in terms of the workshop design and engagement I strove to take a sustainable approach to every stage at every research site, rather than an individual subject-based approach as is often taken in the primary classroom. Beane cautions that the individual subject approach to curriculum is carefully guarded by 'formidable elements' and when effort to reconceptualise this approach is observed, it often experiences 'resistance' from a network of education professionals who have maintained symbiotic relationships which were founded on the separate subject approach to curriculum (1995: 618). Given that an individual disciplinary approach can provide clarity to a given issue,

this does not preclude progressing organically with the same issue in an integrative way or a thematic way within a discipline.

Beane stresses we do not simply observe all the wrongs and all the issues of the world and then sit back and wait for solutions to emerge. Instead, we can specifically and appropriately put our collective knowledge to work (1995: 617). I sought to embody this in the processual approach to the workshop design and the pedagogical engagements throughout it.

5.12.3 Confidentiality and anonymity

The Department for Children and Youth Affairs (DCYA) (2012) addresses the ethical consideration of anonymity and confidentiality. It states that 'identifiable information should not be disclosed without the explicit consent of the participants (except in the case of a concern falling under the scope of the child protection legislation)' (2012: 4). Cohen et al., explain 'the essence of anonymity is that information provided by participants should in no way reveal their identity' (2017: 91) and confidentiality as 'not disclosing information from a participant in any way that might identify that individual' (2017: 92). These points were maintained throughout the research and identifying features about the participants and schools were removed or generalised to ensure that they remain anonymised.

There were wider ethical issues beyond the research sites and participants involved in this research. When operating as a partner in a large project such as the AgroCycle project (2016) where attendance at team meetings and conferences is mandatory, confidentiality is always paramount. At the forefront of all presentations at meetings and conferences was confidentiality and respect for my young co-participants who were always afforded full and

complete anonymity. Prior to the commencement of the research, a specific data storage procedure was established. Hard copies of the *'Talk to an adult'* worksheet, observations from the research journal, and artistic data created by the participants were stored in a locked cabinet on campus. Digital files were password protected and encrypted, as directed by the *Maynooth University Research Integrity Policy (2016)*, to protect the confidentiality and anonymity of all participants. Participants were advised in writing in relation to data storage that the data was accessible to them and would be held for the mandatory period of ten years. It was made clear that data collected would be published in this thesis, but that the identity of individual participants would remain anonymous.

5.12.4 The Ethics of Language and Translation

Consideration of ethics surrounding translation and specifically translation for meaning making was a necessity. One third of the children participating in the research were based in a Gaelscoil and were responding to questions in Irish, discussing the content in Irish, and conducting the research through Irish. To ensure standardisation across the data, the reflections, analysis and data from this site was translated into English but with an awareness that the presence of the Irish language experience would bring another dimension to the data. As a fluent Irish speaker, it was vital to me in honouring my values and the connection I see between the land and the language, that there was an Irish language element within the research experience. It is essential that the intention of the participants and their meaning making is interpreted accurately. Simon (1996) highlights that a translator discusses concepts beyond just words, and that context is essential in ascertaining equivalence or difference in meaning. The artistic endeavours of the participants and the content of the sessions provided

context. Bermann and Wood state that the researcher must 'make an attempt to grasp the writer's presuppositions' (2005: 94). On this note, the intentions of the participants were checked and clarified to ensure an accurate understanding of intent, and at the same time maintaining integrity.

5.12.5 Integrity, validity, and reliability in arts-based research

It is essential to engage in this research with integrity, validity, and reliability. In terms of integrity, the *Department of Children, Equality, Disability, Integration and Youth* (DECDIY) emphasise that any research in social science must be carried out with the utmost integrity encompassing individualism, privacy, autonomy, and respect for diverse values within communities (DECDIY, 2014). This is emulated and evident in the rich data the participants were free to produce. A culmination of methods of data collection allowed for a constructivist approach to validity in this research. Guion (2002) defines validity as:

Validity, in qualitative research, relates to whether the findings of your study are true and certain. "True" in the sense of your findings accurately reflecting the real situation. "Certain" in the sense of your findings being backed by evidence. "Certain" means that there are no good grounds for doubting the results, i.e., the weight of evidence supports your conclusions (Guion, 2002: 1)

Cohen et al. (2007) describes validity as 'an important key to effective research. If a piece of research is invalid, it is worthless' (Cohen et al. 2007: 133). The research journey illustrates the processes and steps taken to ensure credible and authentic progression from beginning to the end of the research, to create a rigorous layered mixed methodological experience guided by insights from theory and literature.

In the social sciences, Cypress states 'the whole notion of reliability in and of itself is problematic' (2017: 257). The concept of reliability is often built on the notion of replication

and repeatability. Cypress explains 'the scientific aspect of reliability assumes that repeated measures of a phenomenon (with the same results) using objective methods establish the truth of the findings' (2017: 257). This illustrates one aspect of reliability but there is more complexity regarding reliability in the qualitative space. To ensure reliability in this research therefore, it was essential to focus on consistency for reliability across all research sites before during and after the research reflecting the recommendations of Davies and Dodd (2002). Davies and Dodd highlight that in qualitative research, care and consistency in the application of research practices, must be reflected in the visibility of the practices, analysis, and conclusions, and reflected in an openness mindful of the constructivist and individualised context of the research data and findings (2002).

Trustworthiness is essential in the process. The research must be trustworthy and carried out ethically and reliably. The researcher must ensure steps are taken at every point to remain credible and work with integrity and authenticity throughout, not allowing bias or personal position to influence outcomes or the process. Validity and credibility are part of this trustworthiness, as are methodologies that could be easily transferable. This would offer an opportunity for similar research processes to be replicated in another setting by another researcher and new participants with consistency and reliability. This research was carried out in three schools in the East, West and Southeast of the country and so represents research in these specific contexts rather than being able to make any wider or generalised-based claims.

Triangulation was used in the research to enhance the validity and rigour of research thus ensuring reliability. Triangulation was achieved using multiple sources of data to achieve the findings. Cohen et al. define triangulation 'as the use of two or more methods of data

collection in the study of some aspect of human behaviour... triangular techniques in the social sciences attempt to map out, or explain more fully, the richness and complexity of human behaviour by studying it from more than one standpoint...' (2007: 112). Foss and Ellefsen (2002) believe that triangulation raises the possibility of a foundation for richer and authentic data. Within this research multiple qualitative experiences and data collection methods were used, specifically regarding the children and adults, to ensure triangulation. Different methodological approaches were used to ensure that different ways of experiencing and learning about the world were included, through the multi-sensory approach of arts-based research methodologies, conversations, and journalling for multiple types of qualitative data to emerge from the three research sites. Triangulation of this data helped ensure credibility and gave greater insight into the research sites, the position and experience of all participants, and an overview of all fifteen research sessions at the three schools.

Cohen et al. highlight how validity in qualitative data is addressed through the 'honesty, depth, richness and scope of the data achieved, the participants approached, the extent of triangulation and the disinterestedness or objectivity of the researcher' (2007: 105). The cross-moderation of the process to ensure validity is outlined below.

Campbell and Fiske highlight 'triangulation is a powerful way of demonstrating concurrent validity, particularly in qualitative research' (1959: 92). Analytical triangulation of common themes in the research analysis was carried out, for example, by identifying when participants illustrated endangered animals close to extinction in one of the data sets, then the other two data sets were analysed for similar depictions. The data presented in Chapter 6, the findings chapter illustrate the results of repeated triangulation across data sets from all three sites to

make meaningful conclusions from the research. The design projects were analysed using the researcher designed rubric (see figure 5.4), which was a contrasting tabular method of analysis in comparison to the data analysis of the other artistic data and researcher's journal which used coding analysis.

Hence, the research design used multiple methods over a sustained period to gain a varied sense of the participants' engagement, as well as using cross coding which took place with a support network of critical friends, all of whom are practising teachers, to gain a multiplicity of different interpretations and approaches. For example, the research methods employed were discussed at length with the practicing teachers involved in the research in the primary classroom. A keen awareness of the researcher as participant and the subjectivity this may have presented therefore, was always kept to the fore to maintain credibility throughout the research. Before introducing any of the research methods to the participants, they were examined with the group of teachers who acted as critical friends throughout the research process. A group of 8 children were invited to review the resources and ideas before the research in schools and piloted the arts-based activities also. The suggestions made in this process were taken on board, such as simplifying the language in places, including the research journal and developing the keyword identification strategy in the researcher's journal as well as annotating observations. These were welcome additions and added a richness to the data.

5.13 Analysis of Visual Art

To analyse the artwork of the participants from the workshops, data from all three sites were merged in order to be treated as a single data set. Braun and Clarke's Thematic Analysis (TA)

was used to identify the patterned meaning or themes evident across this data. Thematic analysis is used to 'identify patterns within and across data in relation to participants' lived experiences, views and perspectives, and behaviour and practices' (Clarke and Braun 2017, 297). Thematic analysis is particularly useful in areas of interest that have not been extensively researched – such as the circular economy in the Irish primary classroom. In a recent paper, Braun and Clarke encourage a 'spectrum of ways of doing TA – from fairly descriptive to more interpretive' (2019: 5). In line with Terry et al. (2017) my research question acted as a guide for theme development, helping determine 'what is, and what is not, relevant in terms of potential clusters of patterned meaning' (Terry et al. 2017: 35). Ryan and Bernard offer clarity when they define themes as 'abstract (and often fuzzy) constructs that link not only expressions found in images, sounds, and objects. You know you have found a theme when you can answer the question, "what is this expression an example of?"' (2003: 87). They highlight that 'themes come in all shapes and sizes. Some themes are broad and sweeping constructs that link many kinds of expressions. Other themes are more focused and link very specific kinds of expressions' (2003: 87).

The themes were developed by systemic cycles of analysis based on perceptions of broad patterns of meaning across codes and were also guided by a consistent return to the research question. This analysis began with reading and re-reading the journal entries to become familiar with the observations made simultaneous to this, I was familiarising myself with all of the visual arts and projects as a whole. In doing this, I also looked at each piece carefully and consciously in the outdoors. The bright light of the outdoors can sometimes illuminate small details that could otherwise go unseen. It was essential to allow common codes emerge, in the deeper search for themes. Initial descriptive coding was carried out to identify clustered

meaning. I engaged in a second round of coding for further clarification and to discard the codes that were too few or not relevant to the research question. In time, I began to generate codes and organised the journal entries in a meaningful way. Braun and Clarke direct that for each code, ‘you need to collate together all instances of where that code appears in the data set’ (2013: 211). With all codes collated, they were then arranged in clusters. From these clusters of codes, the themes developed. The themes illuminated significant connections to the thesis enquiry itself. When a theme was identified, the same set of data was returned to another day, to see if this theme was still as evident or to ensure there was no forced theme that was not evident in actuality. The data illustrated the meaning the participants made from their lived experiences because of engagement with the sessions. Braun and Clarke emphasise that theory cannot be separated from the thematic analysis if it is approached appropriately (2019). As Braun and Clarke highlight, the final refinement of the emergent themes is to ‘identify the ‘essence’ of what each theme is about’ (2006: 92). Hence, the analytical process of identifying codes followed by the themes were subsequently interwoven with the Froebelian ecofeminist framework of this research.

Step 1: Become familiar with the data	Step 4: Review themes
Step 2: Generate initial codes	Step 5: Define and name themes
Step 3: Search for themes	Step 6: Producing the report

Figure 5.5 Braun and Clarke’s Six-Phase Framework for Thematic Analysis (2006: 87)

The analysis interprets and frames what participants illustrated and wrote, as reflecting their thoughts, learning experiences and perspectives during the research. The option to add text to their art ensured every participant had an opportunity to express their position in a way

that suited them. Therefore, using this framework acted as an organising principle for presenting themes from the art samples. A total number of 70 pieces of artwork were coded for themes.

It was vital to keep the thesis enquiry to the forefront of the coding procedure and to acknowledge the influence of the reviewed literature and theoretical framework on the emergent themes. The concepts of climate justice, environmental care, sustainability, transformation, love, and care were predicted themes but not absolute, but an active awareness of these points was maintained to identify associated findings. As Savin-Baden and Major note, while 'researchers often state that themes 'emerged' from the data, as if by magic; rarely do they indicate or even intimate the complex analytical process involved and that the researcher is indeed active' (2013: 413).

5.13.1 Analysis of The Design Project – Data Set 2

The design project gave an opportunity to assess whether the concept of the circular economy was becoming understood by the participants, along with the sustainable concepts under examination. The design projects and their presentations of the projects in session 5 were observed and analysed using the carefully designed rubric which was informed by theoretical and curriculum aspects. Observations and notes were made during the process and the presentation in the final week. The design rubric used elements of the SESE curriculum assessment guidelines (1999) and the visual art curriculum assessment guidelines (1999) from the NCCA. This was guided by Froebelian ecofeminist philosophy with the key aspects of context, content, communication, and Q & A embedded in the rubric (figure 5.4).

This intended to provide insight into the learning and participation, the level of understanding of participants, and evidence of linkage made across curricular areas. The rubric assessed whether the participants illustrated various concepts that were discussed and referred to, throughout the sessions – such as stewardship, zero waste, valorisation, circularity. The rubric was a tool to investigate if the participants were able to answer the questions posed to them at each presentation and if they could coherently represent their understanding of the experiential learning and demonstrate how they had made meaning from the sessions. All child and adult participants in the room were invited to ask questions on the day of the presentations.

Design Project – Highlight the appropriate statements

<p>Context</p> <ul style="list-style-type: none"> <input type="checkbox"/> The participants are able to illustrate a good example of the circular economy concept <input type="checkbox"/> The participants are able to illustrate examples of waste valorisation <input type="checkbox"/> The participants create artwork <input type="checkbox"/> Attempt to illustrate an example of a circular economy concept is incomplete <input type="checkbox"/> There is no evidence of any of the above contexts 	<p>Content</p> <ul style="list-style-type: none"> <input type="checkbox"/> The work relates to other areas of knowledge – science, geography, economics etc. <input type="checkbox"/> The participants respond to a stimulus in the research, develop an idea and express it artistically <input type="checkbox"/> The participants communicate concerns and experiences through visual arts media <input type="checkbox"/> The participants work co-operatively, productively and enjoyably with others <input type="checkbox"/> There is no connection to any of the above
<p>Communication</p> <ul style="list-style-type: none"> <input type="checkbox"/> The design is very clear and the verbal presentation is very good <input type="checkbox"/> Text on the artwork helps to explain the design further <input type="checkbox"/> The visual design is not fully clear but the participants have made great effort to explain their intentions verbally <input type="checkbox"/> There is a sense of stewardship and/or love for the planet conveyed in their efforts <input type="checkbox"/> There was mention of the UN SDGs in the presentation <input type="checkbox"/> The participants are unsure what the design is about, when describing the design, with both artwork and verbal communication unclear 	<p>Q&A</p> <ul style="list-style-type: none"> <input type="checkbox"/> The participants are unable to answer questions about their design <input type="checkbox"/> The participants attempt to answer questions about the design but are unclear <input type="checkbox"/> The participants are able to answer questions about the design <input type="checkbox"/> The participants are able to ask each other relevant and logical questions about their designs <input type="checkbox"/> There is no evidence of questioning or responding to questioning

Figure 5.6 A Researcher Designed Rubric for Analysis of the Design Projects

The inclusion of context, content, communication, and question and answer ability in the rubric was a deliberate act. As outlined, there was a reluctance to ‘assess’ art but rather assess for meaning and understanding of the work to date. The rubric enabled an examination of

the context of the participants' efforts and investigates their level of understanding by exploring the content embedded in their designs. Their ability to communicate their level of knowledge around the concept of a circular economy was observed and their engagement in questioning and answering regarding their learning experiences and designs was assessed using the rubric.

The rubric also addressed how they worked together, and how and if the participants were able to communicate their findings. Throughout all the sessions, attention was paid to the participants questioning and answering each other and engaging in the process with each other. It recorded if the participants used the appropriate vocabulary around the content of their chosen design, having used this vocabulary and heard this vocabulary in previous sessions, such as valorise, circular economy, zero waste, process etc.

5.13.2 Analysis of the Research Journal of Observations – Data Set 3

Using the researcher's journal of independent observations, keyword analysis for themes was carried out. The data were examined and re-examined increasing familiarity within the content of the researcher's journal. In line with this, coding and constant comparison were used as tools of analysis to highlight meaning (Boulton and Hammersley, 1996). Codes were retrieved and then examined for patterns of repetition of keywords before re-organising the data around these themes. Boulton and Hammersley highlight constant comparisons and coding is to 'clarify what the categories that have emerged mean, as well as to identify sub-categories and relations among categories' (1996: 253). The keyword identification strengthened the collection of data.

Savin-Baden and Major explain that as researchers begin to examine their collected data,

things emerge such as ‘behaviours...strategies, states of mind, meanings, patterns, relationships, interactions...’ (2013: 421). This is the foundation for the mechanics of coding. Regarding the collection of observations, the responsibility lay solely with me, the researcher, in what Cohen et al., describe as ‘organizing, accounting for and explaining the data; in short, making sense of data in terms of the participants’ definitions of the situation, noting patterns, themes, categories and regularities’ (2007: 461). It was essential that every effort was made to understand exactly what the participants wanted to say through the observations, and not to misconstrue any intention on their part. Korthagen’s 8 Windows were used to support the reflective nature of the researcher’s journal, identifying thoughts, attitudes, and feelings of all participants (Korthagen and Vasalos, 2006) (Figure 4.5).

KORTHAGEN: 8 WINDOWS		
1	What did I think?	What am I thinking?
2	How did I feel?	How am I feeling?
3	What did I want?	What am I wanting?
4	What did I do?	What am I doing?
5	What did they think?	What are they thinking?
6	How did they feel?	How are they feeling?
7	What did they want?	What are they wanting?
8	What did they do?	What are they doing?

Figure 5.7 Korthagen’s 8 Windows

The strategy of keyword identification was used to highlight common concepts or words which the participants were interested in talking about and highlight the points they felt were relevant to the discussion. As Savin-Baden and Major explain ‘In keyword analysis... the researcher focuses upon the words themselves and notes frequently repeated words, unusual

words and words used in context with other words' (2013: 43).

5.13.3 The *Talk to an Adult* Worksheet and Analysis – Data Set 4

The final activity gave the participants a voluntary opportunity to discuss what they had learnt and experienced with a significant adult in their lives outside of the school context. As discussed in Chapter 6, the findings chapter, a limited number of adult worksheets were returned and, in many cases, there were sections left blank. The two questions that were consistently answered on each worksheet returned were question four and five, and so this became the data focus. Questions four and five were – ‘what was the most enjoyable feature of the five sessions?’ and ‘what have they taught you that you may not have known?’ An example of the worksheets is presented below. The adult was invited to ask the questions on the worksheet, and the participants responded through conversation. The adults then ‘did their homework’ and wrote the responses provided. See Figure 5.6 below, which illustrate some responses from the 38 ‘*Talk to an Adult*’ worksheets which were returned, out of a possible 91.

Art Samples - Thematic Analysis		
<p>Open coding in imagery and text on imagery.</p> <p><i>Emotion</i> <i>Recycling</i> <i>The Environment</i> <i>Danger</i> <i>The planet</i></p>	<p>Searching for themes</p> <p>Multiple occurrences highlighted/coded on samples.</p> <p>Clusters formed according to the 3 most frequent</p>	<p>Final themes</p> <p>Themes refined -</p> <ol style="list-style-type: none"> 1. <i>Presence of emotion (49)</i> 2. <i>Recycling is the main aim of environmental awareness and care (24)</i> 3. <i>Animals in danger or close to extinction (15)</i>

Figure 5.8 Talk to an Adult Worksheet

All the responses from questions four and five were compiled into a word document and colour coded for patterns and correlations, before being linked back into the broader analysis for the research. The findings of these are presented and discussed in Chapter 6 and 7, the findings and discussion of findings.

	themes – emotion, recycle, danger	
Researcher’s Journal - Keyword Analysis		
1. Noting repetition of keywords/concepts 2. Keywords/Concepts refined		
<i>Zero waste/Valorisation of waste: Recycle</i> <i>The Green-Schools Committee: Bin and Care</i> <i>Outdoor Environment: Emotive</i> <i>Environmental Awareness and Care: Care and Emotion</i> <i>Sustainable Living</i>		

Figure 5.9 Details of data analysis regarding Art samples and Researcher’s Journal

5.14 Scope and Limitations of this Research

The qualitative nature and particular approach of this research means that it is framed by this, with a distinctive scope, focus and limitations are evident consequently. It was important to be mindful of potential limitations however, such as the selection of the research sites, the influence of and relationship to the AgroCycle research, the role of supervisor of the research in schools and the energy needed for understanding and maintaining the project as a whole. The selection of the participating schools means that they reflect the criteria of involvement in Green-Schools and an accessible outdoor environment, as well as the Irish language in one instance. This limits the generalisability of the findings as is a feature of all qualitative research.

The research was linked to and informed by the AgroCycle research project, and its material formed the basis of the content for the research workshops. The content from the AgroCycle industry and scientific partners was often complex and difficult to fully understand. Therefore, as researcher alongside primary school children, I had to be careful of the content I was choosing to share due to time constraints and potential level of challenge for the

children. It was regularly considered carefully with my supervisors and critical friends. Additionally, although I was present in the sessions as researcher, I was also by profession a primary school teacher. It was vital to prioritise the researcher and co-participant role over my role as teacher. This used considerable mental energy at the sessions which could be perceived as a limitation or challenge. It was essential to maintain a careful balance of research and pedagogical consideration in the design of the sessions. The research journal and regular discussions with my critical friends ensured this balance was maintained.

There were also other adults present during the sessions and it was essential to discuss with them from the outset of the research sessions, the importance of not doing the work for the child participants or explaining content without due effort on the part of the children to unpack this content themselves. Every effort to remain impartial and to effectively research alongside the participants was made by only recording what was said and not altering it in any way.

Hammersley comments that qualitative research includes unstructured data where engagement in rigid, formal measurement is not required but rather qualitative measurement can be achieved by researchers observing and recording their own descriptions of what they observe (2013:12). With a researcher's journal, there is always a risk of unconscious bias, which requires constant critical reflexivity. The relationship between researcher and participants is also key. Given that I, as researcher, was unfamiliar with the participants before engaging in the research, I had to build up a relationship of trust with the participants which takes considerable time, skill, and care.

As observation was an integral method of data collection, I was conscious that some participants may behave differently if they feel they are being observed. The children were reassured however, that some observations may be recorded, before during and after the research. This may also reflect the fact that the research occurred in the school context where the adults present are often engaged in similar activities of recording. A careful distinction was made clear to participants that these activities and recordings were for research purposes and so governed by the confidentiality and informed consent processes of its ethical processes.

5.15 Conclusion

To conclude, in this chapter, the research rationale was outlined. The research approach including the arts-based methods and pedagogy of love, and overall design of the research – including research sites, context and participants, research methods and analysis processes were highlighted. Important ethical considerations and limitations have been clarified, and gaining informed consent and assent from all participants, whilst guaranteeing them anonymity and freedom to withdraw at any stage was explained. Interesting to note, although the research was explained to all participants in the relevant documentation (included in the appendices) there was a very comfortable culture of discussion and questioning at all sessions. The reflection below illustrates one of the moments which captured further discussion between the participants and me when the research was orally communicated and discussed:

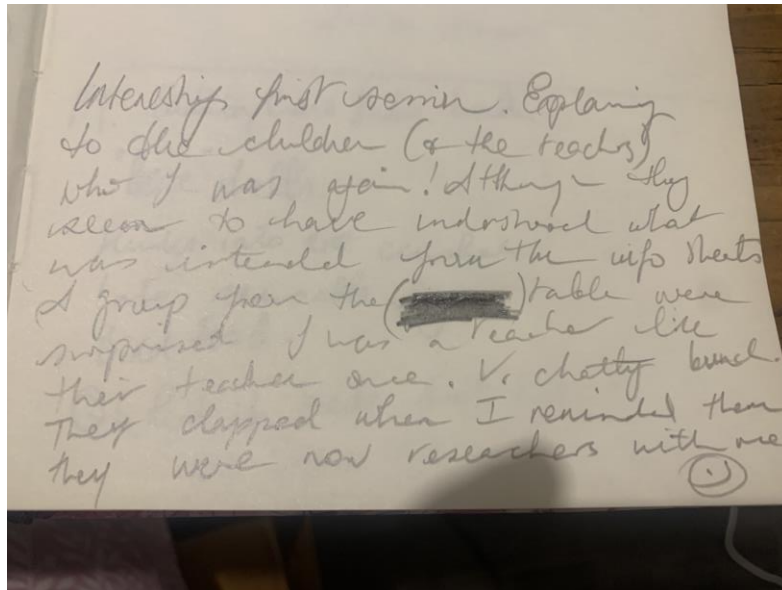


Figure 5.10 Researcher's journal reflection on orally communicating the research

The following chapter will present the findings from the research.

6. Chapter - 6 Findings

6.1 Introduction

This chapter introduces the findings from the data created by the participants to illustrate the meaning making which occurred throughout the research in schools. The insights shared by the participants as they made meaning of their world and the research content through images and text was an honour to observe and is shared in the chapter ahead. As described in Chapter 5, the data collection was not linear, rather it emerged at regular intervals during the research workshops and observations, often at unexpected times. It provides a lens into the meaning making and thoughts of participants in the research. As discussed in the previous chapter, one of the purposes of this work was to create a constructivist experience which as Merriam and Tisdell explain focuses 'on how people construct knowledge or make meaning' (2015: 24). Analysis of the arts and observation data of individuals were presented in this

chapter, along with data co-constructed and negotiated in group work and analysis of the researcher journal.

The findings, and the discussion in the next chapter, provide the reader with insights to the meaning that the participants were expressing in their art pieces and their design projects. Many of the participants felt that their art and designs were self-explanatory and therefore chose not to add text, but others added text to clarify their intentions. Journal reflections and observations are also represented in the findings, where I record observations and extract meaning from the artistic responses and textual responses representative of the experiences of participants.

Firstly an overview of the data sets gathered is provided, followed by an explanation of how the findings of each data set were identified. The findings are then organised in the chapter under the main research questions of the workshop sessions explored at the research sites. The findings correspond to the overarching questions - 'How do young people engage with sustainability and the circular economy concept through arts-based methods? What is the impact of these approaches on the children's engagement with the circular economy and sustainability?

The key questions informed the pedagogical purpose and structure of each session which subsequently worked through the circular economy. At each session, the key questions explored were:

- **Session 1 Key Question:** Is waste ever waste?
- **Session 2 Key Question:** Is it possible to valorise waste and what are the implications if it can be done?

- **Session 3 Key Question:** Where can we find examples of a circular economy in the natural world?
- **Session 4 Key Question:** Can we identify the SDGs relevant to our designs and can we plan a circular economy design or process using what we have researched and learned to date?
- **Session 5 Key Question:** Do the projects depict circular economy content in context, and can the participants communicate the circular economy concept through their designs and presentation?

This style of presentation will provide a holistic view of the themes and information which emerged from the research, the art samples, the design projects, the *Talk to an Adult* sheet, and the reflective journal observations. Through the participation of primary school children and a small number of staff, the findings offer an understanding of the meaning that was made from a myriad of perspectives from all involved. Ensuring the data emerged through different methods enabled more open and differentiated experiences with the participants as individuals. The chosen methodological approach was an integral contribution to this thesis and was the vehicle through which the meaning making of participants was illuminated in the findings presented.

6.2 Data Overview

Using multiple data collection methods enabled a rich data set to emerge and it captured the holistic and creative nature of the experience. The participants had the opportunity to learn and explore new scientific and sustainable development content and in doing so, enabled me to uncover a rich collection of findings. It should be noted that at each research site during

the first session, the participants were invited to raise a green card if they had heard of or understood the term circular economy. If they had not, they were invited to raise a red card. At all three sites, only red cards were raised. This illustrated that the baseline understanding of the circular economy concept was at level zero. No participant had heard of or understood the circular economy concept on the first day of the sessions at the three research sites.

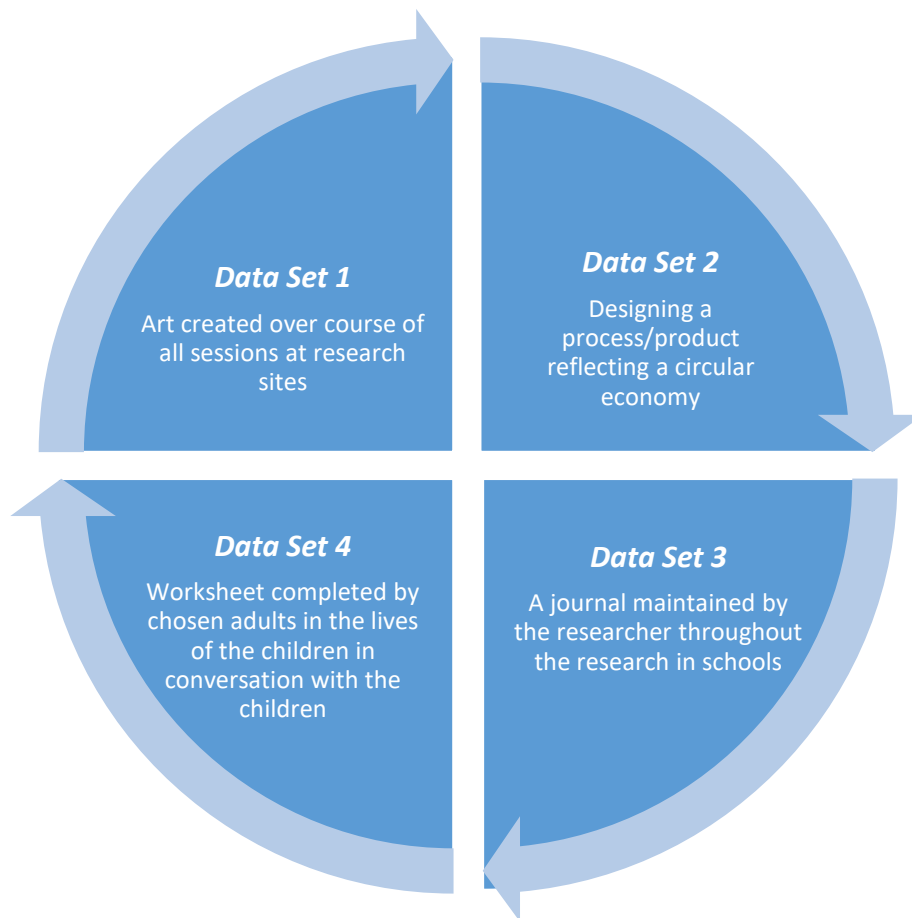


Figure 6.1 Data Sets Diagram

6.3 Identifying the findings in the data

6.3.1 Themes

Findings emerged from analysis of 70 art samples across the 3 schools created and volunteered by the participants, out of which themes became visible when Braun and Clarke's thematic analysis theory was applied (2006).

This approach facilitated examination of the artistic efforts of the children and by including arts-based activities and allowed the children to ask questions themselves about the world around them, and to make meaning from their lived experiences. An example of this is presented below to give an initial sense of the type of art created by participants during the sessions. The full body of art created during the session is presented during the remainder of this chapter in later sections. This example of art by TC9 was drawn in situ at the sea during the outdoor session 3 with the accompanying text (the participants were assigned acronyms for anonymity purposes labelled 1-91 and using the letters TC for target child and TA for target adult). It was analysed as reflecting the theme of care and a significant awareness of love for the natural world, noting how the participant made meaning of his lived experience and simultaneously applied his recent learning.

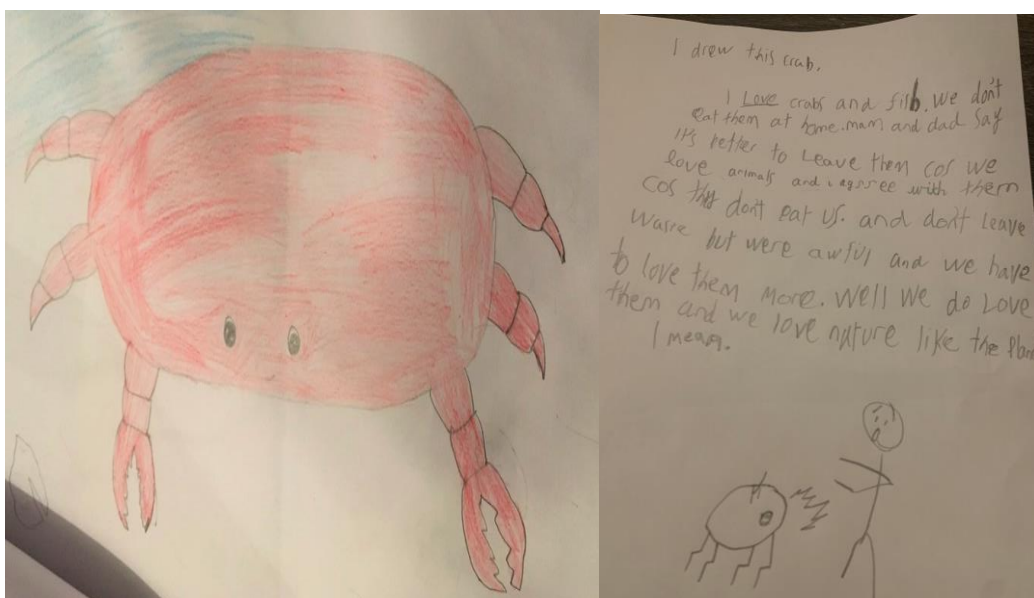


Figure 6.2 Participant artistic data sample A

A crab drawn by TC9 while observing a dead crab on the beach after the recent storm with his comments/rationale.

The three specific themes emerged from the analysis of the art samples which were:

A) The presence of emotion - There were 49 references/responses made during the research (56%).

B) Recycling is seen as the main aim of environmental awareness and care. 24 references to the green-schools programme and the aim of environmental awareness and care being primarily for recycling were made during the research (27%).

C) There were 15 expressions of animals in danger or close to extinction during the research (17%).

Themes also emerged from the analysis through the rubric for the design project and the analysis of the researcher's journal. As researcher, the responsibility lay with me, in what Cohen et al., describe as 'organizing, accounting for and explaining the data ... in terms of the participants' definitions of the situation (2007: 461). It was essential that every effort was made to understand exactly what the participants wanted to say through the observations, and not to misconstrue any intention on their part. As discussed in the methodology chapter, Korthagen's 8 Windows were used to support the reflective nature of the researcher's journal, identifying thoughts, attitudes, and feelings of all participants in the observations and statements noted (Korthagen and Vasalos, 2006) (Figure 5.5).

The analysis of the keywords in the journal was used to highlight the common concepts or words which the participants used in relation to the research inquiry. It revealed the the themes of 1) Zero waste/valorisation of waste: Recycle. 2) The Green-Schools Committee: Bin and Care. 3) Outdoor Environment: Emotive. 4) Environmental Awareness and Care: Care and

Emotion. 5) Sustainable Living.

6.3.2 Participants as Teachers and Adults

Seneca's philosophy 'docendo discimus – by teaching, we learn' is explained by Ellis and Evans 'the Roman orator Seneca wrote that "we learn best by teaching." This is because if we must teach something, we now have an additional, more compelling, reason for learning it' (2010: 13). With this in mind, the inclusion of the *Talk to an Adult* worksheet offered a teaching moment to participants in the final research session in schools and a dissemination route in the home setting. This enabled the participants to build on the knowledge they gained and created through each session by linking with others in their home to critically assess how we live our lives, addressing the lack of circularity in the way we conduct ourselves and consumerism itself. It was vital therefore, that participants had an additional opportunity to teach what they knew and let the findings come full circle from school to home and back to school through the information revealed.

Ahead, the key questions which helped to anchor the sessions at the research sites and the findings will be highlighted. The questions although guiding specific sessions, resurfaced, and were deliberately recast at later sessions as they were all connected to and supportive of exploring the main research question.

6.3.3 The Sessions and Key Questions

It is important to note that the process of the 5 sessions at each research site was never linear. Although there was a guiding key question to anchor each session, all data sets were available

for use and for inclusion at all sessions, with the exception of the *Talk to an Adult* worksheet which was introduced in the final session. All questions re-emerged throughout the five sessions. Therefore, they were not limited to the session in which they were introduced, with the artwork and journaling in particular being cumulatively added to by participants during all of the sessions; and is presented under the relevant key question in the sections ahead.

6.3.4 Session 1 Key Question

Is waste ever waste?

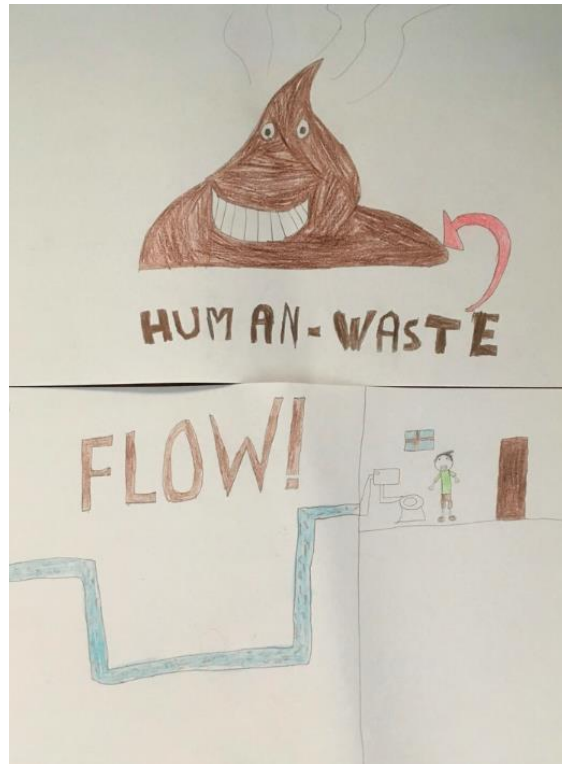
The aim of the sessions was to explore content such as the valorisation of waste and zero waste, the concept of a circular economy, the 5Rs, the necessity of stewardship, which were all supported by a pedagogy of love and Froebelian ecofeminist theoretical framework. However, the principal focus in the first session was 'is waste ever waste?' The discussion evolved to 'is it simply only waste when we decide it is waste?' The discussion explored how we have become desensitised to levels of waste and need to change the narrative to the 5Rs of refuse, reduce, reuse, repurpose, recycle. The research provided an opportunity for participants to have the time and the space to look closely at the wisdom of nature in natural systems which leaves no trace of waste. This question, although introduced in the first session, was not discarded after session one. The questions flowed back and forth and sometimes were only truly addressed by some participants outside of the session in which it was introduced. During specific keyword analysis of the researcher's journal, the themes 'zero waste/valorisation of waste' were used by participants from session one onwards, reflecting the developing awareness of the concept of waste and the potential in the valorisation of waste. See samples below of first round keyword analysis specifically regarding zero waste/valorisation of waste.

Zero waste lifestyle/Valorisation of waste

1. 'You don't use too much plastic or wastewater and stuff like that and you **recycle**' (Coleman, 2018)
2. 'People don't throw out their waste or they sell it and get money from other people for it and they can **recycle** it and get money for it too' (Dempsey, 2018)
3. 'Reduce, reuse, **recycle** is the moral behind it, like you have to **recycle** every day' (Brehony, 2018)
4. 'That means people don't throw their waste out in the right bin' (McKibben, 2018)
5. 'Is it that your life would have reduce, reuse, **recycle**? If you had a zero waste life do you mean?' (White, 2018)
6. 'Tá sé nuair nach bhfuil bruscar ar an talamh agus caithfidh tú **athchúrsáil** a dhéanamh agus níl guma coganta nó salachar na madraí gach ait' (Findlay, 2018)
7. 'Domhan gan bruscar – sin é. Nó, nach féidir leat do bhruscar féin a dhíol b'fhéidir?' (Chatham, 2018)
8. 'Ná fág bruscar ar an talamh agus déan **athchúrsáil**' (O'Brien, 2018)
9. 'Domhan gan dramhail ó gach duine, b'fhéidir?' (Coogan, 2018)
10. 'Is it that you have to eat every single thing you get to eat at dinner time?' (de Buitléar, 2018)
11. 'My mam told me that it's when you can't buy stuff in boxes or bags anymore and you bring your own bags instead when you buy stuff and she said you have to **recycle** everything so then you have no waste' (Keyes, 2018)

Figure 6.3 Keyword Analysis – Zerowaste/Valorisation of Waste

One group developed and presented their design of a human waste machine over the course of workshops to provide enough energy for a family home which reflected a deepening understanding of the concept of waste. The design by the group entitled 'The Flow Machine' addressed what could be suggested as the epitome of 'waste'. It was constructed from environmentally sound and recycled materials, removing human waste from a home through a plumbing system reflecting sophisticated circularity. They advised waste would flow outside the building through pipes underground into an underground machine. Here it would be converted to energy which would power the household. This cycle would be continuous and of a circular nature. For added impact, they communicated a suggestion of converting to a vegetarian diet to ensure less impact on the environment. This was scientific and innovative. As the rubric recorded, the communication of their design both verbally and artistically was of a very high standard. See below:



**Figure 6.4 Participant artistic data sample B
A Design Project – The Flow Machine**

Children at the three research sites discussed this and created scenarios whereby they were trying to establish where products or waste ended up eventually, scenarios which they had not discussed at length before.

The evolving understanding of the concept of waste was evident in the emphasis placed on the concept of 'no away' when exploring the concept of valorisation of waste in datasets 1, 2 and 3. For example:

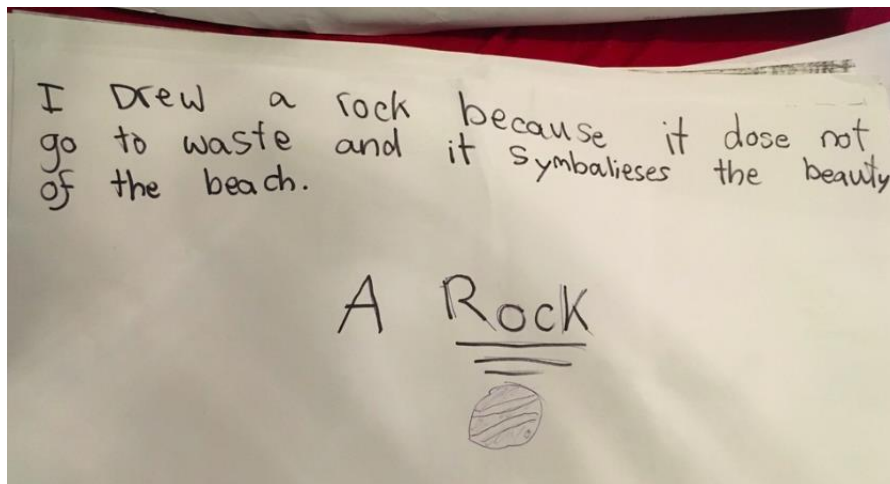


Figure 6.5 Participant data sample C

TC14 stated 'I never thought about that away idea before. The rocks are here and won't be going away yet but like they're not waste and like no one made them like so that's ok'.

During the design project presentations, a child was working on her design project in session four and expressed concern that there was a suspected unused or wasteful link in the circular system of design. For example, TC34 expressed considerable concern about the peel and pulp of the lemon after making the lemon spray. She stated 'there's no way that lemon stuff is going into the ordinary bin, that's a biological waste isn't it? That means it can go back into the ground like' (TC34). This demonstrated a considerable level of understanding of the sessions and the content, but specifically, accurate language acquisition. The term biological waste was taught explicitly to the participants during the workshops. Journalling from the first workshop revealed that participants were unfamiliar with these terms before the sessions in schools. See the first and fourth point below from one of the adult participants when was present. When all participants had shown a red card indicating they knew nothing about the circular economy, the relevant adults also agreed.

Other Adult Participants

1. 'I never heard some of the words you are introducing to them today' (MacArdle, 2018)
2. 'The children were saying they were so delighted to get outside, I really need to go out more with them, there's just so pressure to get the curriculum covered, I do forget to go outside' (O'Sullivan, 2018)
3. 'Gosh, I see a shift in mindset in the children since last week, it's like they genuinely care more or are looking at things differently' (Crawford, 2018)
4. 'What is the circular economy? I'm learning a lot of new stuff myself here' (Newton, 2018)
5. 'I think the idea of art with SESE and SDE is a good idea, you can see they're all engaged in this, I'm going to do more of this myself' (Power, 2018)

Figure 6.6 Adult participant commentary noted in researcher's journal

The conversation concerning what defines waste continued throughout the sessions. The questions from participants increased too. After handling the materials shared by the other AgroCycle partners, coffee cups made of food waste, and bioplastics made from potato pulp, participants began to question the ethics regarding waste and perceptions. For example, an adult participant stated the following:

'Cuireann sé gliondar ar mo chróí nuair a chloisim na ceisteanna ó na páistí. Mar shampla – conas a chruthaigh tú an póstaer sin? An déanta as prátaí é? Ar a laghad tá siad ag smaoiniamh i mbealach éagsúil.' (Journal entry, March 2018)

(Translation: It delights me when I hear questions from the children. For example, 'how did you create that poster? Is it made from potatoes?' At least they are thinking in a different way).

This illustrated that the understanding of environmental care was starting to move beyond simply recycling or being wasteful. This can be interpreted as the presence of Froebelian ecofeminist theory whereby the participants were beginning to delve more deeply into the

interconnectedness of all life. As researcher, this was a very uplifting moment of realisation, and I recorded my observation at one of the research sites:

'Hearing the pupils talking about 'no away' really lifted me this morning. They said they started thinking more about it after the last session and that there really is 'no away'. Maybe we are making an impact after all?' (Journal entry, February 2018)

Following the outdoors session, one of the children took a photo using the class iPad. He stated 'here's a big example of that circularity idea we keep talking about and you can put it on your wall if you want' (TC74). This emerged after a meditation in the forest, not typical of SESE subjects, it followed an earlier discussion on the SDGs and was in line with the key concept of circularity that was woven throughout the many workshop sessions.



Figure 6.7 Participant data sample D

The art samples which participants developed throughout the sessions also provided very interesting data on how the participants perceived waste. Recycling was seen as the main aim of environmental awareness and care and 24 references to the green-schools programme and the aim of environmental awareness and care being primarily for recycling were made during the total responses coded for this research. The following images illustrate this finding:



Figure 6.8 Participant artistic data sample E

'Athchúrsáil' meaning 'Recycling' with references to the 'Coiste Glas' meaning 'Green committee' of the Green schools initiative, with the recycling bins represented here and the image of fire and the words 'global warming' below it, indicative of the connection participants were making between both.



Figure 6.9 Participant artistic data sample F

This art sample also represents recycling, with the large tick indicates the importance of recycling for the participant, and illustrates the familiarity with the logo of recycling clearly identified on the bin. Also noteworthy are the bright sun, smiles and figures actively putting litter in the bin.



Figure 6.10 Participant artistic data sample G

Again, familiarity with the recycling symbol and bins is evident in this art sample, with the participant showing figures actively putting waste in bins, with a sad face and happy face in relation to the right bin to use, followed by the recycling symbol. There is clear acknowledgement for what is right and wrong in human behaviour about recycling evident in these art samples. The awareness of the children to be active and do what they had learnt as 'right' was evident in their work.

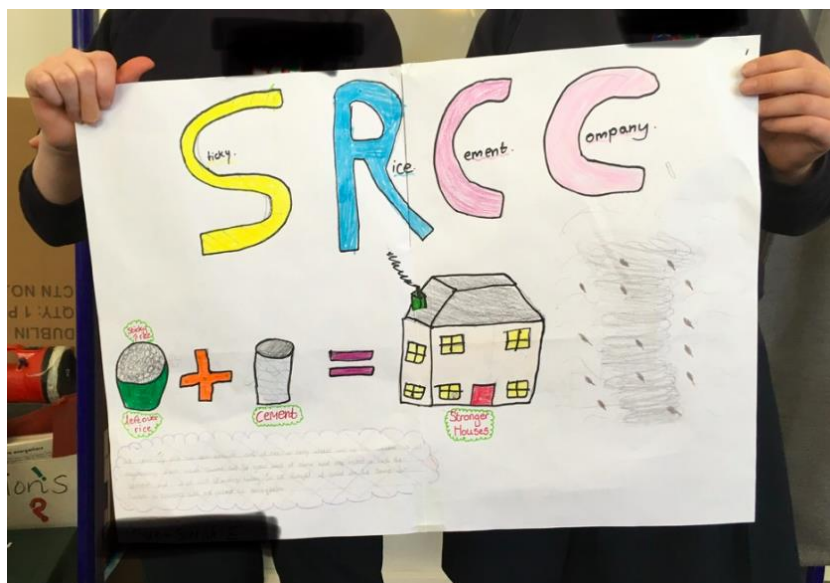


Figure 6.11 Participant artistic data sample H

The participants in this group, researched the issue of excess rice and created a design whereby a company would produce a product to reinforce buildings with excess amounts of rice left around the world. They called their company the 'Sticky Rice Cement Company' and it would ensure there was no waste created from excess rice. This idea was percolating from early on in the research and the participants conducted extensive research online and in their local library between sessions to support their work. They also made powerful connections between the issue of waste and the ramifications of climate change and communicated these clearly through the images and mathematical symbols used in their poster. 'Couldn't they pack this into buildings that are in countries that could get typhoons and tornados and big storms now because of climate change. Because we read that they put leftover sticky rice into the Great Wall of China and that's never fallen down' (TC16). This is a reflection of an awareness of the interconnectedness of all things which was subtly woven through all of the sessions.

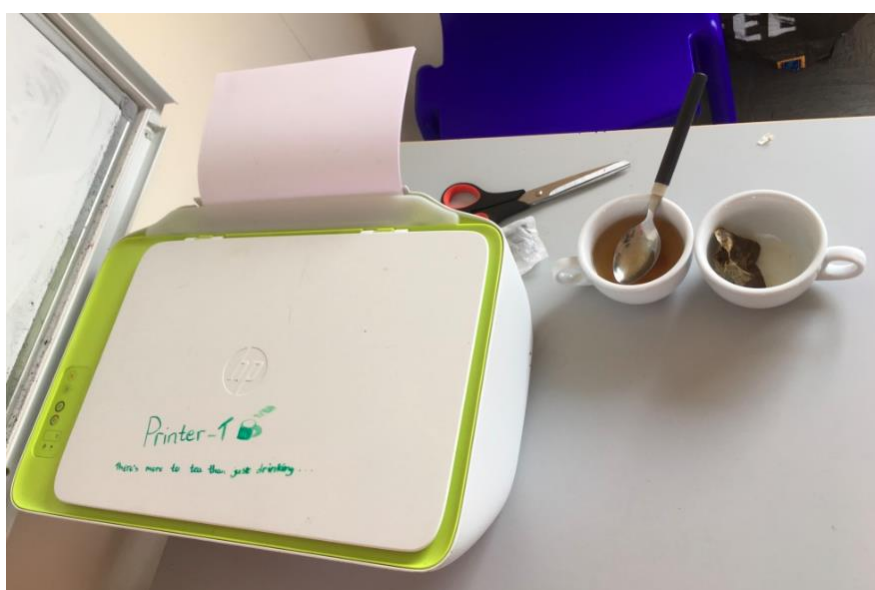


Figure 6.12 Participant artistic data sample I

Recognising the excessive amount of tealeaves wasted daily in her home, another participant designed a company that would produce tea leaf printer cartridges made with no plastic packaging unlike the many ink cartridges currently on the market. When used, the participant stated 'and then you put them in your compost and the biological nutrients will go into the ground and be eaten again by the ground so then there's no waste again' (TC81). With much discussion around waste and if waste is even waste, session two organically progressed to exploring the possibility of making value from waste.

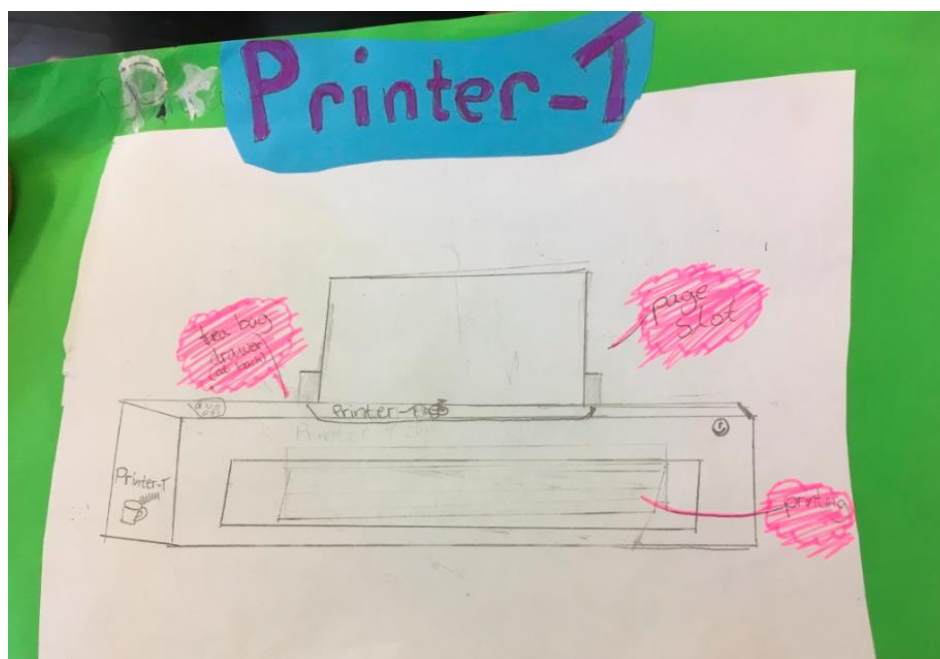


Figure 6.13 Participant artistic data sample J

6.3.5 Session 2 Key Question

Is it possible to valorise waste and what are the implications if it can be done?

In session two of the research in schools, the participants discussed the concept of waste valorisation. As discussed during the first workshop, the participants had no awareness of the

term 'waste valorisation', or a circular economy concept prior to the inception of the research sessions. This included the adult participants also. One of the most frequently used mantras in relation to ESD in primary schools in Ireland, is the concept of the 3Rs – Reduce, Reuse, Recycle. It is illustrated and visible in all schools participating in environmental awareness and care and it has become a well-known mantra in school communities. The 3Rs terminology encourages positive behavioural change in students, in their families, and in the wider school community. It is often transformative for some families, who may not have applied the 3Rs to their daily living.

In the design projects, regarding context, all participants created artwork, with the rubric revealing that 89% of all participants were able to illustrate examples of waste valorisation and 54% able to illustrate a good example of a circular economy concept. The majority of participants were able to engage with the context, content, communication and Q&A aspects of the process and the design presentations positively and innovatively. The majority grasped varying levels of understanding of a circular economy. Capra and Luisi highlight that throughout history artists have significantly contributed to the 'advancement of science' through the exploration of patterns, context and relationships (2014: 357). As the circular economy concept is a circular system built on relationships within, this way of thinking and approaching the circular economy at the research sites, greatly supported the participants in understanding the concept of valorisation.

All participants contributed artwork. This high percentage also indicates a new level of understanding around the concept of a circular economy. It suggests the benefits of using an

arts-based approach to facilitate expression of learning about concepts a circular economy in order to facilitate comprehension and communication.

Through the keyword analysis of the researcher's journal the findings show the emphasis the participants placed on recycling early in the research. When focusing on zero waste possibilities and the valorisation of waste, out of a possible eleven statements made, eight contained the word *recycle*, or *athchúrsáil* in the Irish language. While the catalyst was the concept of zero waste and a related concept, the idea of the valorisation of waste, the word most often represented by participants is *recycle* or *athchúrsáil*, in the Irish language. It may be that the participants, when they discuss or hear anything related to environmental awareness and care, immediately think of the action of recycling rather than the full process of valorisation of waste. This highlights the issue of language and the need to develop people's vocabulary and conceptual thinking about sustainability and related issues. Linked to this was the emotional joy expressed through language regarding the outdoors or the thought of going outdoors, which were emotive and imbued with care and joy. For example, 'I love going out' (TC88), 'Yay, is aoibhinn liom an abhainn' (TC11), 'Aw, that's so sad, look at the poor little octopus' (TC21).

The need for a shift in mindset was reflected in the data, especially at the outdoor amenities, where the eyes of the participants were drawn to discarded rubbish at each site. For example, the photograph of the outdoor classroom below with the rubbish strewn therein and also the images of the river with rubbish discarded and burnt here:

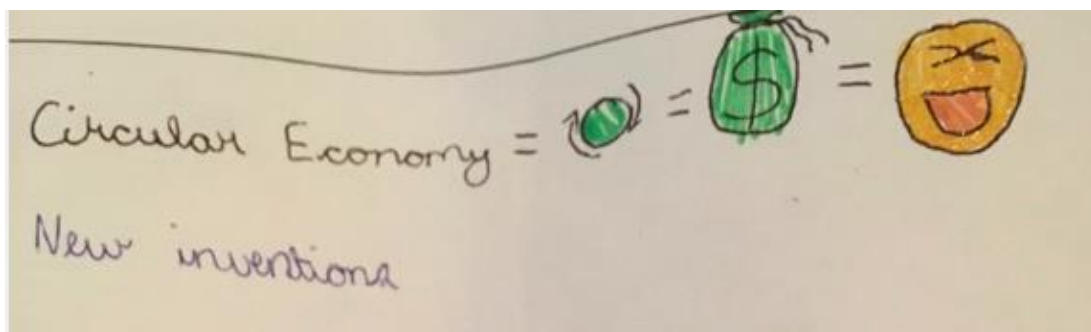
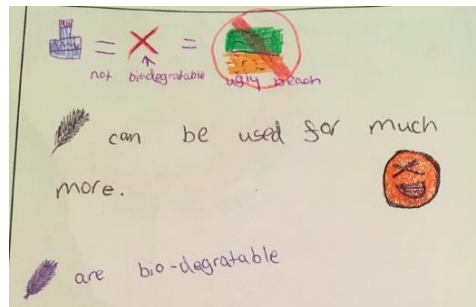


Figure 6.14 Participant data sample L

Participants were aware of the sources of discarded plastic packaging and other materials were always human ‘Oh yeh tá cannaí ansin mar chaith daoine iad san uisce’ [sic] (TC77). Points like this translating as ‘oh yeh, the cans are there because people threw them into the water’ were stated after meditation and discussion at the river. A realization occurred for the participants that nature does not create waste but rather humans do, which the discarded beer cans in the beautiful river demonstrated for us.

Collaborative work and communications also increased amongst participants with teachers in two of the research sites commenting on the increased communications between students. The level of conferring amongst participants increased greatly when the concept of valorisation of waste was introduced according to two out of the three class teachers. T2 stated ‘the children are discussing the project way more than other projects, I haven’t seen them conferring like this before about the environment or the planet’ (T2, Journal entry). T3

stated 'the kids are buddying up in groups now when they're working on the projects, even conferring together. One or two teachers on yard have remarked they are getting more environmentally aware' (T3, Journal entry). As the session progressed the art samples demonstrate an advancing understanding of the concept of waste valorisation and the concept of a circular economy.



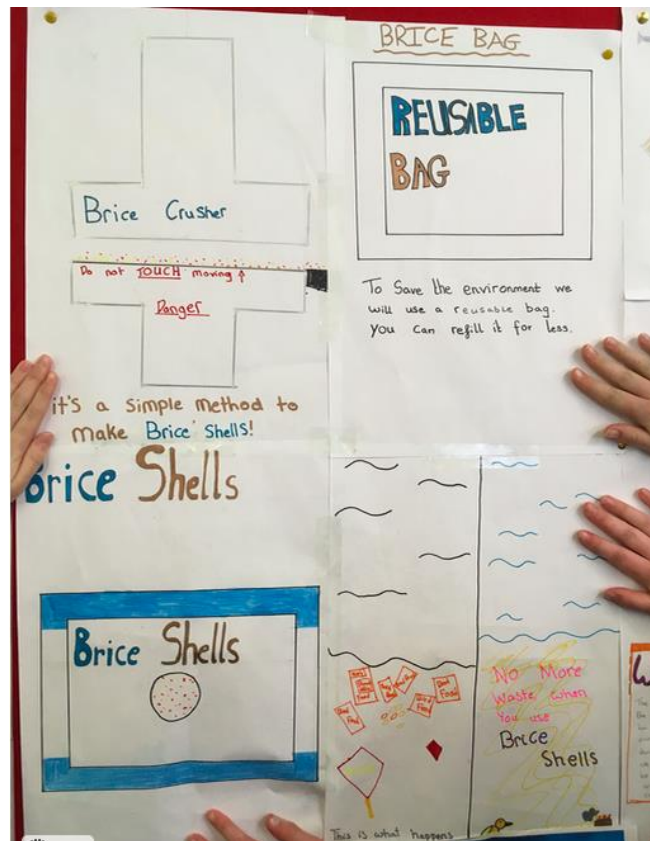


Figure 6.15 Participant artistic data samples M

The three participants of this group were very interested in the processes that occur to produce white rice and other variations of rice and were concerned about the excessive waste involved, which was highlighted during the sessions. They decided to use the husks of rice and mix them with seeds to feed to birds so that the rice waste would no longer be waste. This act of valorisation would also create revenue for them and their new company. Environmentally it would positively enhance bird life and they chose to call it 'Brice Shells' that would be packaged in a foodwaste bag repeatedly reused. The focus on waste valorisation in a circular economy is evident in their thinking about how all aspects of this process can be re-purposed and made into a new useful product with zero waste.

6.3.6 Session 3 Key Question

Where can we find examples of a circular economy in the natural world?

Cornell emphasises that as adults, we must reveal and share our love for the natural world with children, in stating:

I believe it is important for an adult to share his inner self with the child. Only by sharing our deeper thoughts and feelings do we communicate to, and inspire in others, a love and respect for the earth. When we share our own ideas and feelings, it encourages a child to explore, respectfully, his own feelings and perceptions (1979: 12).

During the research, the attention of the participants was explicitly drawn to observe and discuss the circularity that is ever present in the natural world. By imbuing Froebelian ecofeminist concepts in the practical workshops the awareness of the participants was heightened to the wisdom of the natural environment.

The design projects presented in the last session show significant understanding and application of an understanding of the circular economy concept in the work and experiences of the participants throughout the sessions.

Following the presentation of the projects the certificates and apples were gifted to the participants in the forest in the Galway school. One of the children brought the class iPad and invited her group to stand in a circle. She took this photo herself and, on the walk back to the school later, she told me to look through the photos and find the one of the circle of apples. Finding this, I recalled her comment on her walk when I asked her why she photographed them like that. She stated, 'we were in a circle group because we're all equal like you said all the time and we all put our apples in the compost before we went back in, so they're gone back in a circle too and back into the ground' (TC16).



Figure 6.16 Participant photographic data sample N

This was insightful and reflective and an indication of deep understanding of circularity and zero waste as a result of positive and active engagement rather than encouraging ecoanxiety or paralysis which can occur as discussed in Chapter 7, section 7.3. The striking penguin drawing, followed by a fish seen on the beach below illustrate the concerns of participants and demonstrate certain levels of ecoanxiety in both the sad penguin, fish and accompanying texts. The data illustrate the emotive responses also emerging.

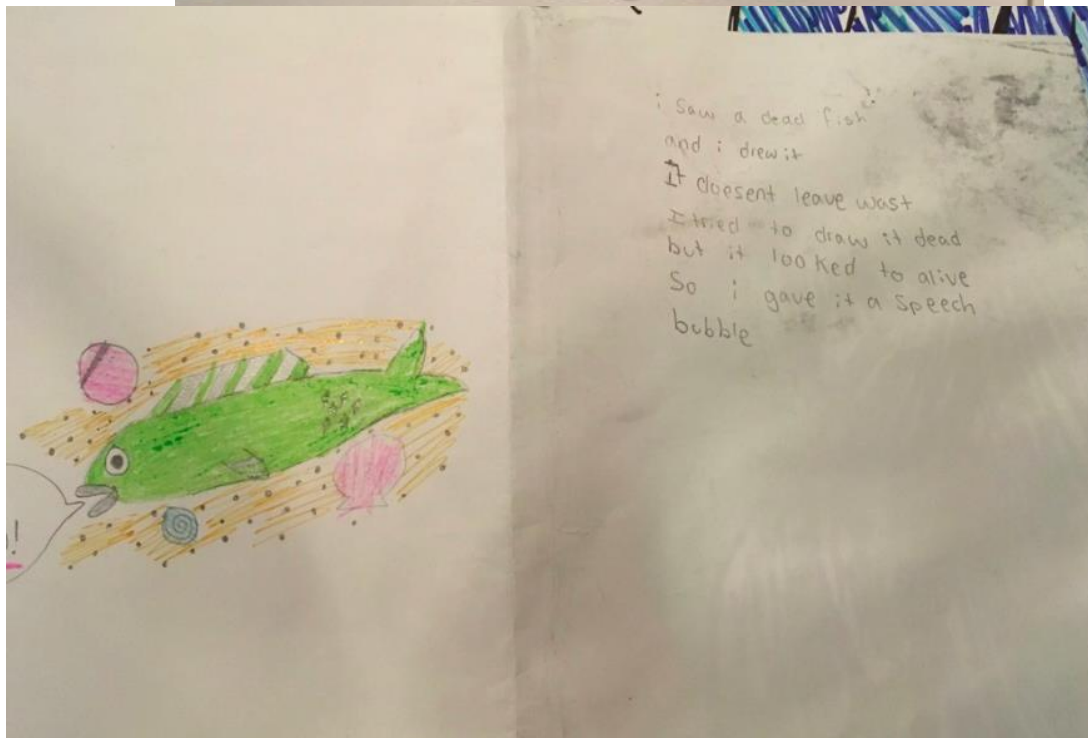


Figure 6.17 Participant artistic data samples O

This fish and description depict an emotive reaction and when I questioned the participant about this, her response was 'well I think if we don't care then more fish will end up dead and this one is cute so I want to remember it alive not dead' (TC88). The domination of nature shown in the often emotionally charged art samples is evident in one participant's work stating in commentary regarding the art they created depicting a mudslide wreaking havoc

on the natural world for all living things 'this is a mudslide because of what people do there's crazy weather and stuff, and that'll hurt animals and even people too' (TC26).

Introducing the concept of a circular economy to the participants was a new and novel occurrence in these three schools. The findings reveal a deepening understanding of a circular economy concept but also of engagement specifically with the Earth. Given that 26 participants who responded to the *Talk to an Adult* worksheet cited going to the outdoor amenity as the most enjoyable aspect of the five sessions, this shows the enthusiasm of children in being outdoors. One reporting adult stated 'she [child participant] was thrilled to be outdoors and said she wants to go out a lot more' (A3). A second adult stated 'he said his art is better when he does it outside so yes, this was the best part for him' (A12).

The excursions to the natural amenities (the river, the forest, and the beach) were an opportunity to discuss with participants this ecological view, whereby humans *are* nature, and an integral part of the natural world and where the circular economy is represented. The time spent in the outdoors was a deliberate act, and one which was intended to encourage empathy, patience, and strengthen love for the natural environment. As a researcher it was vital that I exercised and modelled this, in line with the curricular intention of encouraging responsible attitudes and modes of behaviour relating to the environment and thus foster the concept of humans as custodians of the Earth for future generations as described in the IPSC (1999c: 6). Many of the participants were very surprised when they consciously acknowledged this fact. See a sample of observations from the researcher's journal below collected at the three research sites, recorded during the design project presentations:

'That's mad, then why do we say throw it away. My mam says throw it away. I'm telling her then that she's wrong cos it doesn't go anywhere like' (March, 2018)

'Wow, yeh, so cá rachann [sic] sé nuair a chuireann tú bruscar sa bhruscar mar sin? Cá bhfuil sé críochnaithe nó an bhfuil sé críochnaithe?' (March, 2018)

'D'ya know that's actually right, cos if you throw something away and then it goes to the dump, then the dump makes it go into the ground, but the ground is the ground so it's still there. And anyway, it's not like we can throw it off the side of the planet cos the Earth is round anyway, so yeh I think that away isn't even anywhere' (April, 2018)

The design of the workshops encouraged the participants to focus on connection, after seeing and developing a greater awareness of the interconnectedness of all things in the natural world. Focusing on love, a love for the work, a love for Mother Earth, the designs of participants revealed an explicit intention not to impact negatively on the Earth but rather be empathetic and sympathetic to the needs of the planet.

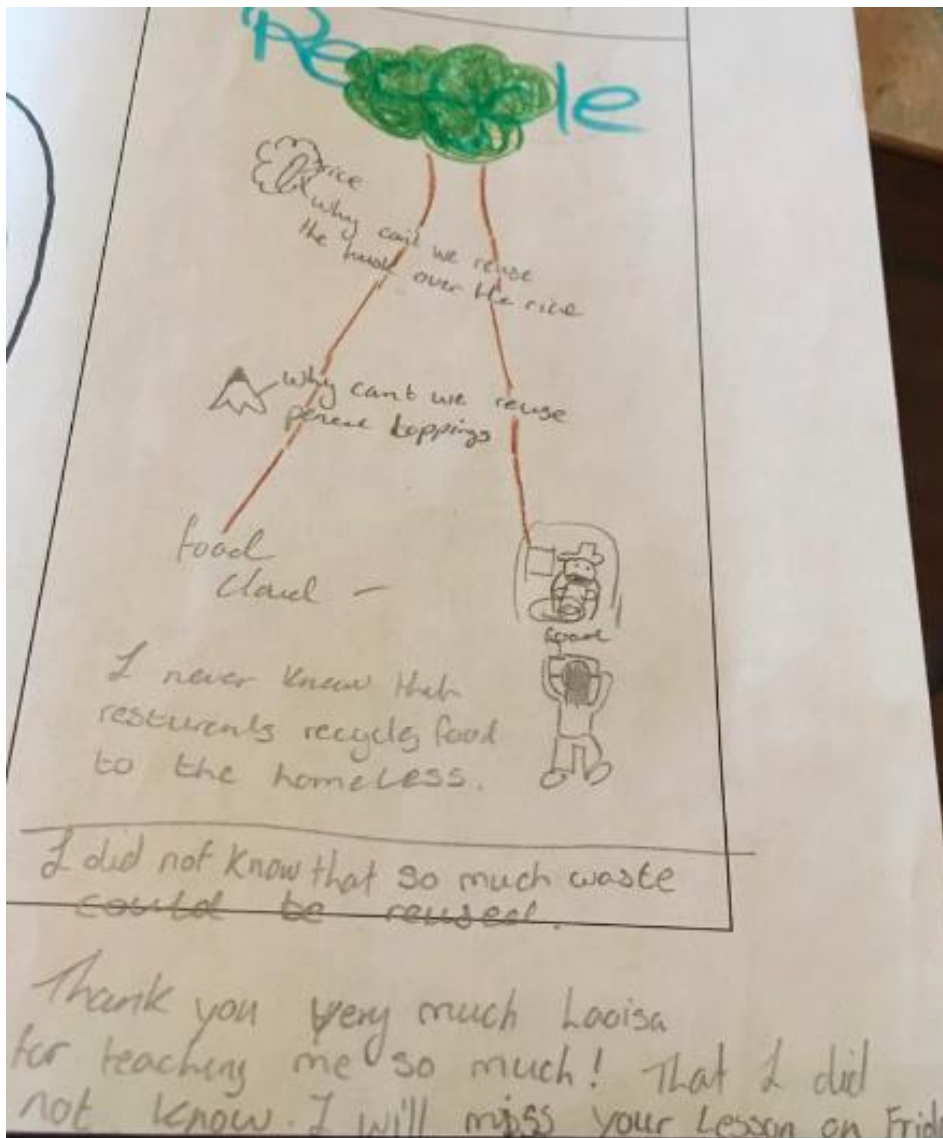


Figure 6.18 Participant data sample P

This picture illustrates several findings. However, the central finding is the illustration of a tall tree. The participant explained that she placed the tree at the centre and added information around it to demonstrate that as the tree is an example of a circular economy, other areas of life can reflect the same, and how she questions the amount of waste which could be reused. The finding below comes from a drawing of another participant. She discussed that it was now her understanding that a tree is an example of a circular economy. When asked if she wished to add text or if there was reason why there was no text, the participant replied that it was obvious from the illustration that 'this is the circular economy here like, I know that

know cos [sic] it comes out of the ground and then goes back into the ground and then does it again and nothing is wasted like' (TC13).

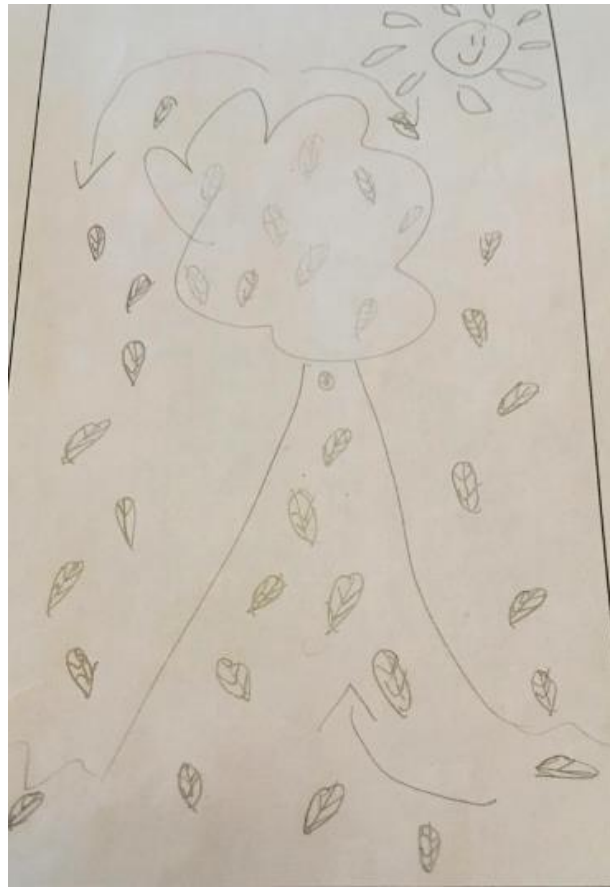


Figure 6.19 Participant artistic data sample Q

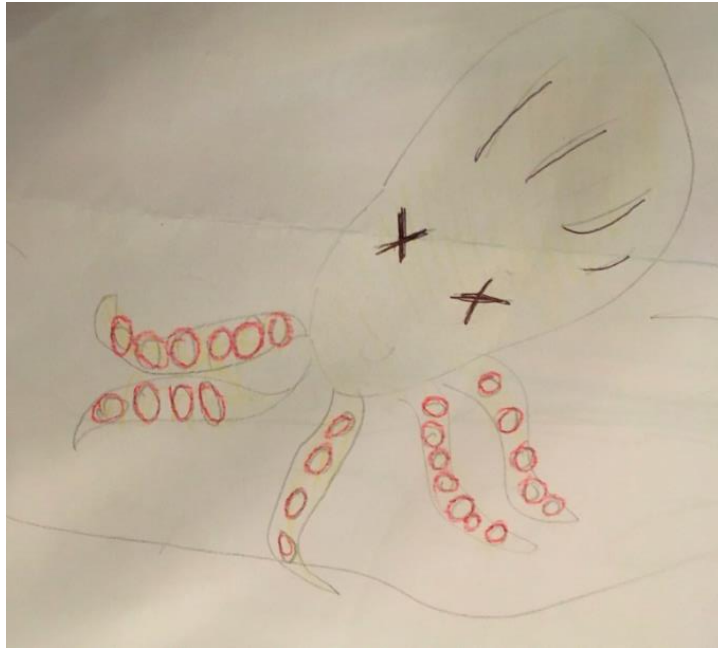
During session three, we walked to the beach and there had been a storm the previous night. The children had a very exciting time inspecting the casualties. The idea of 'no away' emerged graphically when they spotted a very small octopus which had been thrown ashore in the storm. Interestingly, the common octopus was nearly never seen as far north up the east coast as it has been seen recently. Scientists believe that due to warming waters because of climate change, they are becoming more frequent visitors lately. I recorded in the journal a remark one of the participants pointed out at the time, when he mused that the sea would soon take it back out again and larger sea creatures would eat it for food because nature does not create waste (figure 6.20). 'It's grand because that's not rubbish. A bigger fish or sea

creature will eat it when a wave comes in and takes it back out' (TC18).



**Figure 6.20 Participant photographic data sample R
A casualty of the storm at session 3 on the beach in Wicklow**

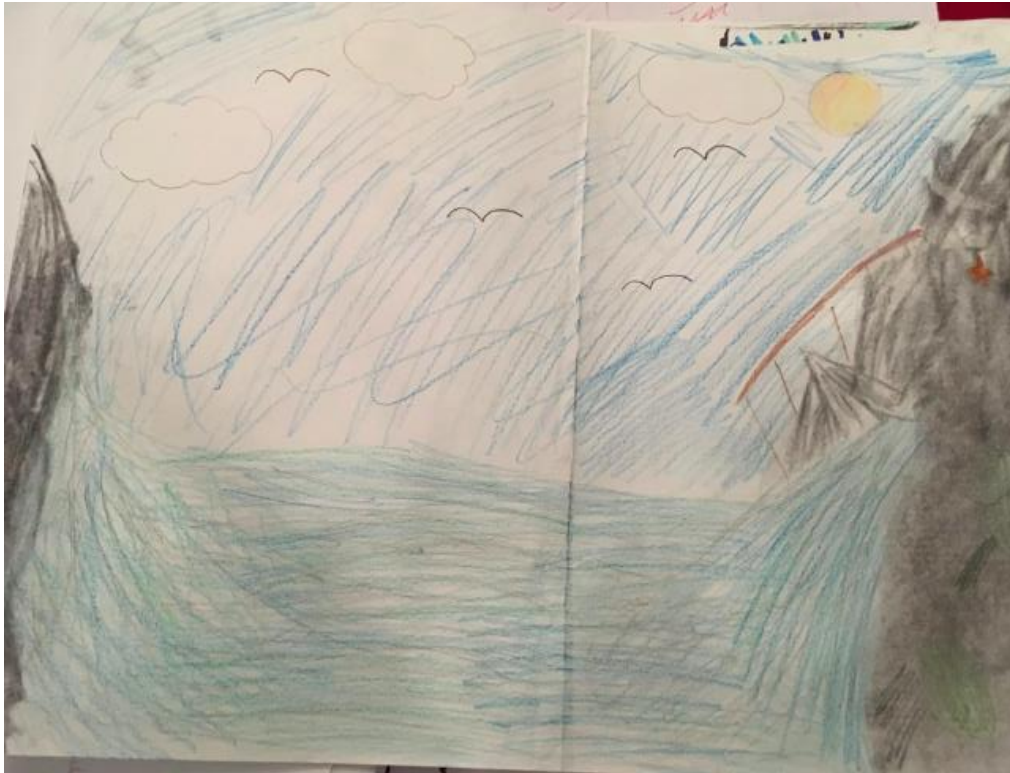
Another participant chose to illustrate it. She stated that it was a mysterious creature and smiled as she explained her interest. The beauty and wonder of nature which Froebelian philosophy would seek to highlight was illuminated in her words and illustration, so it is important to observe and take note of these insights into the mind of the child.



it doesn't leave any mark and it's a mysterious animal

Figure 6.21 Participant data sample S

During the same excursion, a participant chose to illustrate the whole cove. She remarked that she found the morning 'really relaxing'. Her illustration is below, followed by her comment explaining why she chose to draw the whole cove, representing how outdoor learning is embodied, holistic and engendering a broad range of emotions.



I chose the Cove
because its beautiful, mysterious and
full of life and it doesnt produce
waste. It is also an example of a circular economy

Figure 6.22 Participant data sample T

One of the children, using the class iPad, took the time to photograph a fish that had been washed up in the storm (Figure 6.23). He stated 'This fella drowned or the opposite of drowned like! But when the tide comes back in then a bigger fish will eat it so yeh, I actually believe that nature doesn't make waste. It's like the circular economy idea' (TC 27).



Figure 6.23 Participant photographic data sample U
A casualty of the storm at session 3 on the beach in Wicklow

6.3.7 Session 4 Key Question

Can we identify the SDGs relevant to our designs and can we plan a circular economy design or process using what we have researched and learned to date?

A 92% majority of participants in week one was unfamiliar with the SDGs. For example: ‘Níor chuala mé rud ar bith faoi na spriocanna siúd roimhe seo’ (TC51). This translates as ‘I never heard anything about those goals before’. ‘Sustainable development goals, what are those?’ (TC62). Showing progression of learning and knowledge acquisition, 64% of participants referred to the SDGs in their communications about their design projects in the final week. The participants undertook investigative work during the workshop which was rooted in sustainability with the support of the SDGs (2015).



Figure 6.24 Participant data sample V

One group, when presenting their design project, illustrated an electric car which was powered by plastic bottles. When asked why and similar questions, they repeatedly returned to ‘it’s sustainable, it’s more sustainable, it’s all about sustainability’ as noted in the researcher’s journal. Admittedly, it was not the perfect example of a circular economy but there were elements of it, and it was both innovative and creative. For example, the solar panels powering the car created no waste as they worked. Also, recycling bottles to create fuel rather than sending it to landfill, also reflects elements of the circular economy concept (figure 6.24).

When observing a group who designed a natural skin care cream (Figure 6.25), a question from a participant was ‘what about the pot though, is the pot made of plastic, because that wouldn’t be good?’ (TC7).



Figure 6.25 Participant data sample W
A Design Project – All Natural Skin Care Cream

The group of four based their product on plants and herbs growing in one of their gardens. When presenting their design, they expressed that in keeping with sustainable goal 12 'Responsible consumption and production' (UN, 2015) they would create pots that would package their product from something other than plastic as they thought plastic was not 'responsible'.

When we participated in a recce mission to the nearby forest in advance of session three to the outdoor amenity, a participant who had been very vocal in the discussion regarding the SDGs took the following photo with the class iPad:



**Figure 6.26 Participant photographic data sample X
Ignoring SDG 12**

At the weekend, there had been some unexpected guests to the private forest at the back of the school. Looking closely at the pile of rocks and sticks there is a bottle visible which the partial label revealed as a cider bottle. The child participant noted on his artwork later 'that's not keeping to the SDG 12 that we talked about. Whoever drank that alcohol didn't do it responsibly and SDG 12 says you have to try to be responsible in production and in consumption. They consumed [sic] it and threw it in the forest and that's not what SDG 12 wants you to do' (TC61). The fact that these participants who were wholly unaware of the SDGs when the research in schools began were now connecting the theory of the SDGs to everyday events in their own lives was truly heartening.

The definition of sustainability was not linguistically defined clearly in one single definition by the participants by the end of the research sessions. This was an interesting and unexpected outcome, given how the participants were able to reflect the SDGs in the data. On reflection, this may suggest that a narrowed down succinct and specific definition of the nuanced concept of sustainability was not outlined clearly enough for the participants, or that the concept itself is relatively broad to narrow down for the young participants.

6.3.8 Session 5 Key Question

Do the projects depict circular economy content in context, and can the participants communicate the circular economy concept through their designs and presentation?

Data set 2 was comprised of the projects designing for a circular economy and was analysed according to a researcher-designed rubric shown earlier. This comprised of 2 individual projects, 10 groups of 2 participants, 9 groups of 3 participants, 8 groups of 4 participants, and 2 groups of 5 participants. There were 54% in total who were able to illustrate a good example of the circular economy concept. Although 43% did not entirely complete the closed loop concept in their projects, there was a definite continuum of progression observed through their artistic designs. For example, the group who designed skincare products from naturally sourced ingredients were adamant that the packaging would be compostable as they wanted to 'close the loop' illustrating an understanding of the circular economy concept and circularity in context.

Additionally, 89% were able to illustrate a product or service or activity reflecting the concept of waste valorisation. Similarly, 89% conveyed a sense of stewardship and/or love for the planet in the communication of their design projects.

Designing for a circular economy is a challenging task for young or old, and given that much of the language was new and sometimes complex for the participants in the beginning, how they communicated their designs was impressive. A total of 68% presented a very clear design and verbal presentation. 82% chose to include text on their designs to assist them in explaining their ideas. In 43% of designs, the participants made a great effort to explain their intentions verbally, but the visual design was not fully clear. See samples:

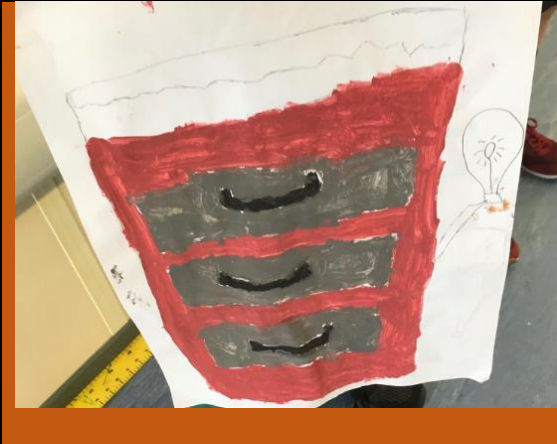

	
<p>Fig 1 Example of participant effort</p> <p>TC18 did his best to explain this design project, and made a fantastic effort presenting in front of the whole group. However, the intentions were not entirely clear by the end of the presentation and it lacked clarity. I was unable to glean the overall aim here.</p>	<p>Fig 2 Example of participant effort</p> <p>Although some participants explained their allocated sections well as part of this group project, there were some participants who found it difficult to express the functions of the service produced, and what they themselves did during the process. The overall aim here remained unclear.</p>

Figure 6.27 Participant data sample Y

Reflecting a difficulty in communicating the design projects, 3% of participants were unable to answer questions about their designs and were unsure of the design when they made an effort to communicate this to the wider group. It could be inferred therefore that 3% did not fully grasp or were unable to fully explain all of the concepts covered over the sessions. For example, the photo below illustrates the use of a cardboard box which has been altered, and although the participants made an effort to create something, and had drawn a design that was artistic in nature, it was unclear what they were trying to achieve, and they were unable to convey it through Q&A.



**Figure 6.28 Participant photographic data sample Z
Unexplained design using a cardboard box.**

How to live more sustainably was outlined verbally and discussed throughout the workshop

sessions. The wide range of responses put forward by participants, when discussing what sustainable living can encompass, reflected this multifaceted concept. From solar panels, growing food, keeping something going, ag iarraidh rudaí a choimeád beo/trying to keep things alive, to electric cars – all of the above were mentioned and technically correct as they each are classified as measures of sustainability. Also, the participants focused on activities which were product orientated rather than a lifestyle basis and had strong examples of circularity.

Patterns and relationships were evident in the designs, demonstrating the increased understanding of the participants regarding the importance of acknowledging interconnectedness. Interconnectedness is key to the circular economy concept. For example, recognising that plasters for injuries are not easily disposable and not compatible with the environment, one participant devised the dock leaf bandage which after use could be composted but also, as made from a natural plant, *Rumex obtusifolius* known for its soothing effect for nettle stings, it would add a healing and calming effect compared to synthetic plasters. This embodied the essence of a circular economy concept. The participant described how his invention would return to the ground causing the least amount of harm to Mother Earth. See the design below (Figure 6.31).



**Figure 6.29 Participant artistic data sample A1
Dock Leaf Design**

In one group, to reach a consensus on which idea to pursue in their research, a debate ensued over whether they could use real lemons or oranges in creating a natural cleaning liquid. They brought in a lemon and an orange and attached it to the tubing of a bottle which brought considerable laughter. 'It's not going to get pumped out of the lemon you know' (TC 36). They then experimented by squeezing lemon juice into the liquid dispenser but did not dilute it. After spraying the desk in an effort to test how effective it was as a cleaning agent, one exclaimed 'oh no way, the table is so sticky, that's no way gonna work' [sic] (TC33). They also tried the small orange, to see if the orange was less sticky (Figure 6.30).



**Figure 6.30 Participant data sample A2
A Design Project – The Natural Cleaning Liquid**

The groups worked collaboratively and eagerly together, discussing ideas and hypothesising. Some groups depicted their ideas and processes on paper, some as seen above, tested physical objects. The process itself was fascinating to observe and an illustration of participative democracy in a primary school class in action. It was also an illustration of a group of participants engaging in the creative process, discussing ideas, discarding ideas back and forth to reach the highest display of circularity in order to produce no waste and ensure the circular economy concept was embedded in their project.

Participants also demonstrated how they could communicate this learning, with participant TC11 explaining to their chosen adult 'I made plasters out of dock leaves because then they can be put into the compost bin or into the ground and continue the circle'. The adult respondents spoke about the depth of engagement that the children had about the topic, feeling that this was linked to the arts-based nature of the activities. She [the student] said she would work harder if she got too [sic] go out and do art more too'. An observation was

also made in the researcher's journal about a principal's comment, which reflects the transformative nature of arts-based methods:

I see you have XXXXXXXX eating out of the palm of your hand with those art tasks. I didn't think he'd work with you now to be honest as he usually doesn't adapt that quickly to new people in the room. XXXXXXXX and I thought we'd have to take him out for a walk (April, 2018).

The principal had thought, along with the teacher, that the child would have preferred to go for a walk rather than interact with a new teacher or adult. This participant had moderate autism with special educational needs. This participant went on to complete all the research at every session and made excellent contributions throughout.

The participative intention of the *Talk to an Adult* worksheet facilitated primary pupils acting as teachers in the circular economy conversation with their chosen adults, willing to discuss this concept with all generations in their immediate families and in the wider school communities.

The *Talk to an Adult* worksheet ensured teaching on the part of the children, albeit informally, and an opportunity to consolidate their own learning. A total of 26 participants cited that going to the outdoor amenity was the most enjoyable aspect of the five sessions which was a welcome finding in line with the Froebelian ecofeminist approach of the research. It is these values that can be seen to be reflected in the high number of favourable responses to being outdoors. One parent remarked to one of the class teachers that they had never heard of the circular economy themselves until their child taught them about it. She stated that she put the family in a circle of chairs at home and explained to them, what the circular economy concept was about. See her *Talk to an Adult* worksheet below:

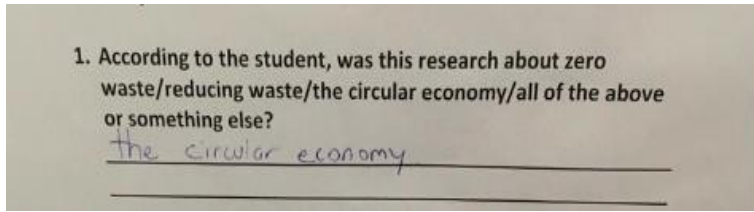


Figure 6.31 Participant data sample A3

Another parent remarked to one of the principals that the children were telling her things she had never heard of, and it was 'all to do with the circle economy' (May, 2018). See her written remarks below:

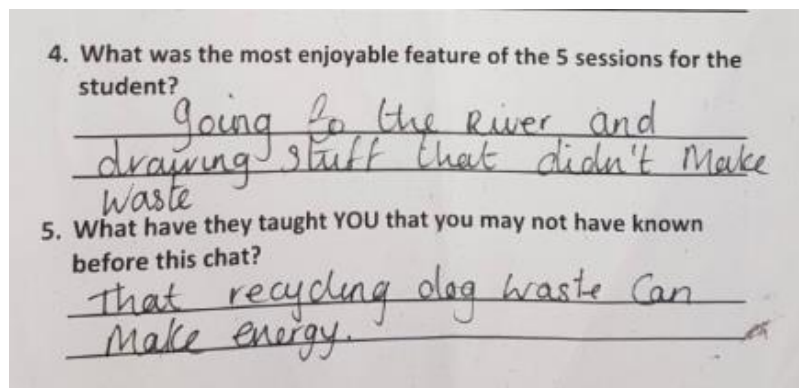


Figure 6.32 Participant data sample A4

A chosen adult stated when relaying what TC7 spoke to her about the sessions 'She said 'we were researching with scientists and the people in Brussels and we came up with ideas for stuff in our projects that didn't make waste and were good for the planet'. This illustrates and awareness of the participative role in the wider AgroCycle research project.

To summarise, the qualitative approach and qualitative findings outlined, illustrate to the reader the subjective meaning-making in which the participants engaged to develop deeper understanding about sustainability. Through artwork and conversations and through adventures outdoors, the findings and emergent thinking revealed themselves about sustainability. This emerged in themes within their art samples, in the design projects, in the presentation of their projects and in the feedback from the chosen adults in their lives with whom they shared the information.

The multiple perspectives and methods of data collection ensured a wide range of insights and ways to understand the meaning making that occurred for the participants. The following chapter discusses the significance and implications of these findings. It returns to the research aims and discusses how the research findings have addressed these aims through the conceptual framework.

7. Chapter 7- Discussion of Findings

7.1 Introduction

This thesis has examined two specific research questions: ‘How do young people engage with sustainability and the circular economy concept through arts-based methods. What is the impact of these approaches on the children’s engagement with the circular economy and sustainability?’

It did so by initially reviewing literature on ecofeminism and Froebelian philosophy to provide a theoretical framework which could support this exploration of how ESD can occur. This was set within a broader analysis of how Irish and international policy on sustainability impacts on education and the IPSC, questioning how knowledge and learning about sustainability can be supported in our primary education system. The design and conduct of an arts-based and participative research methods process was then outlined which complemented this theoretical approach, before presenting the findings of these workshops about how

participants and the researcher collectively experimented and investigated the material and content.

The theoretical approaches of ecofeminism and Froebelian philosophy provided a theoretical framework which could support this exploration of how ESD can occur. The theoretical approach of ecofeminism highlights the interconnectedness of social and environmental issues, emphasising the parallels between the oppression of women and the degradation of nature. Ecofeminism's strength lies in its ability to illuminate the intersections of gender, culture, and ecology, offering a holistic perspective that aligns with the goals of ESD. By recognising the interdependence of gender equality and environmental sustainability, ecofeminism provides a lens through which the exploration of ESD can uncover the multifaceted relationships between societal structures and ecological well-being. On the other hand, Froebelian philosophy, known for its child-centred and nature-oriented approach to education, holds a unique strength in fostering a deep connection to the natural world. This philosophy emphasises the significance of primary level education in shaping individuals' values and attitudes toward nature and society. By integrating Froebelian principles into the exploration of ESD, educators can nurture a sense of wonder, curiosity, and environmental stewardship in learners from an early age. This approach supports the idea that hands-on experiences and outdoor activities are crucial for cultivating environmentally conscious citizens who are actively engaged in sustainable practices.

This was set within a broader analysis of how Irish and international policy on sustainability impacts on education and the IPSC, using the critical policy analysis of Bacchi's WPR model. This analysis allowed a critical exploration of how knowledge and learning about sustainability is positioned within the primary education system. The WPR model of Bacchi (2009) provided

a useful framework to critically analyse curriculum policy documents and explore their implications for sustainable development education and the work of this thesis. The underlying epistemological belief that there is a 'problem' to be fixed (Osborne, 1997) reveals the epistemological boundaries set on how we 'problematise' sustainability in education and the consequent limited power or capacity to enact these principles in practice in schools. It reveals the 'presuppositions' being made in policy, in terms of assuming teachers and students will represent and engage with the 'problem' and that schools are a suitable site for this activity. This research demonstrates the need to provide practical and positive steps to act in solidarity with a loving pedagogy to guide this.

Building on these insights from the theoretical framework and analysis of existing curricula, the methodology chapter outlined a participative workshop approach based on a Froebelian ecofeminist philosophy.

The workshops allowed a practice-based pedagogical approach that provided an opportunity for participants to understand the concepts of circular economy and waste valorisation in a participative way. With the Froebelian principle of unity at the core of the research, and accepting and embracing love, through emotion and feeling towards Mother Earth, there was an acceptance to love and respect nature as an extension of ourselves. The work of Powell and McNair (2020) illustrated how swimming against the tide of the common doctrines in education, critical pedagogies challenges but also creates opportunity for change. The workshops responded to Freire and Shor's call to nurture creative learners as reflected in the participatory approach used in this research. It demonstrated Plumwood's (1993, 2001) suggestion discussed earlier, of allowing logic and feeling be present in unison, representative of the holistic ethos of ecofeminist philosophy.

Through the workshops in schools, the following questions were critically explored: Is waste ever waste? Is it possible to valorise waste and what are the implications if it can be done? Where can we find examples of a circular economy in the natural world? Can we identify the SDGs relevant to our designs and can we plan a circular economy design or process using what we have researched and learned to date? Do the projects depict circular economy content in context, and can the participants communicate the circular economy concept through their designs and presentation?

The research findings explored the initial understanding and knowledge of the circular economy amongst the research participants in the three research schools. After establishing a baseline understanding that there was no prior knowledge of the concept of a circular economy or a deep understanding of the concept of circularity, a carefully designed series of workshops in schools began to explore the possibility of decentering a traditional position of where our response-abilities lie as conscious 'recyclers'. Sterling cautions 'a number of studies have shown relatively high levels of awareness amongst young (and old) of these issues, but often poor understanding' (2001: 23). The level of understanding here contrasts with Sterling's point but will be further discussed ahead. The participants were challenged through the key questions outlined above which were used to structure the workshops. One key question centered the focus of each of the five sessions at each research site, serving as the pedagogical process to investigate the main research question.

7.2 Significance of Findings

This section discusses the significance of the findings at the research sites and how the

findings have addressed the original research aims. The central aims were:

- To examine, with participants, how their learning and activities on sustainability with regard to the sustainable development goals (SDGs) may positively impact on their lives and the lives of others, helping to sustain and protect the natural world.
- To explicitly introduce the concept of a circular economy in the Irish primary school and place emphasis on the concept of circularity
- To explore an integrative approach to sustainability concepts, specifically the concept of circular economy with visual art approaches.

Kwauk et al. highlight that education often maintains a passive role which does not empower or specifically equip children and youth with the tools or awareness of the urgent need for sustainability on the planet now (2019: 12). One of the most disturbing acknowledgements of this discussion in the literature is that children are often excluded from finding solutions to climate change, yet the issue of climate change will be left in their hands to deal with now and in the years ahead.

The critical policy analysis using Bacchi's model revealed a gap between policy aspirations and their application and practice in schools and across society. Bacchi's WPB model asks 'what is the problem represented to be?' (2009: 48). Her model highlights how 'policies are problematising activities' (2009: xi) revealing the underlying epistemological belief that there is a 'problem' to be fixed in the first place. This is used throughout chapter 2 to analyse the discourses about sustainability being presented in international and national policies. Chapter 2 examined the purpose of the SDGs, to create clear and definitive goals in 17 areas for all member states. It documented how Ireland is not reaching these goals appropriately and explores why ESD is not given a more prominent place in the IPSC. The analysis in section 3.6 revealed that without ESD being positioned explicitly in the IPSC, Bacchi's (2009) recommendation for representation, questioning and thus disrupting is not being achieved.

The findings show this as the lack of knowledge to begin with and lack of concentrated work on ESD does not prepare participants in primary schools for interaction with representation, questioning and disruption.

7.2.1 Critical Analysis of Sustainability Policy and Curriculum

As discussed in section 3.14, this policy analysis highlights that policies in Ireland are aspirational and are not ensuring action. A future curriculum deeply enriched with ESD, loving pedagogical approaches to nurture connection with Mother Earth for the whole school community, activities, and opportunities to challenge assumptions is recommended. The *EU Circular Economy Action Plan (2020)* stresses the importance of moving towards a circular economy, ensuring that residual waste levels move towards zero and that resources must be reused as much as possible. This reflects the international policy urgency which is aspiring to and moving towards more than recycling and the correct bin usage alone. However, dominant discourses still emphasise recycling as the ‘solution’ to the ‘problem’ of overconsumption and the crisis of sustainability.

The *National Strategy for ESD (2014)* highlights eight priority action areas, which are positioned as integral to ensuring learners have the knowledge, skills, and values ‘to become informed active citizens who take action for a more sustainable future’ (2014: 3). Policies regarding ESD are encouraging but the key issue is for true change, policy must evolve to be practised and generous time and space must be allocated in curriculum to ESD. Sterling’s (2001) work discussed earlier, shows how change can be potentially achieved through education and the findings demonstrate keen stewards of the planet eager to live with greater circularity. Sterling reminded us that the children who experience our education systems will

be the government decision makers of the future (2010). Yet, regarding primary education in Ireland, as highlighted in section 3.6, there is still no explicit place or dedicated subject area for ESD in the IPSC at the time under consideration in this research.

The inclusion of ESD is at the behest of individual schools and individual teachers as the IPSC does not require that ESD is explicitly taught as a subject in isolation. The literature review highlighted a key principle of the National Strategy (2014) whereby people would become active agents for positive change in reorienting societies towards more sustainable development.

The review of existing curriculum highlights the lack of specific attention and resourcing of ESD and suggests that in future development of the IPSC, the emphasis needs to be placed explicitly on ESD and not left to chance by an interested staff member or Green-Schools coordinator to develop the ESD agenda in an individual school.

The analysis highlighted that the National Strategy at policy level, and the IPSC at practice level, strongly encourage teachers to weave ESD into their curricular teachings. However, this is not always put into practice in a consistent way across all schools so it could be argued that one school can be addressing ESD more deeply or more often than another depending on the adults involved. This lack of consistency is not effective long term if collectively we want to address the SDGs in primary schools.

An analysis of the IPSC illustrated the hopeful aims and objectives of the curriculum. As described in section 3.8, the science curriculum endeavours to cultivate the children's natural curiosity in order to encourage creative action and independent enquiry. The research in

schools provided this opportunity. The natural curiosity and creativity of the participants emerged. Their questions and lines of enquiry of 'I wonder' were strongly present throughout their circular economy design projects but at the same time were imbued with respect for Mother Earth. It is highlighted in the literature analysis that the *NCCA Teacher Guidelines* (1999) strongly encourage an enquiry-based and investigative approach to support holistic development and education in young learners. The findings describe the connections participants were making regarding themselves and how humans positively or negatively contribute to the planet revealing the power of enquiry-based and investigative approaches. Much of the data findings illustrate the 'aha' moments regarding waste, and the acknowledgement of participants that we as humans are the waste creators unlike other elements and living things of the natural world. Chapter 3 highlights an intention of the geography curriculum is to foster a sense of responsibility towards the planet and promote sustainable use of the Earth's resources through one's own lifestyle choices and actions but also through involvement in decision-making. This directly reflects the important conversation raised by this thesis regarding the voices of children and the participation of children in research such as this.

The aims of this research intended to provide a structured transformative process through the series of workshops in the three research schools to address learning about sustainability in a participative, holistic and critically informed manner, guided by five key workshop themes. This structure is used to organise the discussion below which discusses the significance of these approaches.

7.2.2 Significance of Participative Approaches of Workshops

The findings were based on observation of children and their work, during the workshops designed for this research, along with their engagement with the natural world during the outdoor sessions. This was embedded in a theoretical framework that saw the relationships between all living things as a key principle of Froebel's concept of unity and interconnectedness and as a value also intrinsic to ecofeminist philosophy. It is key to hold this conceptual framework to the forefront of this discussion of the findings.

The research in schools introduced and explored with the participants the notion of sustainable development through the specific concepts of circularity, valorisation of waste and the circular economy. This acknowledged and explored the current societal view of sustainable development as based on an anthropocentric view of humanity as positioned above nature and more important and valued than nature. This view has led to and allowed the overexploitation of nature legitimated on economic grounds and the robbery of what western society views as 'resources' of Mother Earth, often amassing unquantifiable amounts of waste as a result (Merchant, 1980). ESD calls for pedagogical approaches to be developed and offered in schools that critically interrogate this and build capacities for a more sustainable future for Mother Earth. The discussion of the findings below explores how meaning has been made by the participants in light of the theoretical framework, policy analysis and literature under the three research aims.

7.3 Research Aim 1 – Impact of SDGs

To examine, with participants, how their learning and activities on sustainability with regard to the sustainable development goals (SDGs) may positively impact on their lives and the lives of others, helping to sustain and protect the natural world.

Many of the findings reveal evidence of learning and activities on sustainability with regard to the sustainable development goals (SDGs). The rubric analysis shows that in data set 2 – The design project – full participation in the creative processes of the workshops was demonstrated, and the work of the EU AgroCycle research project was shared and investigated by all participants in the three schools in 2018. Freire’s words highlight the essential nature of participation in education for transformation:

Education either functions as an instrument which is used to facilitate integration of the younger generation into the logic of the present system and bring about conformity or it becomes the practice of freedom, the means by which men and women deal critically and creatively with reality and discover how to participate in the transformation of their world (1996: 71).

Through the participative learning experience of the workshops, therefore, the potential and opportunity for transformation as the ‘practice of freedom’ arose. When explaining their work, students showed no element of worry or eco-anxiety, but freedom and connection to the concept of circularity. The call-to-action echoes Freire’s emphasis on active participation. In this way, the series of workshops outlined in this thesis offered a structured approach for participants to actively explore and investigate the concept of circularity and examine the content through a carefully designed participative, pedagogical process.

The research was carefully infused with a pedagogy of love to safeguard the young participants ethically and sensitively against overburdening but at the same time enabled them to have the experience of critical engagement and ‘practice of freedom’. This pedagogy of love enabled a very open and accepting culture of discussing love and our love for the natural world, which encouraged embodied engagement and expression of feelings throughout the session. When the aesthetic elements of the natural world were experienced, this was reflected in their commentary and art. For example, the drawing of the crab (figure

6.2) and the note written by TC9 shown in Chapter 6.

In Data set 4, the Talk to an Adult experience, 26 stated that one of the most joyful and enjoyable experiences was going to the natural amenity, a key element of Froebelian ecofeminist philosophy. It allowed participants to position themselves in the world *wild web*, developing an acute awareness of interdependence and unity of all things making an impact on their lives and lives of others now and in the future. The drawings, photos and other contributions of the participants presented in chapter 6 demonstrate how the structured and participative pedagogical approach of the workshops based in activity and deep engagement also gave space for the voices of children to be truly heard in a conversation to which they are not always invited. The children were joining other children, introduced in chapter four, who have made their voices heard regarding the natural world.

Peters in his paper *Education for Ecological Democracy* reveals the possibility lying within education as a potential vehicle to merge two powerful concepts of 'ecology and local democracy' which he explains, are 'needed to bring about the transformation of grass-roots civil society' (2017: 944). Peters states

this combination of 'ecological democracy' rests on two fundamental principles – the freedom to participate in local society and our growing awareness of the interconnectedness of all living things. It also draws and encourages the development of new forms of green identity and citizenship (2017: 944).

Data set 4 revealed that many participants were conscious of their participation in the research and were able to communicate their learning to their chosen adult participants. Bacchi's question of 'where are the silences and can this problem be thought about differently?' (2009: 48) was made visible through the findings. The data the children created,

the insights they shared, their committed participation, ensured the problems in question were communicated to AgroCycle scientific participants to ensure the problems in question considered the children's perspectives as well as the scientific discourse and adult perspectives as discussed earlier.

In data set 2 there was strong evidence (89%) of communicating a sense of stewardship for the planet conveyed, which further reflected the first central aim. Within the design projects of this data set 2, 64% of participants specifically referred to the SDGs. By learning about and examining the concept of a circular economy, and the technologies involved in valorising waste, the participants became aware of alternative ways of living and working, and possible solutions for sustainable development through embedding the SDGs in what we do day to day. The SDGs, particularly SDGs 4, 8, 11 and 12 (UN, 2015) connect with education, question the role of humanity and how the behaviour of humans impacts on the sustainability of the Earth. While general references to the SDGs were evident, there was no uniform understanding and definition of sustainability given by the participants. Rather, ways to be sustainable were offered loosely by participants during the workshops and recorded in the researcher's journal. This could partly be to do with the complexity of the content, as there is not an agreed or concise definition of sustainability. It points to the need for future research on how macro global goals like the SDGs are communicated and learned about in pedagogical processes.

This workshop process attempted to address this by using an arts-based and practice-oriented approach. Crinall and Henry remind us of the synergy that can occur between heart and mind when addressing elements of sustainability when they state 'learning experiences through artistic exploration leads the heart and mind to naturally question daily-life choices that impact sustainability' (2008: 26).

Linked to this is the issue of language, specifically eco-literacy and connecting with the natural world, which must be nurtured and developed, within ourselves as educators and with children in primary school. The findings indicate that language and the importance of using the appropriate language and approach, to navigate through the murky and sometimes scary issues of climate change, is essential. The thematic structure of the five workshops aimed to guide participants through key concepts and the language of sustainability in a transformative pedagogical process.

In line with the spiral nature of the IPSC (1999), the workshop sessions were constructivist in nature. They each built on what was explored in the previous session. It was important to introduce key concepts and language gradually as much of the content was new to the participants. As the findings illustrate, there was no awareness or understanding of the circular economy concept at the outset of the research in any of the schools. This was unsurprising, given that the circular economy concept is only now gaining attention at government level in Ireland in comparison to Finland and the Netherlands, as outlined earlier. Gaard and Gruen remind us why we must delve into the interconnection and interdependence of all things because as a collective 'nothing less than the future of the Earth and all of its inhabitants may well depend on how effectively we all can work together to achieve global justice and planetary health (1993: 252).

UNESCO, in their publication *Learning and Knowing in Indigenous Societies Today* highlights the mechanistic view of life that is so often culturally accepted across western societies towards Mother Earth unlike the view of indigenous peoples. For example, the indigenous

people of the Andes in South America view the relationship of humans and nature as both important and very emotive:

In the modern technical tradition, soils, water, forests and animals are considered to be resources, which humans can utilise and manage for their benefit. In modern thought nature is an object, from which the subject, the human being, is considered to be removed. In contrast, in the Andean life-world the relationship between humans and nature is filial and full of feeling (2009: 62).

This also relates to the interconnected nature of living people and things to sustain and protect the natural world evident in Froebelian ecofeminist philosophy. Its findings also reflect the inclusion sought out in the principles of the National Strategy (2014), a level of inclusion that is a means of individual and community empowerment.

7.4 Research Aim 2 – Circular Economy in Irish Primary Education

To explicitly introduce the concept of a circular economy in the Irish primary school and place emphasis on the concept of circularity

The second central aim was to explicitly introduce the concepts of circular economy and circularity to the participants. Kals and Maes emphasise that ‘the moral cognitive perspective of the underlying motives for sustainable behaviour is supplemented by moral emotions’ (2002: 108). If moral emotion is present, and particularly, if love is present, this can manifest in stewardship and deepen our understanding of reciprocity and circularity. The workshop processes enabled the participants to express their emotional positions, their intrinsic values, and/or the values they wish and need to nurture, and their age-appropriate awareness of existential issues such as the climate change crisis. It began by engaging participants at a general level of ESD to remind them of the possibility of critically thinking through how love ‘works in places where it has been seen as more benevolent...’ (2014: 125). This suggestion

resonated as a way to counteract the negative discourse around environmental ESD, and the grim issue of climate change towards transformative possibilities.

Exploring a cultural acceptance of a language of emotions and love for our home Mother Earth, and local natural environments was central to the research in schools as the research question explores how young people engage in a pedagogy of love with the natural world. The importance of moral emotions is evident in data set 1 where 49 (56%) art samples illustrated the theme of 'emotions about sustainability' and revealed a rich diversity of emotional engagement including emotions of, additional depictions of which, can be seen in the appendices. Boler when asked to comment on emotions and education in the next twenty years, comments on the importance of developing:

pedagogies that can engage emotions and affect as part of the necessary work of "critical pedagogies" – pedagogies that ensure more than what I have termed "drive-by difference" and that invite students to reflexively re-evaluate closely-held assumptions, values and beliefs within a socio-historical frame (Boler 2007: 140).

Through a pedagogy of love and a holistic approach to content associated with sustainability, the participants were acknowledged as feeling, thinking contributors, capable of making connections about the world around them. To be able to discuss the issues affecting Mother Earth, it is vital that we are capable of discussing the content and its moral and emotional significance through our everyday lives. In order to do this, it is essential that we develop higher levels of criticality and ecoliteracy regardless of age. As Sterling et al. explain:

From a linking thinking (or systems) point of view, sustainable development requires us to question how we view and compartmentalise such things as 'environment' and 'economy', 'local' and 'global', 'present' and 'future'. This has ethical implications. By questioning our conceptual boundaries, we can begin to look increasingly at interrelationships and the wellbeing of the whole system. This is thinking that is more *inclusive*, rather than *exclusive*: thinking that expands our system of concern (2005: 78).

Gebara states 'to know is first of all to *experience*, and what we experience cannot always be expressed in words' (1999: 48). Section 6.3.6 of chapter 6 reveals how the participants may be aware of the concept of circularity but may not have had to express it in words or never had the opportunity to delve into the concept of 'no away'.

The researcher's journal illustrates an increase in awareness of the concept of 'no away' in several instances during the workshops as presented in chapter 6. The elements of 'planned obsolescence' and 'perceived obsolescence' embedded in design and consumerism today was investigated during the workshops. The findings in section 6.3.6 reveal how the depth of questioning increased as the weeks progressed, such as questioning what a poster was made of, and if it was possibly made from foodwaste. There was a consistent dialogue about recycling and identifying the right bins as a specific goal throughout the findings as a researcher and educator having the opportunity to observe and participate alongside the participants at the three research sites was a chance to ignite a catalyst for change, starting with language, such as the concept of 'there is no away' through the pedagogical structure of the workshops.



Figure 7.1 Participant data sample A5

The need for transformative learning and a shift in mindset where the undoing of material domination was reflected in the data presented in the findings chapter (Adams and Gruen, 2014). This was striking during the outdoor amenity visits where the participants pointed to the impact of discarded rubbish at each site as shown.

Participants described how the sources of waste they observed during the outdoor sessions were originating from humans, evident of the realisation that nature does not create waste but rather, humans do. Learning about circularity was also evident in the findings about recycling in data set 1 when 27% of the art samples focused on recycling. This reflected the investigation of the commonly accepted 3Rs – reduce, reuse, recycle to the possibility of the 5Rs – refuse, reduce, reuse, repurpose, recycle. Introducing the participants to the 5Rs was purposefully intended to extend their tradition of embracing the 3Rs alone. References/responses made regarding the Green-Schools programme - being primarily for

recycling were depicted in 27% of the samples. The keyword analysis of the journal revealed the connection the participants made between Green-Schools and the use of the appropriate bins and the concept of care. Illustrations by participants shown in Section 6.3.4 earlier depict references to the Green-Schools but many with connections referencing appropriate bin usage to global warming. From the findings, it is clear there is a strong narrative around recycling in schools and it could be argued that this is a strongly held narrative in Irish society in general and internationally. This is evident in Irish policies on sustainability and waste too, as the policy analysis of Chapter 3 demonstrated.

Recycling has been positioned as the first objective in the handling of waste and an assumption that it is the remedy for overconsumption, and as a key aspect to environmental care. Recycling is a necessity and positively welcome, but when the mantra repeated in education circles is the 3Rs, this message becomes reductive. The emphasis on the act of recycling is heard but does not progress much further or deeper along the productive chain of the circular economy. Additionally, Baolong et al. (2018: 870) state 'although research has examined how individuals make consumption choices when they know a product is recyclable, little is known about how individuals make the decision to use greater or fewer resources when they have engaged in recycling activities' which leads into a much wider question in line with this research. Notably with regard to the circular economy concept, it is discussed in the curriculum that children should be encouraged to appreciate the necessity of conservation of resources, for example, through recycling and using paper instead of plastic. This is of particular relevance to the circular economy concept. The findings of this thesis explore however, an initial alternative to the act of recycling and rather the act of refusal should precede it through engagement with the 5Rs in place of the 3Rs, reflecting

indigenous wisdom and the concept of circularity. To note, emphasis was placed on the 5Rs and participants were encouraged to think about the 5Rs in place of the 3Rs at each session. When the AgroCycle Kids video was introduced and the rap song played, we regularly sang this as a reminder and conversation starter regarding living sustainably and each stage of the 5Rs.

7.5 Research Aim 3 – Visual Arts Approach to Sustainability

To explore an integrative approach to sustainability concepts, specifically the concept of circular economy with visual art approaches.

The findings within arts-based research ensured that the participants were included and had nuanced opportunities to respond, create, innovate, and become critically involved in the content of the research. The findings from the 70 art samples of data set 1, the full participation in the design projects in data set 2 and the 21% who expressed art was the most enjoyable aspect of the research in data set 4 all reflect the inclusive and creative intention of the third central aim. Savin-Baden and Major note 'arts-based inquiry is the use of the artistic process, the making and doing of art as a means of understanding experience' (2013: 293). Art can evoke emotional responses rousing the learning community involved in the process. This can lend itself to a transformative learning experience, embodied learning and greater meaning demonstrated through artistic endeavours of this research project which are supported by the interdependency, subjectivities, and holistic care for the world evident in ecofeminism. All data sets illustrated elements of critical thinking, active learning, innovative skills, and the development of creative skills which are core to Froebelian approaches.

The participants of the research in schools were not viewing natural resources as a source to exploit but learning to participate in a circular economy alongside nature. The domination of

nature shown in the often emotionally charged art samples (17% relating to endangered animals), is reflective of the values of the theoretical approach.). Kimmerer's cautionary position noted earlier, is evident here when she reminds us that indigenous wisdom often falls on deaf ears (2013).

Rust alerts us to the concern that if the belief is that humans are different from nature and separate from nature, this is closely associated with an image of nature as uncontrollable and fierce, this nefarious force that must be controlled and dominated (Rust, 2008). This is the antithesis of what the theoretical framework would suggest. Capra and Luisi state that the:

feminist movement and the ecology movement advocate the most profound value shifts, the former through a redefinition of gender relationships, the latter through a redefinition of the relationship between humans and nature. Both movements could contribute significantly to overcoming our culture's glorification of material consumption (2014: 373).

When viewed through a Froebelian ecofeminist lens the data reveal that the relationship between us and nature is no longer viewed as dichotomous, and with respect to a primary classroom setting, and sustainability is not reduced to a single subject focus but rather, an integrated approach. For example, the data in Sections 6.3.4, 6.3.6 and 6.3.8 of the findings chapter revealed how participants could give clear examples of circularity in the forest following the outdoor session. These learning moments were interwoven into the activities and discussions of the sessions.

Engaging in the design projects evidenced in Data set 2 was an opportunity for the children to put their new ways of perceiving the world into action and to channel their developing literacy around sustainability and ecoliteracy into creative projects. It offered an opportunity to participate together in the investigative and creative process collectively. Sterling states 'arguably, the root of the "world problematique" lies in a crisis of perception; of the way we

see the world. Accordingly, there are calls for a “new way of thinking” which would allow us to transcend the limits of thinking that appear to have led to the current global predicament’ (2001: 23). Meadows states:

We humans are smart enough to have created complex systems and amazing productivity; surely we are also smart enough to make sure that everyone shares our bounty, and surely we are smart enough to sustainably steward the natural world upon which we all depend. (Meadows cited in Roe et al., 2018: 210)

The participants at the research sites demonstrated evidence of exploring and creating complex systems and developing their skills of stewardship, as their designs illustrated. The earlier illustration of the face cream in Section 6.3.7 of chapter 6 which utilised only natural materials and plants reveals the depth of thinking sustainably, was achieved.

As well as the depth of engagement in the arts activities evident throughout the workshop 8 participants expressed to their significant adults on the Talk to an Adult worksheets, that doing art was the most enjoyable aspect and 4 expressed it was participating in the design project. Diaz et al. (2006) highlight that the integration of art is an ‘investigation of curricular content through artistic explorations. In this process, the arts provide an avenue for rigorous investigation, representation, expression, and reflection of both curricular content and the art form itself’ (2006: 14). The arts-based activities presented the often complex scientific content in an accessible but also enjoyable and age-appropriate way.

The findings chapter demonstrated how all children engaged actively in the arts-based activities during the workshops, reflecting the power, versatility, and magic that art has in the primary school classroom to be able to hold the attention of participants, regardless of the difficulty some individual children may have with the concept under examination., which was

commented on by the adult respondents and recorded in my observations (as discussed in section X of chapter 6).

Capra and Luisi state that a whole systems approach for educators ‘opens the door for integrating the arts into the school curriculum’ and believe ‘there is hardly anything more effective than the arts – be they visual arts or music and the other performing arts – for developing and refining a child’s natural ability to recognize and express patterns’ (2014: 357). The child participants here began to recognise patterns from the first day of the sessions in schools and through engaging in arts-based activities. For example, in section X of chapter 6, the child who designed the dock leaf plasters stated ‘so ordinary plasters fix our cuts but then they go into a bin and that’s bad for the Earth’ which reveals a pattern of interconnected understanding and awareness of irony, not made by many adults. Stoll, Fink, and Earl highlight the need for placing greater emphasis on conceptual approaches in curriculum, encouraging learners to develop their own thoughts, opinions and ways of knowing:

In an information-based society, there is an endless amount of accessible information. Pupils are faced with the enormous task of making meaning out of a sea of seemingly unrelated facts. They need mechanisms for categorizing and organizing information, connecting ideas and identifying or constructing patterns (2003: 58).

The design of the workshops was intended to give a conceptual curricular approach for the circular economy to facilitate an integrated curricular approach that supported children to identify and express patterns.

The findings in data set 1 illustrating the theme of ‘Emotions about Sustainability’ were heavily imbued with emotions of love, worry, fear and anger, showing how this aim was fulfilled. In discussing the themes with the participants, they held firm on their feelings around

animal extinction and the emotional references, for example the crying penguin illustrated in Section 6.3.6 of Chapter 6. The participants were able to express their integrated understanding of a number of issues regarding sustainability or lack of sustainable development. The inclusion of a pedagogy of love at the core of all that was done throughout this thesis journey, was a deliberate act to support and reveal through research a tangible, moving, transformative learning experience. Taylor and Cranton highlight the benefit of embracing love and emotion in a cognitive situation: ‘by recognizing the interrelationship of cognition and emotion, we can give greater attention to what is most necessary: ways to facilitate the transformative experience (2012: 567).

7.6 Conclusion

Learning that advances our understanding of sustainable development and stewardship beyond a recycle-centric position is required. However, this is not currently carried out systemically through the curriculum and pedagogy in Irish primary schools. As described earlier, the Green-Schools cater for much of the sustainability education content that is covered in schools, with limited attention paid to ESD in other subject areas despite their potential, as explained in Chapter 3. It cannot be left to chance that the planet is in safe hands because we have what is often positioned as a ‘good educational system’ by government agencies. Orr cautions:

My point is simply that education is no guarantee of decency, prudence, or wisdom. More of the same kind of education will only compound our problems. This is not an argument for ignorance but rather a statement that the worth of education must now be measured against the standards of decency and human survival – the issues now looming so large before us in the twenty-first century. It is not education, but education of a certain kind, that will save us (2004: 8).

This thesis presents a wider avenue of exploration about the role and transformative

potential of education for future sustainability, through exploring the significance of the circular economy concept in the Irish primary classroom. It is attending to the issue of human survival and the challenges of climate change, through participative and democratic education in the primary class, to encourage new ways of engaging with and learning about the world that can fulfil Orr's call.

Gaard and Gruen advise that ecofeminist theory is built on a 'community-based knowing and valuing, and the strength of this knowledge is dependent on the inclusivity, flexibility, and reflexivity of the community in which it is generated' (1993: 18). By embracing a critical but loving pedagogy this research has challenged the settled norms of the exploration of ESD as the unwritten benchmark in the Irish primary school curriculum. It is drawing ESD back into the curriculum rather than leaving it to outside agencies. Leaving it to outside agencies is also leaving it to chance, given that engagement with outdoor agencies is not compulsory. The research in schools maintained a reflexive, creative and democratic approach and an inclusive, loving pedagogical approach. This approach can be used by teachers in schools today, as they integrate it into subjects within the IPSC. This will ensure that ESD is embedded into daily teaching and learning in the primary classroom. It was an organic step to conduct this work combining Freobelian philosophy with ecofeminist theory through a pedagogy of love as this is fundamentally a pedagogy of inclusion.

8. Chapter 8- Coming Full Circle

8.1 Introduction

This thesis positions the Earth as the maternal archetype of Mother Earth, an environment where a constant flow of unconditional love is reciprocated in a myriad of life cycles through the planetary ecosystem. A circular economy reflects this behaviour, through maintaining a flow of processes, creating no waste to harm Mother Earth or us any further. This chapter will begin with returning to the main question of the thesis and the central aims. It will discuss how the thesis addressed these points. The overall implications of this and how it is positioned in terms of literature will be discussed. Recommendations will be made regarding pedagogy and how we approach ESD particularly in relation to the participative experience for children. Recommendations will also be made regarding teaching and research. The final section will conclude with an overview of the contributions the thesis and research made and is continuing to make through my own work in education and climate activism.

8.2 Coming Full Circle

This chapter is coming full circle reflecting on the research of the original enquiry as described in the title and key questions:

How do young people engage with sustainability and the circular economy concept through arts-based methods?

What is the impact of these approaches on the children's engagement with the circular economy and sustainability?

It will reflect on the key and central aims of the research namely:

To examine, with participants, how their learning and activities on sustainability with regard to the sustainable development goals (SDGs) may positively impact on their lives and the lives of others, helping to sustain and protect the natural world.

To explicitly introduce the concept of a circular economy in the Irish primary school

and place emphasis on the concept of circularity

To explore an integrative approach to sustainability concepts, specifically the concept of circular economy with visual art approaches.

Given the transformative nature of this thesis, the research findings and discussion show evidence of learning and a shift in thinking by participants towards more holistic, interconnected and sustainable understanding of the world, such as embracing the concept of 'no away' in their designs and artwork. The findings demonstrate how the participants embraced opportunities to make meaning of what they were investigating and their understanding of what it meant to be sustainable. This emergent understanding was facilitated in the design and pedagogical processes of the arts-based activities, the open nature of the discussions and dialogical format of the workshops which all worked together to ensure the participants were comfortable in revealing their emotional positions regarding the natural world and their concerns and observations. Children's voices were consciously heard in an otherwise adult conversation as co-learners and co-participants. The notion of hierarchies being reductive in nature highlighted by Plumwood (1993) earlier was addressed in action, by ensuring the voices of children were heard in an otherwise adult conversation.

Harvester and Blenkinsop explain 'ecofeminism is one framework from which an educator can disrupt dominant discourses and root metaphors while working to change social conditions and ecological relationships' (2010: 122). Ecofeminism has the power to connect and reconnect learners with nature, and to nurture stewardship but with Froebelian philosophy present, it allows us to follow the child. Solón has articulated what this thesis has highlighted:

Humans are not gods. The capitalist system has gone beyond control. Like a virus it's

going to kill the body that feeds it... it's going to damage the Earth System, making life impossible for humans as we know it. We need to overthrow capitalism and develop a system that is based on the Community of the Earth (2015:11).

Similarly, the discussion of Froebelian philosophy throughout the thesis has illustrated the educative nature of the natural world. To understand unity and interconnectedness which Froebelian philosophy returns to repeatedly, can be guided by observation of nature. There are cooperative ecological systems all around us should we care to look. Marrying ecofeminism and Froebelian philosophy connects these ideas.

This following section discusses recommendations in pedagogy and participation. It is intended that these will illuminate the contributions to knowledge that the research has created and inform the recommendations this thesis is making.

8.3 Recommendations in Pedagogy and Participation

A significant contribution has been made by this thesis to the global circular economy conversation, particularly in advancing this conversation in an Irish context at primary level. The concept of a circular economy was not explicitly researched in reference to primary schooling or integrated with the IPSC (1999). To have the opportunity to use sustainable and transformative learning methods is timely. This methodological approach adopted the values of a loving pedagogical approach through the effective use of arts-based methods and participatory approaches with an emphasis on outdoor learning methods. The presence of art-based methods ensured opportunities for exploring other ways of knowing, expressing, and reflecting. Wilson outlines:

Making art – whether dance, theatre, film and visual arts, music, literature, architecture – involves creative ways of working on problems and in engaging with people... artists' roles include inspiring empathy, thought and debate as well as providing a platform for audiences to experiment with risk and innovation (2011: 19).

Using art as a pedagogical and methodological approach ensured a participative approach with young primary school children in investigating otherwise complex concepts. Lehtonen et al. explain 'integration of art into critical thinking and self-transformation demands concentration and applying effort to collective and individual reflection on thoughts, ideas, experiences and sensations. Furthermore, intuitive thinking can arise during the working process' (2019: 360). In the NCCA *Visual Art Guidelines*, educators are reminded that 'openness to art enables children to evaluate art works in a critical and personally meaningful way. Their attention span and powers of concentration expand and deepen with continued exposure to a wide variety of art works' (1999f: 20). This was evident when the participants investigated the work of their peers and shared their thoughts and aspirations regarding Mother Earth and how through our discussions in school and at home, we can steward the planet. The arts-based activities and participatory experience of the participants reflected the words of Lehtonen et al:

Art-based learning is critical to unleash creative potential because it naturally combines different ways of knowing: preconscious, intuitive and rational. Arts should be used aside natural and social sciences to deepen the insight into questions traditionally approached only via scientific knowledge. Hope, courage and trust strengthen in embodied, shared experiences that explore alternative visions of a new sustainable reality where humanity is fully realized (2019: 361).

The inclusion of art-based methods and outdoor education succeeded in ensuring the participants had a shared experience based in different forms of knowing which was filled with hope for a circular society where we stop living beyond our planetary means. It offered the opportunity as Lehtonen et al. discuss, to deepen our questions, and assess for example, where is 'away' and begin to realise there is 'no away.' The discussions with their significant adults in the findings highlighted their joy of being outdoors. This reflects research which highlights the benefits of learning outdoors. A study on teaching and learning science in the

outdoors revealed:

There is very strong evidence that teaching science outdoors on a regular basis is an appropriate strategy to meet the challenges of the twenty first century and might also be a solution to bridge the still-existing gap between science teaching and environmental education (Wals et al, 2014: 6).

In another study conducted during a residential science course for children, interesting data emerged whereby the attitudes and motivation of children drastically improved when spending time learning outdoors:

The contextualization of the results from the various data on the student's motivational behavior with respect to the satisfaction of basic psychological needs, and the discussion with recent literature, has shown that outdoor residential programs using explorative learning methodology can drastically improve the student's learning attitudes (Dettweiler et al, 2017:5)

To teach and learn about ESD, which is intrinsically linked to nature, means there is a significant place for outdoor learning. It was through the outdoor experiences that the connection with Mother Earth was further enriched, and this research illustrates the importance of experiencing the outdoors during the school day and during our teaching in the primary school. Commitment from teachers and school principals is needed to ensure inclusive, consistent and respectful environmentally sustainable work practices take place in schools. All school staff must be supported to practice authentic, environmental sustainable development pedagogical and methodological approaches. For example, using biobased resources in everyday teaching and learning, along with authentic outdoor learning experiences throughout the school year.

The literature reviewed in Chapter 3 suggests that the exclusion of children and lack of children-centred, democracy-based approaches in primary education can be viewed as analogous to the broader othering of nature, endemic in western society. Froebelian

principles such as 'the integrity of childhood in its own right, and the 'importance of the rights of children' remind us that the first point of departure is consultation with the children. This thesis recommends that primary school children, using arts-based methods and a loving pedagogical approach can and must have a voice in ESD, particularly in conversations such as the circular economy conversation and others regarding the urgency of greater sustainability. The extent to which the young participants absorbed the concept of circularity is an indicator of the potential in this approach. As highlighted, Froebel draws attention to the importance of respecting the rights of children and revering childhood in its own right. This is still vital centuries later, especially in the circular economy conversation and this research shows they are capable of participating and worthy of contributing their voices. Woodhouse states 'the pragmatic connections between the circular economy and the ecology of childhood are obvious... The environmental principles of conservation and sustainability should be embedded in any project for healing the ecology of childhood' (2020: 288). Woodhouse also reminds us that 'children may be the canaries in the coal mine, signaling a toxic environment, but they also hold the secret to achieving a healthy planet' (2020: 302). Approaching an issue such as climate change, and working together through a Froebelian ecofeminist lens, is reflective of an ecosocial lens such as Cox describes in his paper *Pedagogy from and for Social Movements: A Conversation Between Theory and Practice* (2019). Cox cautions that we are facing the biggest issue of our time where 'ecological destruction sharpened to the point of climate change and the horrors of capitalism sharpened to the point of crisis neoliberalism make the point very starkly; patriarchy and the racial world order are among other obvious dimensions of the problem, which calls for a far-reaching response' (2019 :70, 71).

A pedagogy of love can transform how we approach sustainable development education and education as a whole, as is reflected in the data chapter. Taylor emphasises ‘...we need to cease the discussion of rationality as a separate entity, because the very existence of rationality is rooted in the presence of emotion, without which it cannot exist’ (2012: 566). Robinson-Morris describes the transformative power of love as ‘more than a feeling; it is an action, an act of the will to love—a choice. Even more, love is an ethic; it is an ethical, social, political, cultural responsibility and commitment to truth, to overcoming domination, oppression, and subordination. Love is, perhaps, the most powerful force in the Universe (2019: 27). Children, as the data has shown, did not detach emotion from reason. They embraced it and it was visible in their art and commentary. When space and culture is created where emotions are acceptable and normalised, primary school children are supported to express their thoughts regarding ESD. The children involved in the research were the central tenet to the work. It is essential to welcome every child to the circular economy and sustainable development conversation celebrating their unique perspectives and insights, contributions and emotional perspectives should they emerge. In the aims, principles and features of the IPSC, it states the curriculum:

celebrates the uniqueness of the child, as it is expressed in each child’s personality, intelligence and potential for development. It is designed to nurture the child in all dimensions of his or her life—spiritual, moral, cognitive, emotional, imaginative, aesthetic, social and physical (1999g: 6).

To remove emotion or feeling is to work without part of oneself. Given the awareness highlighted earlier regarding eco-anxiety, the thesis strongly recommends honouring and embracing a pedagogy of love in the area of ESD.

8.4 Recommendations to Policy and Initial Teacher Education

As a researcher in this area, it is my hope that this research will assist and inspire educators, those involved in research regarding sustainable development, and ESD providers at all education levels to seize every opportunity to deepen their understanding of the concept of circularity. Legislation is needed in Ireland to embed the circular economy concept in curriculum at all levels in line with the leaders in this action – Finland and the Netherlands. Drawing attention to alternative ways of knowing such as indigenous wisdom highlights that there are more appropriate approaches and ways of thinking which are essential in our planetary crisis.

Using Mother Earth as our teacher, we can observe that there is a place for all ages in the sustainability and circularity conversation. This requires commitment from third level institutions, and a national approach at all levels of education, one that is inclusive and consistent and focuses on respectful environmentally sustainable work practices. Initial teacher educators must practise this themselves and also encourage their student teachers to practice authentic, sustainable development pedagogical practices. For example, using biobased materials in methods lectures and encouraging outdoor education and authentic outdoor learning experiences in all weathers, throughout the academic year. This will encourage future teachers to replicate this way of knowing and learning and teaching. It is hoped that the research will support future studies in ESD in the primary classroom. The inclusion of children in large scale research projects such as the Horizon Europe funded project BioBeo (<https://www.biobeo.eu/>) which was a direct result of this research will further shine a light on different ways of perceiving and being in our world. As teachers and researchers, we can shift the focus towards circularity, and build on the commitment to

recycling as the goal of school communities. This research can serve as a catalyst in moving from the disposable models to which we have become accustomed, towards reciprocity in all we do, reflecting the actions of Mother Earth.

It is hoped that this research will encourage others to explore the theory of ecofeminism and Froebelian theory and use them as a lens through which further ESD content can be investigated. As this thesis highlights, there is considerable intersection between issues of rights and ensuring a voice of the oppressed is heard, but as outlined, Froebelian ecofeminist theory has supported addressing this in the research. Together they offer an innovative approach to the circular economy in the primary classroom. Additionally, I hope the merit of using arts-based methods to investigate complex scientific concepts will be understood and replicated, reflecting Dunn's point:

It is time for us to abandon the constraining and simplistic notion that a person can be either artist or scientist, never both. There is no such thing as a pure artist or a pure scientist. We all employ thinking derived from observations of both our objective and subjective realities. Employing every faculty, we know that honing the sharpest solutions should be the highest guiding principle of how we can most effectively grapple with the challenging problems that await humanity in the coming decades (Dunn in Roche, Farina and Commins, 2018: X).

Approaching the complex issue of excessive waste and the need to highlight alternatives such as a circular economy concept and the concept of circularity through qualitative methods, greatly supported the teaching and learning of the overall experience. Preaching messages of dread and highlighting what is going wrong has not been overly successful but instead has offered reductive focus points such as recycling mantras and similar in schools and communities. The qualitative nature of this research allowed children to be included in otherwise adult research and conversation on issues which affect everyone globally. The

research in schools was a joyful and hopeful experience with no place for apathy and doom. The qualitative pedagogical approach had significant influence on ensuring this for all participants. To conclude, activists and educators invested in ESD would advocate for environmental improvement and positive change. The research opportunity presented through the AgroCycle Project offered the prospect of using the enormous problem, to put it in Bacchi's (2009) terms, of food waste as a catalyst for a circular economy conversation. It was an opportunity to delve deeper into the concept of circularity and to perceive Mother Earth as the living, loving, whole ecosystem that she is, instead of an entity of resources for disposable use. It was a learning experience for all involved but most importantly it was one based on a pedagogy of love motivated by a love for Mother Earth. As Clifford states 'each time we learn something new, the edges of our world expand' (2018: 129).

8.5 Research Contributions to Primary ESD and ITE

This final section concludes with an overview of the contributions this thesis and research made and is continuing to make through my own work in education and climate activism. As demonstrated by the thesis, the primary contribution here lies in the primary sustainability education research. Additionally, it is highlighting the need for resources and spaces regarding ESD in initial teacher education (ITE). Hargreaves highlights how international best practice has identified the importance of integrating ESD principles into ITE curricula to ensure appropriate teaching and learning of sustainable development education in the classroom takes place (2008: 71). France has already embraced this, as far back as 2013, when they embedded it into their competency frameworks and we see this emerging in current

discussions and initiatives in ESD in Ireland, including the content that is emerging from this research.

Emerging from the education component of the AgroCycle Project, the An Chomhairle um Oideachas Gaeltachta agus Gaelscolaíochta funded publication titled *Draíocht Dara* (2022) for use in schools to enable outdoor teaching and learning through the theoretical framework of Froebelian ecofeminist philosophy was created. With Dr Máire Nic an Bhaird and Áine Nic Ghiolla Phádraig, I co-authored this publication which puts into practice, the recommendation to develop integrated content of SESE (1999a) and Teanga 2 of the New Primary Language Curriculum (PLC) (2020) and climate change. *Draíocht Dara* is built on the interconnectedness of all things, as highlighted by the research of this thesis and is supported by Froebelian ecofeminist philosophy. The publication is available to all schools and users of the COGG website (www.cogg.ie) and users of MURAL, Maynooth (www.mural.maynoothuniversity.ie) thus disseminating the work of this thesis to an even wider community, particularly to primary schools and those eager to belong in nature, protect nature, and learn more about the natural world in a sustainable manner.

Regarding initial teacher education, we developed the Dearcán Project, funded by the Government of Ireland Healthy Ireland Programme 2020. The themes of Climate Change, Being Creative, Exploring Heritage on My Doorstep, and Biodiversity in My Garden in Winter and Spring were addressed through the lens of Froebelian ecofeminist philosophy. Engagement with the Dearcán Project blended the findings on participative pedagogical processes of the workshops with the Covid-19 online learning context. It was a catalyst for innovative ‘communities of learning and connection’ irrespective of physical distancing as Dr

Máire Nic an Bhaird and I adapted much of the content to make it accessible online during Covid-19. The content was conducted indoors and outdoors using the campus of Maynooth University, Co. Kildare.

The curriculum for this programme was based on the research of this thesis and explored through a pedagogy of love, with the SDGs embedded into the Maynooth University module EDF485 Teanga an Ghrá/Language of Love. This bilingual module is taught to Professional Master's in Education and Bachelor of Education students and was chosen as the national exemplar of best practice for Maynooth University's *Project Live* representation (2021). It was chosen as the 2021 community-engaged learning initiative to be featured as a filmed *Campus Engage* example of excellence (A video describing the work is available here <https://youtu.be/mjC1r0lxRIs>). The module is also used as an exemplar by the Irish Universities Association (IUA) as an example of best practice nationally (IUA, 2021), revealing the importance of sharing practice.

The content, pedagogical approach, and theoretical framework of the module EDF485 emerged from this thesis and was introduced as part of the curriculum for the National Forum for Enhanced Teaching and Learning (NFETL) 'Train-the-Trainer' course on community-engaged learning to demonstrate how to embed the SDGs and the complementary pedagogical approach in third level education. It is hoped this will guide and support other educators in emulating our approach. Opportunities such as this demonstrate how the research is transferable to initial teacher education. The student teachers who explore this pedagogical approach and content have the potential to disseminate this in multiple schools. The more engaged student teachers are with this sustainable development content, the more

likely the key concept of circularity will filter into schools and reach numerous communities. Specific outputs of the research have been created to continue supporting others to investigate the circular economy concept, ESD, the concept of circularity, and stewardship of Mother Earth.

As part of AgroCycle project, we were afforded the opportunity to travel to the People's Republic of China (PRC) to introduce elements of the content in a large primary school in Beijing and provision was then made for translating these resources into Chinese. The resources on the AgroCycle website (www.AgroCycle-platform.com) are now available in Irish, English, and Chinese. Children and adults can access these resources which explore the key concepts of the research developed through this thesis. The resources explore a circular economy, circularity, waste valorisation, biodiversity, ESD, multiple subject areas, integration possibilities, the 5Rs, further content of the AgroCycle partners, to develop knowledge and awareness around measures we can take through ESD, to heal Mother Earth. The teaching and learning resources for *AgroCycle Kids* were awarded 1st place in Europe in *The European Think Biobased Challenge* ([Biobased Challenge - CoE BBE](#)). The resources are suitable for educators, university students, children, parents, guardians, and the wider community. The goal of this campaign was to source innovative teaching materials that could be used to draw students' attention to the bioeconomy and ensure enjoyment and stimulating teaching and learning experiences for all participants who engage with the materials. These resources are an output from the research in schools and based on Froebelian ecofeminist theory. As these resources are downloaded, there is further dissemination of this content ensuring this research continues far beyond the thesis.

I am a research team member for the Horizon 2020 BioBeo Project with Dr Máire Nic an Bhaird for our application to develop bespoke education programmes addressing the science-society nexus. The key focus is to embed the SDGs into preschool, primary, secondary, and initial teacher education programmes across Europe, leading to societal understanding and awareness of a sustainable future. Our partners include MU Erasmus partners Rotterdam University of Applied Sciences (RUAS) and ODISEE University of Applied Sciences (OUAS) along with An Taisce in Ireland. This emerged as a direct result of an application based on Froebelian ecofeminist philosophy, the research of this thesis and pedagogy of love approach which will collectively be further developed in this vast dissemination opportunity.

I was commissioned to write an education programme by GILL Publishing Ireland titled *Cosán na Gealaí* (2022) for primary education. My additional role in the team of writers is to ensure visible sustainability and that opportunities for outdoor teaching and learning are visible and explicit in the work. A specific aim of the programme is to embed visible sustainability into the literature, imagery, digital resources and additional activities.

I continue to utilise various channels of dissemination for my Horizon Europe research on AgroCycle and BioBeo, for example, through the national broadcaster RTÉ Brainstorm on climate activism, thus engaging with wider society and communities regarding my research interests. I feel privileged to teach and cocreate with student teachers in Maynooth University and have co-researched with student teachers on Froebelian philosophy via the funded Summer Programme for Undergraduate Research (SPUR), culminating in a research repository titled *An Taisce* for the Irish Froebel Network. I mentored an undergraduate student under the SPUR Programme 2022, who created sensory trails for the community of

Athy, Co. Kildare. The trails were created through a Froebelian ecofeminist lens, and her work won first place in the Faculty of Social Sciences of Maynooth University.

My research through AgroCycle has shown me the importance of transdisciplinary collaborations and I will continue to work with scientists to improve my teaching and learning and research output. For example in 2021 I co-authored with my colleagues in the UCD School of Biosystems and Food Engineering the funded EU Environmental Protection Agency research publication for children called *Amóinia, Amóinia, Amóinia, Cad faoi Amóinia?* I also co-authored two educational publications for children on the circular bioeconomy progressing from my AgroCycle research called, *Finding Beo* and *Tóraíocht Bheo*, which were funded by UCD Institute of Food and Health in 2022. Due to my interest in ecofeminist philosophy and urge to ensure often unheard voices are elevated, I launched *The Learning Garden Podcast*, supported by the Irish Froebel Network in 2023. This is a lifelong learning platform showcasing conversations with a wide variety of guests imbued with wisdom, knowledge and life experience in the world of education.

The research and outputs discussed here demonstrate my dedication to ongoing work in arts-based, participative, and democratic approaches to ESD. I engage in this work in order to continue to develop pedagogical resources and programmes for ITE in primary education, rooted in ecofeminism and Froebelian philosophy. The title of this chapter *Coming Full Circle* is representative of my philosophical position and respect I have for the concept of reciprocity or *cómhalartacht* in the Irish language, a concept indigenous nations highlight in the climate change conversation. I have not yet 'reached' full circle, because as a lifelong learner, I continue to learn, grow, and develop. I will continue to cocreate with children, students,

communities, and colleagues in Maynooth University and beyond, particularly through a pedagogy of love in an effort to live in mutual exchange, generosity and appreciation, emulating the reciprocity shown to us daily by Mother Earth.

Amor Vincit Omnia.

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Appendices

Appendix 1

Froebel Department/Education Department
Maynooth University,
Kildare,
Ireland

Dear

I am writing to you to ask for your valuable assistance in an important research project that I am undertaking for my PhD. My name is Laoise Ní Chléirigh and I am currently a PhD researcher with the Education Department of Maynooth University and The Froebel Department of Maynooth University. I was a primary school teacher before embarking this research path. The research I am involved in is investigating the concept of the circular economy and sustainability. It is my intention to explore these concepts through an arts-based narrative. I hope to gain an insight into how effective this method of approaching the circular economy concept is in bringing about behavioural attitudes towards the environment. I am particularly interested in how this research may offer new possibilities in the area of sustainable development education and in teaching a variety of subjects in a thematic approach.

What will I be asking of you?

In order to carry out this research, I am requesting your permission to conduct five sessions of 30-60 minutes (except for session 3 which is anticipated to be around 60-90 mins) with either your fifth or sixth class, or both, if fifth and sixth class is mixed in your school. This would be carried out during the school year of 2017-2018.

The Sessions

Session 1	30-60 mins	Introduction and explanation. Eliciting what the children know already, their attitudes around sustainability and their green schools achievements thus far. There will be a video presentation of sustainable systems and talk and discussion, games and group work.
Session 2	30-60 mins	Further exploration of the concept of a circular economy. Plan for session three – our classroom without walls session outdoors.
Session 3	60 - 90 mins	An outdoor session in a wood or coastal setting that is a walk away from the school grounds. The objective of this session is for the participants to witness an example of a circular economy in the natural world.
Session 4	30-60 mins	The fourth session will be an opportunity for much discussion and reflection. The participants will then be invited to look in their own environments – their homes or in the school setting or their own suggestions, and to design an example of a circular economy or zero waste model.
Session 5	30-60 mins	Presentation of the work of the children. Dissemination of what has been understood after the 5 sessions. Debriefing and feedback.

Note: All materials needed for the research project will be provided by me and there will be no financial costs for the school in relation to this research.

Anonymity and Confidentiality

All school information will be combined from all three schools involved in the research project and any participants involved in the research who are contributing to the data. Each participant will be assigned a fictional name so as to not identify anyone. When the research is written up in thesis form, only combined information will appear. The school or the participants will not be identified in this written material. All electronic information about the research will be stored on my personal laptop, which is password protected, and within files that will be encrypted. All physical data/material will be stored in a locked filing cabinet to which, only I have access to. This data will be held for ten years as is recommended by Maynooth University. After this date, all data, electronic and paper data will be destroyed.

Note:

It must be recognized that, in some circumstances, confidentiality of research data and records may be overridden by courts in the event of litigation or in the course of investigation by lawful authority. In such circumstances the University will take all reasonable steps within law to ensure that confidentiality is maintained to the greatest possible extent.'

While the material is not of a very sensitive nature, if, during the research, a participant becomes stressed in any way, we can stop the session and talk to the participant to alleviate his/her fears or anxieties. If any participant discloses particularly worrying information, I will immediately refer them to you and the class teacher for further assistance. Should participants wish to withdraw from the research at any time, it is their fundamental right to do this, and it will be accepted without prejudice.

Should any participant feel anxious or stressed as a result of the research, they are welcome to contact Maynooth University Counselling Service @00353-1-7083554.

Ethics

I will adhere to the following code of ethics throughout the research project:

<https://www.bera.ac.uk/publication/ethical-guidelines-for-educational-research-2018>

I will also be mindful of the following, throughout the research project:

Data Protection Act of Ireland

<https://www.dataprotection.ie/documents/legal/DPAConsolMay09.pdf>

Should you require more information about the research project, please do not hesitate to contact me at laoise.nichleirigh.2017@mumail.ie or my supervisor Dr. Máire Nic an Bhaire at Maire.NicanBhaird@nuim.ie

Sincere thanks for your time, and many thanks for reading this information. I look forward to hearing from you.

Le gach dea-ghuí,

Laoise Ní Chléirigh

Appendix 2

Information Sheet for Teachers and Parents

Introduction

My name is Laoise Ní Chléirigh and I am a PhD student with the Froebel Department and the Education Department of Maynooth University, Ireland. I am also a primary school teacher. My research is addressing environmental awareness and care but principally the concept of a circular economy. It is the objective of this research to explore and effectively unpack the concept with primary school children through arts-based activities. I want to ascertain if primary school children can unpack this concept of a circular economy, effectively a scientific and sustainability concept – as agents of their own discovery, through arts-based activities. My interests also lie in the area of Froebelian methodologies and how they can assist arts-based activities in the teaching of science – a STEM (Science, Technology, Engineering, Maths) to STEAM (Science, Technology, Engineering, *Art* and Maths) initiative. I am therefore asking for participants to attend to this research with me, as co-participants. We will delve into the worlds of arts-based activities, science, nature, and biomimicry, all the while developing our own creativity and innovation skills.

What I ask of you as participants or guardians of participants

I am inviting you as guardian of your child, to grant consent for him or her to participate in the research. This will entail 5 sessions during school hours where together, we will explore the area of sustainable living. We will learn about the commonly practised linearised way of life on the planet and investigate the unsustainable aspects of same. I would then like to explore alternatives to this – how we can move from linear to circular, investigating the possibilities of a zero waste lifestyle and how we can close the loop in areas of our everyday lives. In order to explore these concepts, we will work through the medium of visual art. This material and discourse will be the data that will inform the research for analysis.

Confidentiality and Anonymity

All information and material gathered from the 3 schools participating in the research will be combined. When the research is written as a thesis, only combined information will be written. No single person's contribution will be identified or become the focus of the research. All electronic information will be stored on my laptop which is password protected, and the files will be encrypted. The written or physical artistic material will be stored in a locked filing cabinet, and I will be the only person with access to this material. As recommended by Maynooth University, this data will be kept for ten years. After this date, all data will be destroyed.

Note

'It must be recognized that, in some circumstances, confidentiality of research data and records may be overridden by courts in the event of litigation or in the course of investigation by lawful authority. In such circumstances the University will take all reasonable steps within law to ensure that confidentiality is maintained to the greatest possible extent.'

Research Timeline

Research will be carried out throughout the academic year of 2017/2018

Five sessions with myself in the classroom and in the outdoor environment of the school campus, lasting 30-60 minutes for each session.

Note

I am available at any stage of the research should you have any concerns or worries, and you can contact me @ laoise.nichleirigh.2017@mumail.ie

Ethics

I will adhere to the following code of ethics throughout the research project:

BERA guidelines for Educational Research –

<https://www.bera.ac.uk/publication/ethical-guidelines-for-educational-research-2018>

(I will be mindful of the following, throughout the research project)

Data Protection Act of Ireland

<https://www.dataprotection.ie/documents/legal/DPAConsolMay09.pdf>

Note:

Should you require more information about the research project, please do not hesitate to contact me at laoise.nichleirigh.2017@mumail.ie or my supervisor Dr. Máire Nic an Bhaird at Maire.NicanBhaird@nuim.ie

Appendix 3

INFORMATION!



***Participant** - Someone who takes part in something ***Creativity** – Using your imagination to make something ***Innovation** – Coming up with new ideas or ways of doing things ***Biomimicry** – making things smartly, just like how nature makes things.

Introduction

Hello there! My name is Laoise, and I am a PhD student with the Froebel Department and the Education Department of Maynooth University, Ireland. What is a PhD? It is a big project like a project you might do in school but bigger. I used to be a primary school teacher just like your teacher now. I might be a primary school teacher again when I finish this project. My research is all about how we can help the earth and the world in which we live. There is a lot of science, geography, history and even SPHE in it but I want to explore all of these subjects through art activities with you. I'd really like to find out if we can learn about this through art and similar activities. I would be so grateful if you could help me do this. We will look at nature and biomimicry and all of the subjects above, but at the same time, work on our creativity and innovation skills.

What I am asking you to do...

This is an invite to you from me, to do the project with me. I'll come to your school 5 times and we will do the project on these days, together both in the classroom and outside too. You can tell me what you already know, maybe things you learned about how to look after the environment through the green schools work. Then we will look at what else we can do, but we will do this through art activities and through YOUR ideas too. I want to hear YOUR opinions! All of our combined art and fun activities will be what they call 'data' in college.

Confidentiality and Anonymity

You will be given an undercover name so that nobody can identify your work!

If we take any photos of our working time together, you may be seen from behind or blurred but you will not be identified.

For parents/guardians:

Note: 'It must be recognized that, in some circumstances, confidentiality of research data and records may be overridden by courts in the event of litigation or in the course of investigation by lawful authority. In such circumstances the University will take all reasonable steps within law to ensure that confidentiality is maintained to the greatest possible extent.'

Ethics

I will adhere to the following code of ethics throughout the research project:

BERA guidelines for Educational Research –

<https://www.bera.ac.uk/publication/ethical-guidelines-for-educational-research-2018>

I will also be mindful of the following, throughout the research project:

Data Protection Act of Ireland

<https://www.dataprotection.ie/documents/legal/DPAConsolMay09.pdf>

Míle buíochas, Múinteoir Laoise

Appendix 4



Assent Form for Child Participants

Please tick the **Yes** box if you agree with the sentences:

		Yes
1.	I read and understood the information sheet	
2.	I agree to do this project	
3.	It's my choice to do this project	
4.	I can stop doing the project if I want to stop	
5.	I don't have to answer questions if I don't want to	
6.	I understood the answers given to me	
7.	I got the chance to ask questions	
8.	I'll let you use the art I make for your thesis in college and for other college things or related to college things in the future	

If you have any more questions about this, you can me through your teacher at laoise.nichleirigh.2017@mumail.ie or telephone:

Participant's Name _____

Participant's Signature _____

Guardian's Name _____

Guardian's Signature _____

Researcher's Name _____ Laoise Ní Chléirigh _____

Researcher's Signature _____

Note: If during your participation in this study you feel the information and guidelines that you were given have been neglected or disregarded in any way, or if you are unhappy about the process, please contact the Secretary of the Maynooth University Ethics Committee at research.ethics@nuim.ie or +353 (0)1 708 6019. Please be assured that your concerns will be dealt with in a sensitive manner.

Appendix 5

Consent Form for Participants

Please complete where applicable:

		Yes
1.	I have read and understood the information sheet	
2.	I accept that my participation is completely voluntary	
3.	I understand that it is my fundamental right to withdraw from the research project at any point	
4.	I understand that I am under no obligation to answer questions	
5.	I have had an opportunity to ask questions and my questions have been answered sufficiently	
6.	I consent to participating in this study	
7.	I consent to you using the art I produce during this research project, for your thesis and for further secondary use in the future	

If you have any further questions or queries about this research, you can contact the researcher Laoise Ní Chléirigh at laoise.nichleirigh.2017@mumail.ie or telephone:

Participant's Name _____

Participant's Signature _____

Researcher's Name _____ Laoise Ní Chléirigh _____

Researcher's Signature _____

Note: If during your participation in this study you feel the information and guidelines that you were given have been neglected or disregarded in any way, or if you are unhappy about the process, please contact the Secretary of the Maynooth University Ethics Committee at research.ethics@nuim.ie or +353 (0)1 708 6019. Please be assured that your concerns will be dealt with in a sensitive manner.

Appendix 6

Schedule of Sessions in Schools:

Session 1

SESSION ONE Introducing the Circular Economy: 60-90 minutes.

Key Question: Is waste ever waste?

Session 2

SESSION TWO Investigating 'The Circular Economy' through the AgroCycle Project: 60-90 minutes.

Key Question: Is it possible to valorise waste and what are the implications if it can be done?

Session 3

SESSION THREE The Circular Economy in the Natural World: 60-90 minutes.

Key Question: Where can we find examples of a circular economy in the natural world?

Session 4

SESSION FOUR Designing a Circular Economy System: 60-90 minutes.

Key Question: Can we identify the SDGs relevant to our designs and can we plan a circular economy design or process using what we have researched and learned to date?

Session 5

SESSION FIVE Create, Innovate, Discuss, Reflect: 60-90 minutes.

Key Question: Do the projects depict circular economy content in context, and can the participants communicate the circular economy concept through their designs and presentation?

Appendix 7

Talk to an Adult

Thank you for chatting to _____ about the exciting research in which she/he has been participating. As we come to the end, this is a chance for the student to tell you what they know. Please have a chat with them about what they have done over the 5 sessions, and perhaps you could then answer the following questions please?

1. According to the student, was this research about zero waste/reducing waste/the circular economy/all of the above or something else?

2. Did they understand it? Any further comments?

3. Do they think they know more now at the end of the research, than they did at the start?

4. What was the most enjoyable feature of the 5 sessions?

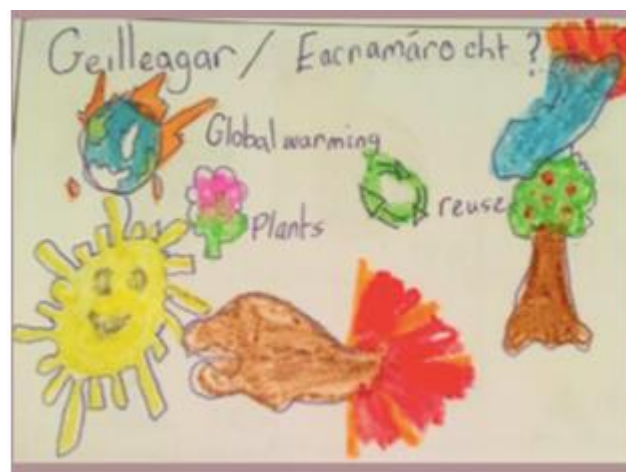
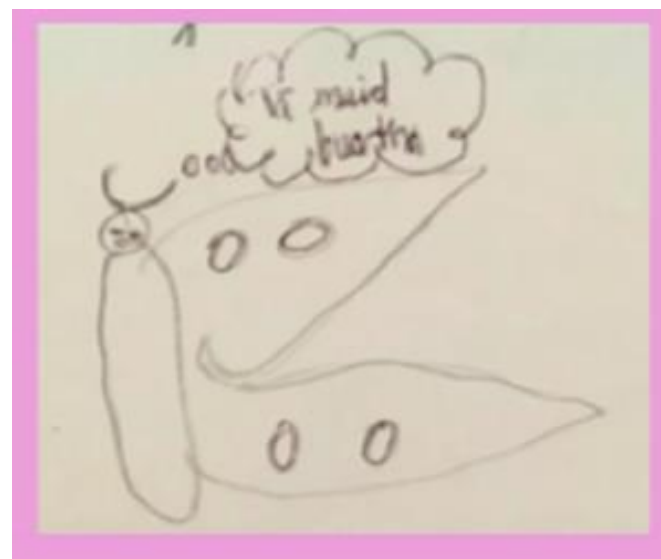
5. What have they taught YOU that you may not have known?

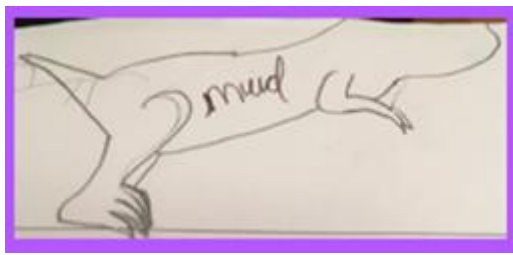


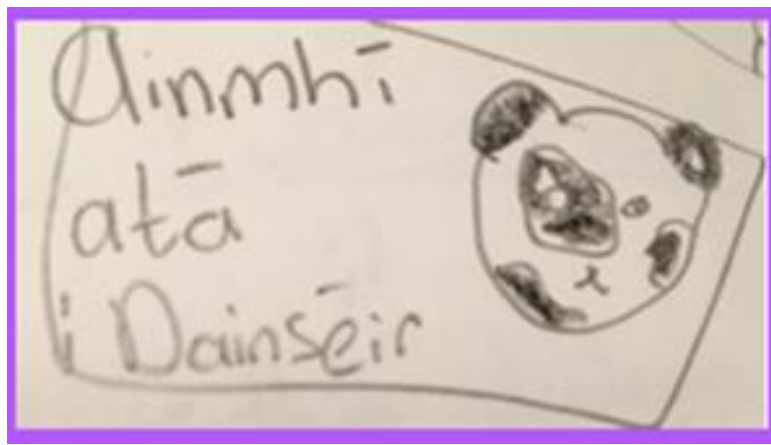
Many thanks for your time and help!

Appendix 8

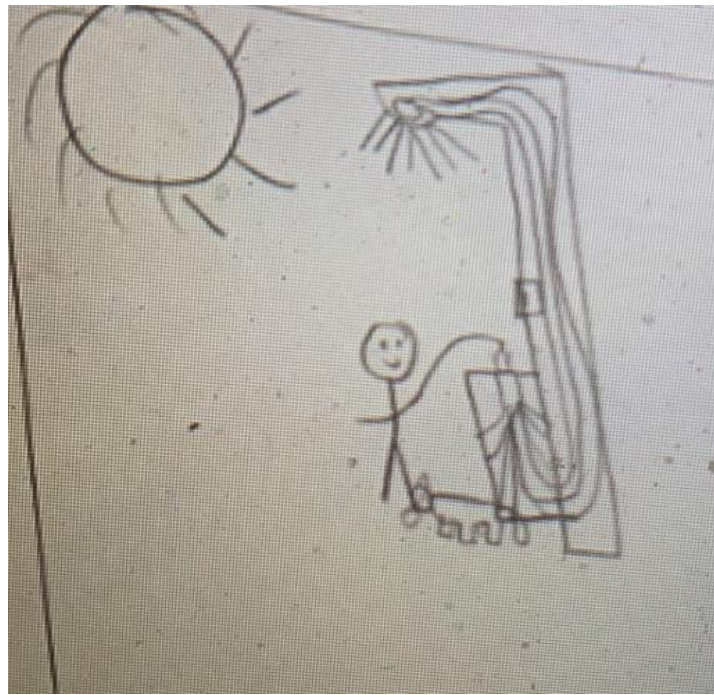
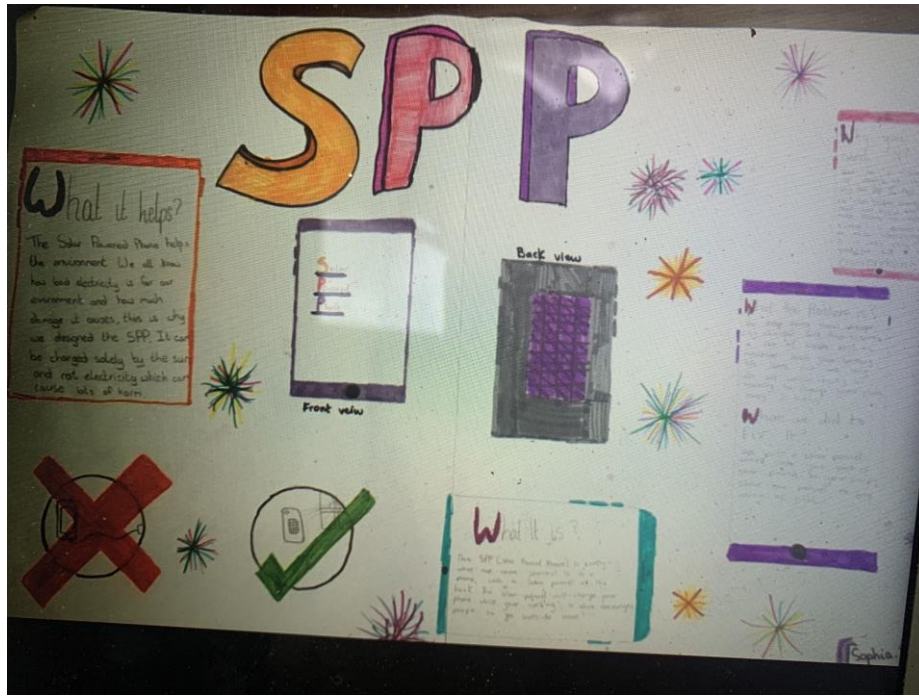
Further Art Samples of the Participants:

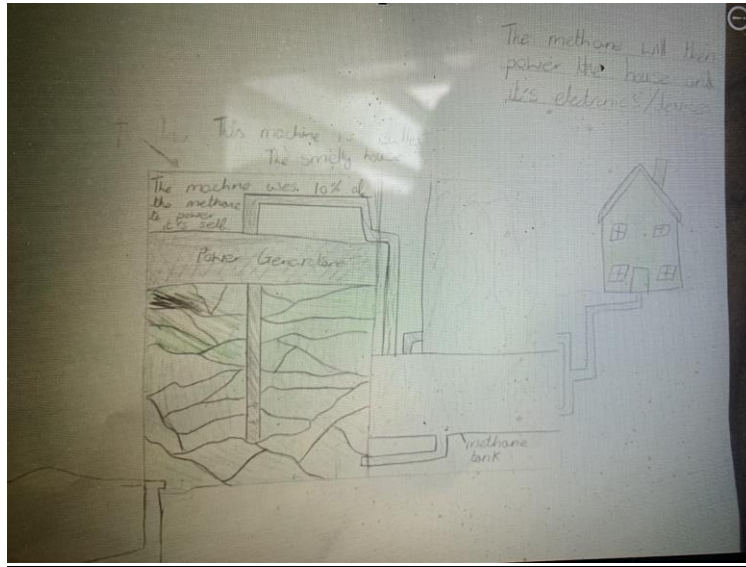






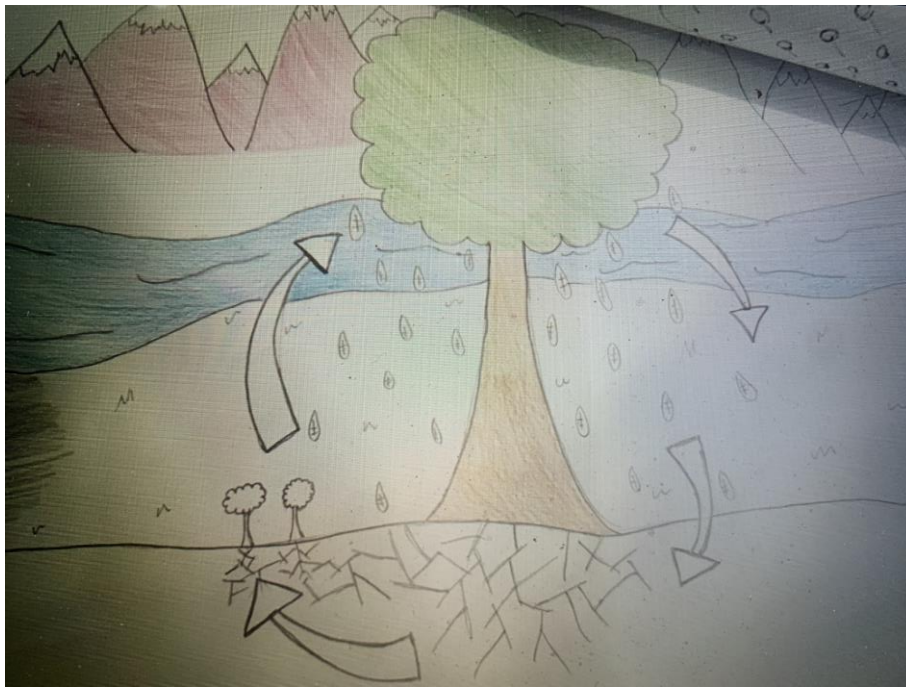
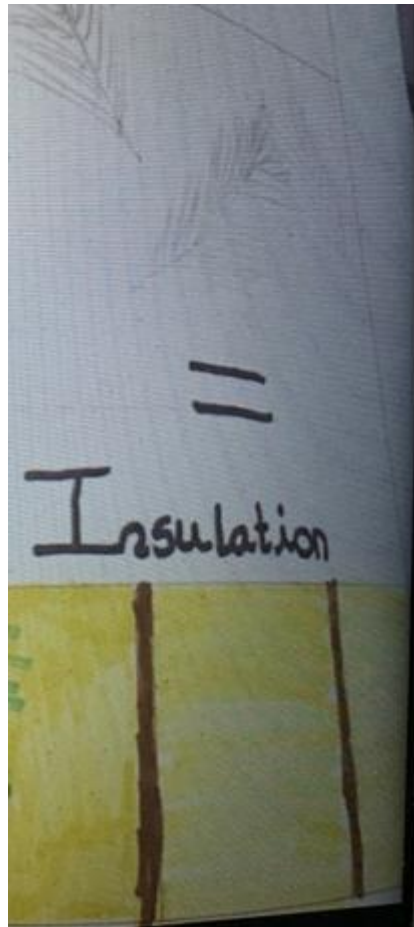
Further Project Planning and Design Samples





I drew a rock because it dose not go to waste and it symbalises the beauty of the beach.

A Rock



Bhí mé ag smaoineamh
fui cailín ag súi
in aice leis an tuisce
So seo chad a tháinig sé
amach mar !!
Níor dáigeann uisce nó an grian
aon bruscar.



Appendix 9

Keyword Analysis Sample

Environmental Awareness and Care

1. 'That's like **when you really care** about the environment and you don't want people to **wreck** **it** (Smyth, 2018)
 2. '**If you're** aware then **you care** about the world' (Horner, 2018)
 3. 'I think we did something about that in SESE with teacher' (Williamson, 2018)
 4. 'Is that not what we do when we **pick up rubbish** in the yard and stuff?' (McDonald, 2018)
 5. 'I think it's when **you love** the natural outside world, then you're **taking care of it** (Roberts, 2018)
 6. 'When we do SESE we talk about that, like recycling and using the **right bins**' (Bird, 2018)
 7. '**If you care** about the environment then you have to **recycle**, we do that in SESE and we do it with the Green Schools Committee' (Winters, 2018)
 8. 'It's **looking after** the school yard outside isn't it, and **recycling in the right bins** yeh?' (Mitchell, 2018)
 9. 'I think if you want to learn about environmental awareness and care then you should be on the Green Schools Committee because they tell us all about the **right bins**' (O'Shea, 2018)
 10. 'Bhuel, de réir mar a fheicimse é ná go bhfuil orainn **aire a thabhairt** don timpeallacht nuair a thágann daoine bruscar timpeall na háite toisc nach bhfuil daoine grámhar don timpeallacht uaireanta. Is cuma leo i ndáiríre' (Ní Mhurchú, 2018)
 11. 'Sílím go labhraíonn na múinteoirí faoi seo nuair a dhéanann siad OSIE linn' (Ní Bhroin, 2018)
-

Appendix 10

Template samples:

  		
 Recording Our Observations 		
Box 1 Before What I Knew Before	Box 2 During What We Are Exploring Today	Box 3 After What I Know Now

  		
 Taifead Breathnóireachta 		
Bosca 1 Inné An méid a bhí ar eolas agam roimh an gceacht	Bosca 2 Inniu An méid atá ar eolas agam le linn an cheachta	Bosca 3 Amárach An méid a bheidh ar eolas agam ag deireadh an cheachta

Appendix 11

Session Plans

Pleananna Gaeilge:



Seisiún a hAon

An Geilleagar Ciorclach

Ábhair:

Eolalocht, Tíreolalocht, Stair, OSPS, Na hAmharc-ealalona, Gaeilge, Oldeachas i bhForbairt Inbhuanaithe, Saoránacht Dhomhnada, Ceol

Aois na bpáistí:

11-14

Am:

60-90 nóiméad

Aidhmeanna an cheachta:

1. An téarma 'Geilleagar Ciorclach' a roinnt leis an rang.
2. Athmhachnamh a dhéanamh maidir le **dramhall**. Cad is dramhall ann?
3. Foclóir nua a bhaineann leis an ngeilleagar ciorclach a thuisctint agus a úsáid.

Ábhair agus áiseanna:

(Beidh na bileoga agus físeán ar fáil ar shuíomh AgroCycle Kids)

- **Taifead Breathnóireachta:** Bileog A3
- **An Bleachtairé Timpeallachta:** Bileog A4
- **Ábhair ealaine** – criáin, pinn luaidhe, pinn luaidhe daite, cailc, gualach
- Bileoga A3
- Bileoga don obair gharbh
- Físeán ar an Idirlíon - <https://www.youtube.com/watch?v=3591bQ4ozz0&t=33s> agus <https://www.youtube.com/watch?v=5yrT3zwn3I>

An Balla Foclóra:

(Tosaigh Balla Foclóra ag baint úsáide as na focail seo a leanas)

An geilleagar ciorclach, breathnóireacht, maireachtáil inbhuanaithe, dramhall, luach a chur ar dhramhall, athchruthaigh



Seisiún a dó

An Geilleagar Ciorclach sa tionscnamh AgroCycle

Ábhair:

Eolalocht, Tíreolalocht, Stair, Gaeilge, Oideachas i bhForbairt Inbhuanaithe, OSPS, Na hAmharc-ealaíona, Ceol

Aois na bPáistí:

11-14

Am:

60-90 nóiméad

Aidhmeanna an Cheachta:

1. An tábhacht a bhaineann le luach a chur ar dhramhall a thuiscint.
2. Foclóir nua a bhaineann leis an ngeilleagar ciorclach a thuiscint agus a úsáid.
3. Anailís chriticiúil a dhéanamh ar éifeacht an chine dhaonna ar an bpláinéad.

Áiseanna agus ullmhúchán:

(Beidh na bileoga agus físeán ar fáil ar shuíomh AgroCycle Kids)

- **Tailfead Breathnóireachta** ó sheisiún 1.
- Ábhair ealaíne – criáin, pinn luaidhe, pinn luaidhe daite, calic, gualach
- Bileoga A3
- Bileoga A5
- Cur i láthair **Powerpoint – AgroCycle**
- Suíomhanna idirlín a thaispeáint - <https://www.youtube.com/watch?v=359ibQ4ozz0&t=33s> agus <https://www.youtube.com/watch?v=5yztT3zww3I>
- Cuardach Focal – Seisiún 2

Balla Foclóra:

(Cuir na focail seo a leanas ar an mBall Foclóra)

Luach a chur ar dhramhall, cuthaitheach bitheolaloch, cuthaitheach teicneolaloch, geilleagar líneach



Seisiún a trí

An Geilleagar Ciorclach sa Dúira

Ábhair:

Eolalocht, Tíreolalocht, Stair, OSPS, Na hAmharc-ealaíona, Gaeilge, Oideachas i bhForbairt Inbhuanaithe, Saoránacht Dhomhnada, Corpoideachas

Aois na bPáistí:

11-14

Am:

60-90 nóiméad

Aidhmeanna an cheachta:

1. Sampla den **Gheilleagar Ciorclach** a aimsiú sa dúira.
2. Samplaí den gheilleagar ciorclach sa dúira a tharraingt.
3. Foclóir nua a bhaineann leis an ngeilleagar ciorclach a thuiscint agus a úsáid.

Ábhair agus áiseanna:

(Beidh na bileoga agus físeán ar fáil ar shuíomh AgroCycle Kids)

- **Tailfead Breathnóireachta:** Bileog A3
- Ábhair ealaíne – criáin, pinn luaidhe, pinn luaidhe daite, calic, gualach
- Bileoga A3/A4
- Físeán ar an idirlín - <https://www.youtube.com/watch?v=359ibQ4ozz0&t=33s> agus <https://www.youtube.com/watch?v=5yztT3zww3I>
- Cluiche: Cuardach Focal (Seisiún a trí)
- Fás-chláir ag gach páiste.

An Ball Foclóra:

(Cuir na focail seo a leanas ar an mBall Foclóra)

Dúira, áit nádúrtha, dramhall ar bith, gailearaí, machnamh, breathnaigh ar



Sesiún a ceathair Geilleagar Ciorclach a dhearadh

Ábhair:

Eolaíocht, Tíreolaíocht, Stair, OSPS, Na hAmharc-ealaíona, Gaeilge, Oideachas i bhForbairt Inbhuanaithe, Saoránacht Dhomhnada, Corpoideachas, Ceol

Aois na bpáistí:

11-14

Am:

60-90 nóiméad

Aidhmeanna an cheachta:

1. Spriocanna Domhanda um Fhorbairt Inbhuanaithe a fhiosnú – sprioc 11, 12, 13 ach go háirithe.
2. Tionscnaimh dearadh a phleanáil, a thaispeánfaidh samplaí den gheilleagar ciorclach.
3. Le cinnliú leis na páistí go dtuigtear an tionscnaimh dearadh/ealaíne.
4. Foclóir nua a bhaineann leis an ngheilleagar ciorclach a thuiscint agus a úsáid.

Ábhair agus áiseanna:

(Beidh na bileoga agus fiseáin ar fáil ar shuíomh AgroCycle Kids)

- **Taifead Breathnóireachta:** Bileog A3
- Ábhair ealaíne – criáin, pinn luaidhe, pinn luaidhe daite, calic, gualach
- Bileoga A3
- Fiseáin ar an idirlíon:
<https://www.youtube.com/watch?v=359ibQ4ozt0&t=33s> agus
<https://www.youtube.com/watch?v=5yztT3zwq3I>
- Powerpoint (Sesiún 4)

An Balla Foclóra:

(Cuir na focail seo a leanas ar an mBalla Foclóra)

Na Náisiúin Aontaithe, Spriocanna Domhanda um Fhorbairt Inbhuanaithe, bran ríse, nuálach



Sesiún a cúig Athmhachnamh agus Cruthaitheacht

Ábhair:

Eolaíocht, Tíreolaíocht, Stair, OSPS, Na hAmharc-ealaíona, Gaeilge, Oideachas i bhForbairt Inbhuanaithe, Saoránacht Dhomhnada, Ceol, Corpoideachas

Aois na bpáistí:

11-14

Am:

60-90 nóiméad

Aidhmeanna an cheachta:

1. Dearal na bpáistí a chur i láthair.
2. Deis a thabhairt do chulle dhuine ceistiú a chéile agus na dearal a phlé.
3. Athmhachnamh a dhéanamh le chéile, maidir leis na seisiúin ar fad.
4. Foclóir nua a bhaineann leis an ngheilleagar ciorclach a thuiscint agus a úsáid.
5. An bhileog 'Labhair le Duine Fásta' a mhíniú.

Ábhair agus áiseanna:

(Beidh na bileoga agus fiseáin ar fáil ar shuíomh AgroCycle Kids)

- **Taifead Breathnóireachta:** Bileog A3
- **Labhair le Duine Fásta:** Bileog A4
- Ábhair ealaíne – criáin, pinn luaidhe, pinn luaidhe daite, calic, gualach
- Dearal na bpáistí

An Balla Foclóra:

(Cuir na focail seo i leanas ar an mBalla Foclóra)

Nuálach, córas ciorclach, ceisteanna domhanda, séasúrach, nuálalocht

Pleananna Béarla:



AGROCYCLE
for a circular economy
SESSION ONE
Introducing the Circular Economy

Content:

Science, Geography, History, SPHE, Visual Art, English, Education for Sustainable Development, Global citizenship, Music

Age Range:

11-14

Time:

Approximately 60-90 minutes

Learning Outcomes:

1. To explore the term 'The Circular Economy.'
2. To rethink how we look at waste.
3. To develop an understanding of new terms and vocabulary and to use in dialogue.

Materials and Preparation:

(All worksheets & video links available on AgroCycle Kids website)

- **Recording Our Observations** worksheet A3 size
- **The Environmental Detective** worksheet A4 size
- A selection of art materials – crayons, pencils, colouring pencils, charcoal, chalk
- A3 sheets
- Rough work sheets
- Access to video links <https://www.youtube.com/watch?v=359lbQ4ozz0&t=33s> and <https://www.youtube.com/watch?v=5yztT3zwq3I>

Word Wall:

(Use these terms to start a word wall)

Circular Economy, observation, sustainable living, waste, valorise, repurpose



AGROCYCLE
for a circular economy
SESSION TWO

Investigating 'The Circular Economy' through the AgroCycle Project

Content:

Science, Geography, History, SPHE, Visual Art, English, Education for Sustainable Development, Global Citizenship, Music

Age Range:

11-14

Time:

Approximately 60-90 minutes

Learning Outcomes:

1. To understand the concept of the valorisation of waste.
2. To critically analyse the impact that human behaviour has on the planet.
3. To develop an understanding of new terms and vocabulary and to use in dialogue.

Materials and Preparation:

(All worksheets & video links available on AgroCycle Kids website)

- Their original **Recording Our Observations** worksheets from session 1
- A selection of art materials – crayons, pencils, colouring pencils, charcoal
- A3 sheets
- A5 sheets
- Word Search (Session 2)
- **The AgroCycle PowerPoint Presentation**
- Access to video links and PowerPoint presentation <https://www.youtube.com/watch?v=359lbQ4ozz0&t=33s> and <https://www.youtube.com/watch?v=5yztT3zwq3I>

Word Wall:

(Add these terms to the word wall)

Valorise, biological nutrient, technological nutrient, linear economy, waste value chain



The Circular Economy in the Natural World

Content:

Science, Geography, History, SPHE, Visual Art, English, Education for Sustainable Development, Physical Education

Age Range:

11-14

Time:

Approximately 60-90 minutes

Learning Outcomes:

1. To identify an example of the circular economy in nature.
2. To draw/sketch their chosen natural examples outdoors.
3. To develop an understanding of new terms and vocabulary and to use in dialogue.

Materials and Preparation:

(All worksheets & video links available on AgroCycle Kids website)

- Ensure access to the chosen amenity and ensure a risk assessment survey is done beforehand.
- **Recording Our Observations** worksheet from previous session.
- Word Search (Session 3)
- A selection of art materials – crayons, pencils, colouring pencils, charcoal, chalk.
- A4/A3 sheets on clipboards.
- Access to video links <https://www.youtube.com/watch?v=359lbQ4ozr0&t=33s> and <https://www.youtube.com/watch?v=5yzt3zwq3l>

Word Bank:

(Add these terms to the word bank)

Zero waste, amenity, gallery, meditation, mindful, natural, observe



Designing a Circular Economy System

Content:

Science, Geography, History, SPHE, Visual Art, English, Education for Sustainable Development, Physical Education, Global Citizenship, Music

Age Range:

11-14

Time:

Approximately 60-90 minutes

Learning Outcomes:

1. To explore the UN sustainable development goals, specifically – Goal 11, 12 and 13.
2. To plan individual or group art projects that will illustrate a proposed circular economy system.
3. To ensure the participants understand and agree on the given art task directives.
4. To develop an understanding of new terms and vocabulary and to use in dialogue.

Materials and Preparation:

(All worksheets & video links available on AgroCycle Kids website)

- **Recording Our Observations** worksheet – 1 for each participant
- A selection of art materials – crayons, pencils, colouring pencils, charcoal
- A3 pages
- **AgroCycle Kids Website** <https://www.youtube.com/watch?v=359lbQ4ozr0&t=33s> agus <https://www.youtube.com/watch?v=5yzt3zwq3l>
- The PowerPoint presentation (Session 4)

Word Bank:

(Add these terms to the word wall)

United Nations, Sustainable Development Goals, innovative, rice bran



SESSION FIVE

Create, Innovate, Discuss, Reflect

Content:

Science, Geography, History, SPHE, Visual Art, English, Education for Sustainable Development, Physical Education, Global Citizenship

Age Range:

11-14

Time:

Approximately 60-90 minutes

Learning Outcomes:

1. To present and explain their circular economy designs to the group.
2. For the participants to have the opportunity to question each other about their designs.
3. To share and reflect as a group on the five sessions.
4. To develop an understanding of new terms and vocabulary and to use in dialogue and their presentations.
5. To explain the 'Talk to an Adult' worksheet.

Materials and Preparation:

(All worksheets & video links available on AgroCycle Kids website)

- **Recording Our Observations** worksheet.
- **Talk to an Adult** worksheet.
- A selection of art materials – crayons, pencils, colouring pencils, charcoal.
- The **designs** of the participants for presentation.

Word Bank:

(Add these terms to the word bank)

Innovative, circular systems, global issue, seasonal, innovation
