An Investigation into the Impact of Inquiry-Based Learning on Young Learners’ Environmental Awareness and Agency in the Local Environment

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Declaration

I hereby declare that this dissertation is a presentation of my original research work. Wherever contributions of others are involved, every effort is made to indicate this clearly. This work has not been submitted previously at this or any other educational institution. The work was done under the guidance of Dr. Karin Bacon at the Marino Institute of Education, Dublin. I agree that the Library may lend or copy this dissertation upon request.

Niamh Horan  
Date 02/06/2020
Abstract

This thesis describes a case study analysis of an inquiry-based learning (IBL) approach with a class of young learners in an urban, primary school setting. Firstly, it examines how IBL can deepen the understanding of young learners’ environmental awareness in the local environment. Secondly, it investigates how IBL can promote agency for young learners. The data were generated with a group of 24 children, through a unit of inquiry which was taught over 5 weeks. Qualitative data were generated in this study by observations, samples of children’s work and focus groups interviews. Kath Murdoch’s (2010) inquiry cycle was used as the conceptual frame during the data generation and analysis processes. A triangulation strategy was used in the form of thick descriptions, an audit trail and member checking to maximise the validity of the data. The findings from this study found that conceptual learning, key inquiry skills and the role of the learner were pivotal in answering the research questions. The findings suggest the usefulness of conceptual learning as one way to address the overburdened curriculum in an Irish context. It also suggests the effectiveness of IBL approach to learning about environment awareness and promoting agency for young learners.

Keywords: inquiry-based learning, case study, young learners, environmental awareness, agency
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List of Acronyms

IBL - Inquiry-based learning

DES - Department of Education and Skills

MERC - Marino Ethics in Research Committee

SESE - Social, Environmental and Scientific Education

NCCA - National Council for Curriculum and Assessment

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Chapter One: Introduction

1.1. Purpose of the study

The focus of this study was two-fold. Firstly, it investigated how inquiry-based learning (IBL) can deepen the understanding of young learners’ environmental awareness in the local environment. Secondly, it examined how IBL can promote agency for young learners. It is important to begin to explore what is meant by IBL, environmental awareness and agency for the purpose of this thesis.

1. Carstens and Bernstein Howell (2012) define IBL as an approach which prioritises the student’s central role, begins with student-driven questions which involve critical analysis, and emphasises learning processes rather than a set of answers. IBL will be explored in greater detail later in the literature review.

2. Environmental awareness refers to the environmental knowledge, attitudes, and actions which can have an effect on students (Hadzigeorgiou & Skoumios, 2013). The word environment is used to denote ‘the surroundings or external conditions with which an individual (human or other living organism) or community interacts’ (SESE Irish Curriculum, 1999 p.2).

3. Chiaratto (2011) states that agency exists when students feel empowered to make their own decisions about aspects of their own learning and are able to act upon them.
Carstens and Bernstein Howell (2012) emphasised the process of learning in IBL. This definition spoke to me as the research questions (RQs) in this study also prioritised the learning process. The RQs referred to the how in relation to IBL as an approach. Like the definition stated above, the RQs aimed to centralise the role of the learner, start with their ideas and gain meaningful insight into the learning process. Further to the definition of awareness of the environment stated above, it is worth noting that the learners’ environmental awareness was discussed throughout this study. Environmental awareness referred to children’s experience and understanding of the local environment around their school. I strongly agreed with Chiaratto’s (2011) definition of agency. It conveyed a sense of true agency whereby children not only are supported but afforded the chance to implement their decisions which suggest authentic agency to me.

The significance of this study can be attributed to the growing popularity of IBL within education in recent times. The context for IBL in this study emerges against a backdrop of concern for pressing environmental issues. This thesis follows a case study design, with in-depth analysis of how IBL can deepen the understanding of young learners’ environmental awareness in the local environment and promote agency. Data for this study was collected using observations, samples of children’s work and focus groups. The hope was that this study would contribute to my own professional practice and the literature on education.

1.2 Rationale for the Study

This study aimed to contribute to the growth of IBL research by exploring how it can deepen the understanding of young learners’ environmental awareness in the local environment. It also aimed to investigate how IBL can promote agency for young learners. The how is significant in getting to the
crux of the investigation. A sharpened understanding of the relationship between IBL and environmental awareness is the premise for this study. Based on the findings, this study could indicate which elements of IBL are most effective in deepening young learners’ environmental awareness. Moreover, it may indicate more of a need to employ or increase the use of IBL strategies in a primary school setting. It may also suggest an effective way to harness the content of an overloaded Irish curriculum as well as the limitless information which learners are expected to navigate in the 21st century (NCCA, 2010). Thus, this study serves an important purpose. It deliberately places young learners at the centre of the RQs as literature on IBL has shown that there is scope for further research with this demographic.

1.3 Research Questions

This study aimed to address the following research questions:

1. How can IBL deepen the understanding of young learners’ environmental awareness in the local environment?

2. How can IBL promote young learners’ agency?

1.4 Context of RQs within IBL and Environmental Education

IBL has been gaining traction in recent times, particularly in education. According to Pedaste et al., ‘Inquiry-based learning is gaining popularity in science curricula, international research and development projects as well as teaching’ (2015, p. 47). The literature remains heavily weighted towards IBL within science curricula (Hoisington, Chalufour, Winokur & Clark-Chiarelli, 2014,
Pedaste et al, 2015). However, Chiaratto (2011) argues that IBL transcends disciplinary lines. This study aimed to add to the literature on integrated learning with young learners.

Despite an increase in popularity in recent times, IBL has also been received critically by some. IBL has been contested and accused of having little rigour in terms of theoretical grounding (Pataray-Ching and Robertson, 2002). However, such criticism could be considered as a parallel with the tension stage of inquiry. It invites discourse that may result in new possibilities and developments within the stance of IBL. Hence, this study will present a framework rooted in constructivist theory to hang the RQs on. The study will use Kath Murdoch’s (2010) inquiry cycle. Murdoch states that once she understood constructivism, it made sense to ‘describe what was such a natural process of building understanding over time’ (2013). According to Dewey (1902), Constructivist Learning Theory emphasised that children are active in their own learning. Dewey (1902) also contended that children learn through interactions and experience, and that their curiosities ought to be the starting point. These elements of constructivism are reflected in Murdoch’s (2010) the inquiry cycle. Constructivism and the inquiry cycle will be discussed in the next chapter.

The need for environmental education (EE) as a vehicle to teach awareness of the environment and encourage agency is arguably more pressing than ever. This need emerged against a backdrop of major environmental challenges such as climate change and global warming. Winograd stated that an ‘environmental crisis’ is omnipresent (2016, p. 4). These challenges are not a recent phenomenon. However, they have been brought to the fore by ‘growing social movements’ across the globe in response to the crisis (Winograd, 2016, p.4). The media has also played a role in highlighting environmental issues. Teachers, policy makers and educational planners are now required to look
beyond EE in a traditional sense. They have been compelled to look ‘beyond knowledge’ and develop different strategies (Boxley, Clarke, Dewey & Witt, 2014, p. 2). Hence, this study will use IBL as a strategy to deepen the understanding of young learners’ environmental awareness and to promote the agency of the young learners in my class.

1.5 Overview of Methodology

A case study design was employed in this study. Data were collected using observations, samples of children’s work and focus groups. The sample consisted of 24 fifth class students in a primary school setting. The sample was purposive as I was also the teacher of this group of children. This brought about the issue of insider as researcher. Thus, steps were taken to maximise the trustworthiness and validity of the data including thick descriptions, an audit trail and member-checking. The frame for this study was grounded in the principles of constructivism. Kath Murdoch’s (2010) inquiry cycle was used to frame the data collection and analysis processes.

1.5.1 Researcher positionality. It was important to acknowledge my position in this study as ‘insider as researcher’ in this study (Sikes, 2008, p.129). The dual role of teacher and researcher brought vulnerability to the research. Subsequently, strategies were employed to minimise the risks. I constantly reflected on my roles in my researcher journal. Triangulation of both data sources and strategies of validity were implemented to maximise the trustworthiness of the study. The triangulation of data sources included observations, samples of children’s work and focus groups. The strategies of
validity included an audit trail, thick descriptions and member-checking. These strategies will be discussed in further detail in the methodology chapter.

1.6 Organisation of the Thesis

This thesis comprises five chapters, including this introductory chapter. Chapter two situates the study in the context of the relevant literature pertaining to the RQs. It presents a critical analysis of the literature according to the three themes at the centre of this research: IBL, environmental awareness and agency. It also outlines the theoretical grounding and conceptual frame for this study. The third chapter outlines the methodology by giving a detailed account of the design and procedures of the study, including ethical considerations. The fourth chapter presents the findings of the research, focusing on the three key themes that are central to the RQs. The conceptual frame is used to illustrate and analyse the findings. The fifth chapter draws on the entire thesis, synthesising the theoretical and empirical elements to give a summary and critique of the findings. Finally, this chapter will present recommendations and implications for further research based on the findings of the study.
Chapter Two: Literature Review

‘Children’s inquiry acts provide a window to their thinking, allowing us to glimpse what they make sense of and how they are doing it, how they understand and how they use others to help them’.

(Lindfors, 1999, p.16)

2.1 Introduction

Two questions posed in the previous chapter asked how inquiry-based learning (IBL) can deepen the understanding of young learners’ environmental awareness and agency in the local environment. This chapter begins by setting the context; examining the current place that IBL holds in educational discourse. It will address the current rhetoric in the media regarding the environmental crisis today. Most importantly, it will critique the themes of IBL, environmental awareness and children’s agency in the literature. However, I was open to new themes emerging throughout the study. This review examined the literature mainly from the last ten years relating to these themes. Although the main focus of this study is within primary education, the literature addresses the themes within primary education and beyond. It considers research within a national and global context.
2.2 Inquiry-Based Learning

2.2.1 What is inquiry-based learning? The literature demonstrates that a variety of educational approaches have been compared to IBL. It is a term that has been associated with project-based learning and problem-based learning (Lonergan, Cumming & O’Neill, 2019) or discovery learning (Gijlers & De Jong, 2005). Such self-directed educational approaches typically involve active engagement of the learner through placing them at the centre of the learning process (Alfieri et al., 2011).

Despite some shared features, IBL can be set apart from these educational practices by constructivist theory and through definitions. IBL is supported by a framework which is rigorously rooted in constructivist theory. Constructivism will be addressed later in this chapter. Next, the following three definitions of IBL help to distinguish it from the other approaches stated above. They are as follows:

Inquiry-based learning is an educational strategy in which students follow methods and practices similar to those of professional scientists in order to construct knowledge. It can be defined as a process of discovering new causal relations, with the learner formulating hypotheses and testing them by conducting experiments and/or making observations (Pedaste et al, 2015, p.48).

Inquiry is a ‘stance’ and ‘collaborative process of connecting to, and reaching beyond, current understandings to explore tensions significant to the learner’ (Short, 2009, p.12).
Inquiry-based learning is a dynamic and emergent process that builds on students’ natural curiosity about the world in which they live. As its name suggests, Inquiry places students’ questions and ideas, rather than solely those of the teacher, at the centre of the learning experience. Students’ questions drive the learning process forward. Teachers using an inquiry-based approach encourage students to ask and genuinely investigate their own questions about the world. Teachers further facilitate students’ learning by providing a variety of tools, resources, and experiences that enable learners to investigate, reflect, and rigorously discuss potential solutions to their own questions about a topic the class is studying (Chiaratto, 2011, p. 7).

These definitions offer rich, comprehensive understandings of IBL. However, for the purpose of this thesis, an adaptation of all three will be used. This adaptation was necessary as the definitions outlined above were too broad and general. There was a need for a more succinct and targeted definition, relevant to this study.

Inquiry-based learning is a stance which places learners at the centre of meaningful, real-world learning which is conceptually-driven. It is dynamic and requires teachers to foster a habit of key inquiry skills for learners such as: questioning, observing, investigating, reflecting and taking action. It engages learners through collaborative and transdisciplinary learning (Pedaste et al. 2015, Short 2009 and Chiaratto 2011).

This definition was tentative and constructed with an open mind to the possibility that it may change during the study. It aimed to present a succinct yet comprehensive interpretation of IBL. This new definition highlighted the learner-driven nature of IBL. It also echoed some of the scientific processes which Pedaste et al (2015) referred to except they have been adapted to suit learners in a
primary setting. This definition used Short’s view of IBL as a ‘stance’ (2009, p. 12). I felt that this term was more potent than ‘method’ which felt rigid and less dynamic (Short, 2009, p. 12). This definition was altered towards the end of this study in light of the findings, due to the emergence of strong IBL elements. The key elements which define IBL will be examined next, starting with inquiry as a process.

2.2.2 Inquiry as a process. Oftentimes, the process of IBL is organised into stages of inquiry that together form an inquiry cycle (Pedaste et al., 2015). Inquiry cycles serve to guide the inquiry process. Various representations of inquiry cycles can be identified throughout the literature (Pedaste et al., 2015). According to Bruce and Casey (2012), the inquiry cycle summarises aspects of inquiry. It allows us to relate the embedded constructivist theory in IBL with ordinary teaching and learning engagements (Bruce & Casey, 2012). The inquiry cycle can be used to assist in informing and guiding learner experiences. However, Bruce and Casey alert that a cycle ‘is merely suggestive, neither the sole, complete, nor rigid characterization of inquiry-based learning’ (2012, p.4).

Bruce and Casey posit that inquiry is rarely reduced to a ‘simple, linear fashion’ (2012, p. 4). Conversely, Murdoch cautions that there is the possibility that inquiry may become a ‘montage of activities that lack clear intent or thoughtful design’ (2015, p. 76). The challenge is to be mindful that our approach to planning and teaching does not become overly prescriptive (Murdoch, 2015). The cycle seeks to find a balance and distinguishes parts of an otherwise ‘opaque process’ (Bruce and Casey, 2012, p. 4). I was mindful of this during the inquiry process.
Previously, I used inquiry cycles with class groups and found them to be very effective in guiding the inquiry process. They acted as a point of reference for the inquiry journey, as the learners and I checked in from time to time, without following it in a rigid fashion. In addition, many inquiry cycles have been adapted in creative ways using colour, images and questions as prompts. This was important for catching the attention of young learners as well as making cycles accessible for different abilities in the class. In my experience, the inclusion of inquiry cycles as a frame for IBL is a valuable and practical scaffolding tool in the learning process. Kath Murdoch’s (2010) inquiry cycle will be examined as a frame for this research later in this chapter.

Key inquiry skills are also fundamental to the inquiry process. According to Murdoch, ‘inquiry requires and strengthens ‘whole of life’ transferable skills’ (2015, p. 15). The literature varies in distinguishing which exact skills are key to inquiry. Generally, these skills include questioning, planning, critical thinking, communicating, analysing and reflecting (Worth 1999, Chiaratto 2011, Murdoch 2015, Short 2009).

Chiaratto (2011) outlines several key functions of a teacher in an IBL environment including: planning flexibly, being a co-learner, looking out for teachable moments, modelling thinking processes, reflecting on student ideas and focusing on key concepts instead of specific expectations. However, I was surprised that Chiaratto did not emphasise fostering critical thinking skills as a key discrete function. It is possible that this role may fall under the ‘model inquiry-based thinking processes for students’ (Chiaratto, 2011, p. 18). Chiaratto (2011) goes on to give the example of open-ended questioning to internalise this way of thinking to develop independent problem-solving skills. Undoubtedly, there is scope for more of these processes to be discussed. In my experience in the
classroom, critical thinking skills are fundamental to IBL such as questioning, observing, analysing, comparing, evaluating and reflecting. Oftentimes, these critical thinking skills are not given the time needed to teach them explicitly.

2.2.3 Inquiry is conceptual. One of the most prolific authors of inquiry within primary education is Kathy Short. She argues that IBL is driven by a conceptually-based, as opposed to a topic-based, approach to curriculum (2009). Conceptual understanding can be described as ‘the process of grasping ideas in a transferable way which can facilitate learners to apply what they learn in class across domains’ (Macanas & Rogayan, 2019, p. 207). Short states that a conceptually-based curriculum places considerable emphasis around the central ideas of a topic and goes beyond information to reach a deeper understanding (2009). Similarly, Murdoch contends that ‘quality inquiry must challenge students to engage with significant conceptual understanding of their world’ (2015, p. 14). She elaborates that students need to inquire into conceptually-driven ideas both across and within disciplines (Murdoch, 2015).

In critiquing traditional practices of teaching, Short states that oftentimes ‘we are so used to covering content that we lose sight of the conceptual frame and immerse ourselves in designing activities to cover the content’ (2009, p.13). She illustrates this point using the example of nutrition as the topic and choice as the conceptual frame. Here, the conceptual frame of ‘making choices that affect our health and lives’, may be lost in facts around ‘bones, food groups and body systems’ (2009,
According to Short (2009), an abundance of information has resulted from the shift in society to an Information Age. She insists that it is necessary for learners to think conceptually to identify and apply knowledge to critical issues today (Short, 2009).

Similarly, Erickson argues that ‘concept-based curricula are more effective than topic-based curricula, for the world of today and tomorrow, because they take teaching and learning to a higher level as students analyze, synthesize, and generalize from facts to deeper understanding’ (2008, p. x). Erickson illustrates this position in the context of a history class. She contends that ‘When students (and teachers) consider specific events issues and historical figures through a conceptual lens, they are forced to analyze, evaluate and investigate at deeper levels as they consider the transferable legitimacy of an idea’ (2008, p.26). This directly relates to what the RQs in this study set out to investigate. It examined how learners evaluated learning on a deeper level through IBL which is conceptually-driven.

The argument for a conceptually-driven curriculum is rooted in the assumption that there is an onus on educators to prepare students for the 21st century. The association of IBL and the need for 21st century skills in education, appears to be a recurring theme in the literature. Macanas and Rogayan contend that elementary school educators are relentlessly seeking innovative strategies to ameliorate science education (2019). Omari and Chen state that the use of concepts enables learners to take what they learn in class and apply it in their lives (2016). The literature argues that traditional methods and rote memorisation are insufficient to tackle real-world issues (Macanas & Rogayan 2019,
Omari & Chen 2016, Short 2009). As a result, there has been a call for an increase in IBL in primary and secondary schools as it draws on conceptual learning (Miller McNeal & Herbert 2010).

Birbili (2007) illustrates how conceptual learning develops in the classroom. The teacher facilitates concept formation through questioning by guiding children to observe and reflect carefully, see commonalities and differences, identify relationships, categorise events, objects and situations, attach labels to them and eventually discover patterns and generalise (Birbili, 2007). Through what Erickson refers to as ‘essential questions’, teachers facilitate and guide concept development (2002, p.91).

In summary, the literature has argued that conceptual learning is a key element to IBL. It compels learners to reach a deeper understanding of their world and to experience learning within and across disciplines (Murdoch, 2015). It is implemented through a conceptual frame in the form of big ideas within IBL (Short, 2009). The literature contends that thinking conceptually is important to apply knowledge to critical issues and to navigate the limitless availability of content as a result of the Information Age we live in (Macanas and Rogayan 2019, Short 2009). Conceptual learning was used in the unit of inquiry. A central idea framed the unit along with concepts to facilitate conceptual understanding of the local environment.

**2.2.4 Inquiry is collaborative.** Central to the entire discipline of IBL is the concept of collaboration. ‘Inquiry classrooms demand complex collaborative skills’ (Murdoch, 2015, p. 30). Short (2009) contends that inquiry is collaborative as it entails going beyond our own understandings.
However, she cautions that school practice often involves cooperation (2009). Collaboration, on the other hand, engages students in transformative dialogue (Freire, 1978). It calls for students not only to work together but to think together (Short, 2009). Murdoch posits that student collaboration is not confined to class-based groups (2015). It may involve learning engagements with the community or other students in the school (Murdoch, 2015). Due to convincing arguments made by Short (2009) and Murdoch (2015), this study endeavoured to encourage collaboration among learners, the school community, parents and the wider community in terms of building and sharing knowledge.

2.2.5 The role of the learner. The role of the learner is another distinguishing element of IBL. This is where a parallel can be drawn between the themes of IBL and agency. Both themes identify that the ownership of the learner in the learning process is paramount.

When given opportunities to pose questions and problems, children play a ‘key part in directing how and what they learn’ (Murdoch, 2015, p. 11). Chiaratto suggests that IBL ‘places students’ questions, ideas and theories at the centre’ of learning (2011, p. 8). Equally, it is the role of the teacher to provide opportunities that may spark curiosity and wonder so that students’ critical thinking skills become habitual (Chiaratto, 2011). Orr warns that students’ ‘sense of wonder is fragile; once crushed, it rarely blossoms again (2004, p.24). The risk, then, is that student questioning and curiosity stops and the focus becomes what they think the teacher wants to hear and the content to which they will be assessed (Chiaratto, 2011).
The literature made a convincing argument that the role of the learner is fundamental to IBL. This view was in line with my own view of the learner. This is something that I reflected on as a teacher. Traditionally, the teacher leads much of the learning. However, my experience with inquiry has demonstrated that child-led learning is fruitful, meaningful and effective. For this reason, I deliberately placed the learners along with the concept of agency at the centre of my RQs.

2.2.6 Constructivism. It was evident from the literature that IBL is guided by constructivist views of learning. Constructivist ideas make up a wide stream of theories that have been attached to human behaviour and education. However, just three carefully selected theorists whose works are arguably most pertinent to IBL provided the theoretical rigour for this study. The study was informed by ideas by Dewey (1902), Bruner (1966) and Vygotsky (1978).

Key tenets of teaching and learning through inquiry are rooted in the writings of American philosopher John Dewey. Pike (2016) concisely summarises Dewey’s ideas on learning as an active process based on real-life tasks, where children learn through experience and curriculum is appropriate. Dewey insists that children and their curiosities ought to be the starting point for learning (Pike, 2016). He states that ‘the child is the starting point, the centre, and the end...the child’s own instincts and powers furnish the material and give the starting point for all education’ (Dewey, 1902, p. 276). Dewey’s description of the learning process echoes the inquiry process. To me it is evident that while Dewey did not state the term inquiry, it was apparent in his ideas.
The work of Jerome Bruner was considered in light of IBL. Bruner maintains that the teacher ought to guide students in the process of knowledge building rather than focus on knowledge as a product (Bruner, 1966). He also contends that students actively participated in learning to construct their own meaning and link new knowledge to prior knowledge (Bruner, 1960). Similar to Dewey, Bruner influenced the idea of spiral curricula in Ireland and Australia. Bruner argues that complex information could be taught at a simple level to begin with increasing complexity as the child develops (Pike, 2016). He states that by starting with a hypothesis at an early stage, which can be revisited and built upon until the child fully grasps the curriculum concept (Pike, 2016). This reflected the tentative nature of IBL. It is not fixed but fluid. Ideas and questions are revisited and reviewed throughout the process developing depth and complexity.

The literature demonstrated that Vygotsky’s ideas are reflected in IBL. The collaborative element of IBL implies the acknowledgement and adoption of Vygotskian sociocultural theory which relates to the way knowledge is constructed through interactions in social and cultural contexts (Wang, Bruce & Hughes, 2011). Vygotsky’s seminal works Mind in Society (1978) and Thought and Language (1986) critiqued the significance of social and cultural context to human cognitive development (Wang et al., 2011). Sociocultural theory aligns with IBL through active collaboration. Learners work with peers, teachers and the wider communities which support social interaction and learning. Vygotsky’s idea of community of practice is embedded in IBL also. This aspect of cognitive development recognises a group of people with a special expertise (Wang et al. 2011). The role of the teacher within Vygotsky’s theory and IBL is to facilitate this construction of meaning. Another theory of cognitive development by Vygotsky is the Zone of Proximal Development (ZPD). Vygotsky defines ZPD as “the distance between the actual developmental level as determined by independent
problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (1978, p.85). IBL facilitates the learner in driving their own learning which allows teachers to distinguish their level of independent problem-solving. At this point, the teacher can model critical thinking processes or act on teachable moments based on the level needed to develop learners’ cognitive development. Equally, this development can be aided by more capable peers through collaboration.

The literature indicates that constructivist theories permeate the fundamental principles of IBL. While this thesis examined the work of Dewey (1902), Bruner (1966) and Vygotsky (1978), it does not suggest that the theory behind IBL is restricted solely to these three constructivist theorists. However, this chapter argues that there are several parallels that give IBL a robust theoretical grounding within the work of the three theorists mentioned.

A number of authors around IBL have created inquiry cycles which harness the principles of constructivism (Pedaste et al. 2015, Short 2009). Such cycles provide a gateway to learning through inquiry for educators and students. Cycles also represent the process of inquiry.

2.2.7 Frame. Kath Murdoch’s (2010) inquiry cycle was used for this study. The reasons for choosing this cycle will be outlined next.
The inquiry cycle in Figure 1 represents important aspects of inquiry. This inquiry cycle gives enough detail to guide the process, without being overly prescriptive. It also leaves the point of entry open to interpretation for inquirers. Equally, the details supplied for each stage come in the form of questions. The questions are open-ended and invite inquiry learners to think. The reflecting on
personal understanding stage is at the centre of the cycle which suggests that it ought to be engaged with continuously throughout the inquiry (Murdoch, 2015). Furthermore, no arrows indicating the direction of the inquiry limit this cycle which allows for movement and iterations (Pedaste et al, 2015). Murdoch’s cycle is clear, colourful and easy to follow. Other inquiry cycles have either too many or too few stages and I felt that this one had an adequate amount of stages, so as not to overwhelm children or supply too little guidance. Thus, it was important for me to critique other cycles and to be selective with learners with the research questions in mind. This cycle will act as a structure through which the main themes in the RQs will be addressed. While Murdoch’s (2010) interpretation of an inquiry cycle will formed the basis of the inquiry process in this study, ultimately it was the children who are central to critiquing and deciding on which representation of the cycle was used.

2.3 Environmental Awareness

2.3.1 What is environmental awareness in education? While it was outlined in the introduction, it is worth taking a closer look at what is meant by environmental education (EE) and environmental awareness for the purpose of this thesis. EE is broad and defining it is subject to much debate. Dean (2019) contends that this field is perhaps beyond definition as a rapidly evolving concept that is largely dependent on time and place. However, in the context of the Irish curriculum EE:

provides opportunities for the child to explore, investigate and develop an understanding of the natural, human, social and cultural dimensions of the local and wider environments; to learn and practise a wide range of skills; and to acquire open, critical and responsible attitudes (Department of Education and Skills, 1999).
It also ‘enables the child to live as an informed and caring member of local and wider communities’ (Department of Education and Skills, 1999). This definition resonated with me as it incorporates a holistic approach to EE by including a broad range of dimensions for the learner. It also links environmental learning with the cultivation of active citizens which involves the taking action stage of IBL and agency.

EE and environmental awareness are very closely linked. For this study, environmental awareness incorporates what is defined as environmental education as stated above and refers to the act of being cognisant of the environmental dimensions that surround them, as noted in the EE definition. I felt that awareness constituted more targeted language than education for the first RQ. In this study, children’s environmental awareness is specific to the context of the local environment at their school. However, EE will be used to explore environmental awareness as it is the more broadly used term in the literature as will be demonstrated next.

Chiaratto highlights four significant aspects of EE that are identified as: IBL, experiential learning, integrated learning and stewardship. Chiaratto insists that these four elements make for a ‘dynamic and cohesive pedagogical framework’ pertinent to EE (2011, p. 6).

Chiaratto states:

...when the principles of Inquiry-based Learning are consciously considered, the potential of Experiential Learning, Integrated Learning, and Stewardship is both
informed and enhanced. In turn, the latter three branches spark new iterations in Inquiry-based Learning, propelling children’s learning deeper into the Environmental Inquiry process (2011, p. 6).

Chiaratto’s (2011) framework for EE suggests the interconnectedness of the themes set out in the RQs. This will be explored further next as this thesis examines experiential learning, integrated learning and stewardship.

2.3.2 Experiential learning. According to Chiaratto, experiential learning refers to a process that seeks to veer away from textbooks as the only repository (2011). It also engages learners in direct experiences with their immediate environment through exploration of their senses (Chiaratto, 2011). Experiential learning is underpinned by the work of Dewey (1938) and Kolb (1984). Dewey (1938) highlights the reflective element of experiential learning. It involves a ‘continuous exchange between students’ immediate experiences and their personal reflections in order to reassess previously held beliefs and influence future experiences and behaviour (2011, p. 35).

Meanwhile, Kolb (1984) states that experiential learning endeavours to transform learner experiences into newly formed knowledge (2011, p.35). However, both theorists caution that direct experience in isolation does not result in experiential learning. They emphasise the importance of conscious engagement (2011, p.35). Moreover, Kolb and Dewey maintain that students must determine meaning from their experience and reflect on current understandings to form new knowledge (Chiaratto, 2011). This study endeavoured to facilitate effective experiential learning.
Learners used concepts as a lens to analyse the local environment and regularly reflected on their learning to facilitate ‘conscious’ engagement of their direct experience in the locality (Kolb 1984, Dewey 1938).

2.3.3 Integrated learning. The concept of integrated learning is omnipresent in curriculum theory and policy. In the Irish context, ‘integration gives children’s learning a broader and richer perspective, emphasises the interconnectedness of knowledge and ideas and reinforces the learning process’ (Government of Ireland, 1999, p.16). However, this definition is quite general. It may reflect a lack of priority in the curriculum for integrated learning. Drawing on personal experience of practice, oftentimes integration is employed with a lack of depth because of an already overloaded curriculum and school day. It is considered that the overlap of some content between two subjects suffices as integration. There is scope for a renewed approach to integration which brings richness to learning through connections.

Chiaratto (2011) proffers a more detailed view of integrated learning. It is concerned with the need for learners to grasp the bigger picture instead of it being presented as ‘divided into small pieces’ (Chiaratto, 2011, p. 43). She argues that integrated learning transcends disciplinary lines but is most often associated with subject integration (Chiaratto, 2011). This can present limitations in relation to the depth of connections (Chiaratto, 2011). Indeed, Chiaratto identifies a potential weakness in the surface level integration associated with subject integration. For the purpose of this thesis, an IBL approach to integrated learning will be employed. It endeavours to take a holistic approach to learning through transdisciplinary integration, recognising the need for learners to see the bigger picture (Brazee & Capelluti, 1995).
Again, the issue of the 21st century learner has emerged in the literature. It is argued that integrated or transdisciplinary approaches to learning can address the needs of learners through skill acquisition and a broad perspective through which to negotiate a complex world (Savage & Drake, 2016, Hargreaves & Fullan, 2012; Hargreaves & Shirley, 2009). According to Savage and Drake (2016), an application of a transdisciplinary curriculum is evident at tertiary level education. However, the International Baccalaureate (IB) Primary Years Program (PYP) is a notable exception as a curriculum which merits and implements transdisciplinary learning (Drake and Savage, 2016). Additionally, the Aistear framework (NCCA, 2009) has employed new means of integration for the younger classes. The Primary Language Curriculum is also currently being implemented (DES, 2016). This study attempted to employ a transdisciplinary approach to integration using various skills, a central idea and concepts as a conceptual framework across several subject disciplines.

2.3.4 Stewardship. Stewardship can be constituted as ‘the human actions that contribute to a sustainable future for humans, animals, and plant species alike’ (Chiaratto, 2011, p. 54). It is rooted in a strong respect and willingness to protect the biosphere (Chiaratto, 2011). The following learning conditions support the implementation of stewardship; ‘students’ agency’, ‘time spent in nature’ and ‘students’ stewardship actions’ linked to their classroom setting (Chiaratto, 2011, p.55). Parallels can be drawn between stewardship and children’s agency which links in with the RQs in this study. Orr (2004) acknowledges the connection between stewardship and education. He asserts that education ought to be the catalyst to cultivate children’s curiosity and empowerment in the world (Orr, 2004).
To sum up, environmental inquiry represents a transformational educational response to EE. It suggests the need for a fundamental shift in our thoughts and behaviours as well as our teaching and learning (Orr, 2004). The need for environmental inquiry has always existed. However, it is arguably more pertinent given the vulnerable state of the earth. According to Andrzejewski, ‘There is ample evidence that life on earth today is facing problems unlike any other era’ (2016, p. 174). The urgency for a focus on EE is timely. The literature shows that there has been a shift towards EE as a vehicle for incorporating stewardship for young learners in recent times (Dean, 2019). The next part of this thesis will examine place-based education (PBE) as a theme emerging from the literature around EE.

2.3.5 **Place-based education.** According to Winograd, PBE ‘grounds curriculum and teaching in the geography, social issues and problems of students’ immediate communities’ (2016, p.5). While this idea has otherwise been referred to as ‘place-conscious education’ in the literature, the common elements of the approach are consistent (Szabo and Golden, 2016, p.22). Smith and Sobel (2010) draw on five elements of PBE. They include curriculum rooted in environmental challenges and collaboration among learners and teachers in the construction of learning. PBE also involves learner-led inquiry and action, partnership with the community and finally, the development of an appreciation, connection and understanding of the local region for students (Smith & Sobel, 2010). These five elements act as a guide to give educators a chance to engage learners and help them connect to their immediate environment (Szabo & Golden, 2016). However, the caveat here is that ‘place gives us...varied experiences’ (Szabo & Golden, 2016, p.27). Thus, ‘the suburban child and the rural child will most likely organize their knowledge into different patterns’ (Szabo & Golden, 2016, p. 22). These authors question the need for a more contextualised, ‘locally responsive curriculum’ (Preston, 2015). The PBE approach echoes many aspects of the IBL approach to teaching and learning.
such as a co-constructed curriculum rooted in real-life issues, collaboration among learners, teachers and the community and learner-led agency and action. Based on the links made here it is apparent that PBE is relevant to IBL and this study.

2.3.6 Environmental education and inquiry. Each of the five elements of PBE discussed above are shared between EE and IBL. The core elements of IBL mentioned in the previous section are all equally integral to EE. As EE is broad in nature, conceptual learning would be a suitable fit. Other connections between these two themes are collaboration and agency. These features are key to the central question of this research as it seeks to investigate children’s experience specific to their local environment. Next, the theme of children's agency will be explored.

2.4 Agency

The theme of children’s agency emerged from the literature as a natural progression and link between EE and IBL. It represents one of the four branches mentioned in the environmental inquiry framework which is indicative of the significant place it holds within EE (Chiaratto, 2011). Agency is also integral to IBL as it is the learner-centred by nature.

2.4.1 What is agency? Sairanen and Kumpulainen define agency as ‘the capacity of individuals to act independently and to make their own free choices’ (2014, p.145). According to Chawla; ‘The process of building a sense of agency through seeing the effects of one’s action is integral to mastery of experiences, when people undertake activity that they consider significant and succeed’ (2009,
p.16). However, it is Chiaratto who offers the most fitting description of agency for the context of this thesis. According to Chiaratto:

Students develop a sense of agency when they have the opportunity to make decisions about aspects of their own learning. As a result, they feel more motivated to acquire new knowledge and may even gain the confidence to act upon it by challenging established norms and effecting change within their own community (2011, p. 56).

2.4.2 Background of children’s agency. Traditionally, agency has been considered a valuable aspect of human life in many Western societies (Sairenan and Kumpulainen, 2014). However, Sairanen and Kumpulainen (2014) highlight that agency in children has only been acknowledged and appreciated in recent times. This is evident through the place children’s agency holds in educational policy, practice and research (Sairenan and Kumpulainen, 2014).

Sairenan and Kumpulainen contend that several initiatives have been the catalyst for the recognition of agency (2014). It was the ratification of the UN Convention on the Rights of the Child (UNCRC) in 1992, that spearheaded a shift in practice towards children’s agency. Ireland responded to this by a commitment that ‘the voices of children and young people are heard and that their opinions are given due weight in matters that affect them’ (National Strategy on Children and Young People’s Participation in Decision-Making, 2015-2020, p.6).

2.4.3 Policy and research on children’s agency. Evidently, Ireland has shown a commitment to policy development to reflect the rights of children and young people since the ratification of the
UNCRC. A number of other initiatives which demonstrate this vow include Comhairle na nÓg (local child and youth councils) present in each Local Authority area of Ireland; a national youth parliament (Dáil na nÓg) and commissioned research to build the evidence base for participation by children and young people in decision-making (National Strategy on Children and Young People’s Participation in Decision-Making, 2015-2020, p.6).

The literature demonstrates that progress has been made in educational policy and research around children’s agency. However, this policy has not adequately transferred into practice in the Irish classroom in my experience. For this reason, it is worth examining the facilitation children’s agency within educational practice outside of Ireland. This example is particularly fitting to this study as it focuses on children’s agency within the local environment.

2.4.4 Pedagogical research on the facilitation of children’s agency. The effective facilitation of agency for young learners is exemplified in a pedagogical research project carried out in an Australian primary school. Dapto Dreaming focused on a place-based participatory research project in a primary school close to Sydney (Malone, 2016). The children exercised agency through proposing ideas to urban developers for a child-friendly local environment. Research and educational workshops assisted children in collecting data about the experiences of their locality and assessing the child friendly qualities of the community (Malone, 2016). Children developed a sense of stewardship for there are as well as a sense of responsibility as they played a key role as ‘social agents in community planning’ (Malone, 2016 p. 125). This project provided an opportunity for children to practice agency and was a unique testament to the reciprocal nature of community (Malone, 2016). It is evident to that this project is an example of effective, authentic agency for children in the local environment.
These findings highlight the significance of PBE outside of the classroom. Malone (2016) recommends that educators ought to consider ways for children to engage in outdoor encounters during and outside of school time, to support them as agents of change. This project spurred me to consider why there is a lack of priority around children’s agency in my experience in Irish primary settings.

2.4.5 What are the challenges of facilitating children’s agency? One of the challenges to children’s agency is the attitudes and beliefs of adults. In critiquing this position, Andrzejewski (2016) argues that adults believe they are shielding children from the harsh realities of global problems such as animal extinction, climate disruptions, war and environmental destruction. However, Andrzejewski (2016) stresses that the avoidance of these issues could cause harm to children. In doing so, censorship during childhood could result in the lack of development of agency and consciousness for children (Andrzejewski, 2016). Children could be vulnerable to manipulation of the media, advertisements or corporate-influenced news. Andrzejewski (2016) argues that addressing global issues would provide a space for children to train in evaluating accuracy of information.

Malala Yousafzai is a notable example of a young person who was compelled to take social and environmental action (Andrzejewski, 2016). Malala Yousafzai campaigned for girls and their right to education (Andrzejewski, 2016). Despite her peaceful efforts for equal rights, Malala was shot in the head after taking an exam in 2012 (Andrzejewski, 2016). However, she recovered and became the youngest person to be awarded the Nobel Peace Prize (Andrzejewski, 2016). While examples of young activists are important for children to relate to, the case of Malala Yousafzai comes with a serious
warning that agency will be affected by cultural norms and that children ought to be protected and guided when exercising agency. Andrzejewski (2016) fails to highlight what can be learned from the case of Malala Yousafzai. It could be argued that while children’s voices hold a place in environmental discourse, adults, particularly educators, have a responsibility to guide children as agents of change. The implications of societal and cultural norms of the place where the children are situated needs to be considered.

2.4.6 What are the benefits of facilitating children’s agency? The facilitation of agency promotes a number of benefits for young learners. Chiaratto asserts that agency can support motivation and boost confidence (2011). This occurs when children are given the opportunity to direct their own learning, make decisions and implement them (Chiaratto, 2011). Chiaratto suggests that this motivation and confidence may spur children to become agents of change in their own communities (Chiaratto, 2011).

Similarly, Pike maintains that agency can be a catalyst for promoting citizenship for young learners (2016). When children are enabled to make their own decisions, they take responsibility for their own lives and their communities (Pike, 2016). ‘Qualitative analyses by Langford and Maiteny (2002) suggest that some individuals respond to the threat of climate change with social engagement, which leads to a sense of empowerment and other positive emotions’ (Doherty & Clayton, 2011, p. 272).

Together these studies provide important insights into the potential positive and negative side effects of children as agents of change. It has highlighted that educators ought to be aware of the risks
and that social action can work to mitigate the negative effects of environmental issues. The literature indicates that there is scope for the inclusion of social action in teaching and learning. This is one of the reasons that this study sought to find out how IBL can provide a space for children’s issues in their local environment.

**2.4.7 Agency and environmental education.** A noteworthy parallel can be drawn between the literature on agency and EE. A strong link exists in the literature as identified throughout the previous sections e.g. the parallels between agency and stewardship. Chiaratto argues that a fundamental goal of education is to create ‘discerning, active citizens’ (2011, p. 56). Winograd maintains that the most effective way to weave children’s agency into EE is to ‘be aware of modest problems or issues in the local environment that might be of interest to children as topics for social action projects’ (2016, p. 264). This is particularly relevant in the context of this study. The themes of EE and agency were almost inseparable in the literature which meant that it was important and fitting that both featured in the RQs. Barlow also stated that ‘local connections need to be made so meaningful links can be forged to the wider, interconnected world whether it is close by or further afield’ (2016, p. 118). Upon reflection on these themes, I felt agency ought to begin on a local level so that it can transfer and be applied to a more national or global context.

**2.4.8 Agency, environmental education and inquiry-based learning.** Further to the section above, IBL is the third component to consider in light of agency and EE. The literature has demonstrated strong links between the three. The role of the learner appears central to each of these themes. Additionally, EE provides the space for conceptual learning which is fundamental to IBL. Another factor that ties these themes together is the context of the local environment to which they
will all be applied. Murdoch’s (2010) inquiry cycle was used to weave these three themes together and was used to form the frame for the unit of inquiry during data generation and analysis.

2.5 Conclusion

To conclude, the literature identifies that the three themes examined in this thesis are inextricably linked. In order to synthesise the main themes in the RQ’s, they will be represented in the Venn diagram next.
Figure 2. Venn diagram of RQ themes using visual software from www.Creately.com.

Figure 2 demonstrates a visual representation of the interconnectedness of IBL, environmental awareness and agency. It is evident that there are several commonalities shared. Organising the themes and sub-themes set out in this literature by means of a Venn diagram allows for easy identification of the relationships among the sets.
Overall, the literature has shown that IBL has attracted considerable interest in recent times. It also contends that educators face an ‘environmental crisis’ in which we must prepare children for a new world of challenges (Winograd, 2016, p. 4). Next, IBL was explored in terms of a definition and the attributes associated with the process. The theoretical roots of IBL were grounded in the constructivist theory. Murdoch’s inquiry cycle (2010) was critiqued in terms of its relevance to this study. Then, the theme of environmental awareness was explored in the context of EE including environmental inquiry (Chiaratto, 2011) and PBE (Smith & Sobel, 2010). The literature around children’s agency was also examined in this chapter and mapped its development from policy and research, to pedagogical research. In my experience, there is room for improvement in relation to agency in Irish classrooms.

It must also be noted that the original RQ in this study was refined following the completion of the literature review as I was influenced by Chiaratto’s (2011) argument that agency was an integral part of the environmental inquiry framework. It drove me to consider agency more specifically rather than an inbuilt element of IBL. I was also influenced by the ‘Dapto Dreaming’ pedagogical research project which exemplified the effectiveness of promoting agency for young learners (Malone, 2016).

The refined RQ is as follows: how can IBL deepen the understanding of young learners’ environmental awareness and promote agency? This slight alteration is important and will allow for a more targeted approach to the methodology chapter. Furthermore, I decided to unpack this question a little further to make two RQs to make sure that both were given adequate attention. The first research question is: how can IBL deepen the understanding of young learner’s environmental awareness in the
local environment? The second research question asks: how can IBL promote young learners’ agency?

The next chapter will outline the methodology chosen for this research study.
Chapter Two: Methodology

3.1 Introduction

This chapter provides a description of the research design for this study. Firstly, it begins with the rationale for a case study approach and it also outlines the context of the study. Next, it discusses the organisation of the study and methods used, followed by an outline of the data generation process. Finally, the ethical considerations and limitations of the study are addressed.

3.2 Research Questions (RQs)

The first RQ at the centre of this research is how can inquiry-based learning (IBL) deepen the understanding of young learners’ environmental awareness in the local environment? The second research question asks how can IBL promote young learners’ agency? As noted in the previous chapter, I made a slight alteration of the RQs. The inclusion of the word ‘promote’ in the refined second RQ, drove me to consider exactly how agency is developed through IBL. This alteration impacted on the methodology chosen. Photographs were added as an instrument to capture and encourage learner’s agency which will be discussed in further detail later.

3.3 Research Approach

A single case study was carried out for this research as it was deemed the most suitable approach in answering the RQs. A case study was chosen as it is an exploratory research approach. It is the most fitting way of generating an in-depth, multi-layered understanding of a complex real-life issue (Cohen, Mannion & Morrison, 2018). This understanding of the ‘fine-grain detail’, or the how as set out in the
RQs, is what this thesis seeks to investigate (Cohen et al., 2018, p. 378). A case study works best for this thesis as it required an in-depth account of the specific role of IBL in deepening the understanding of young learners’ environmental awareness of the environment and in promoting agency.

Stake defines a case study as ‘the study of the particularity and complexity of a single case, coming to understand its activity within important circumstances’ (1995, p. xi). Gillham (2000) states that a case is one example of a phenomenon. Under investigation in this study is a case of children’s environmental awareness and agency in the context of an IBL project carried out in a group. Stake states that ‘we study a case when it itself is of very special interest’ (1995, p. ix). Evidently, the case in this study is of interest to me as the teacher of the class and as a reflective educational practitioner.

Denscombe contends that the case requires ‘distinct boundaries’ (2010, p. 55). The following sets out the relevant group, geographic area and time period as the boundaries for this case. A group of 24 fifth class students were the relevant group in this study. The local environment delineates the geographic area. This is specific to the nearby streets and landmarks of the school at the centre of the study. Furthermore, the data collection process was carried out over a period of 5 weeks because this was an appropriate and sufficient time to spend on a unit of inquiry. I sought to carry out the focus groups in the sixth week of the research. However, the in-class element of the inquiry was brought to a premature ending because of school closure due to unforeseen circumstances which will be outlined next.

3.4 Covid 19

As a result of Covid 19, schools closed on the 12th of March 2020 and remained closed for the rest of the school year. This impacted on the data generation in this study. I had to adapt to this situation. The children and I continued the inquiry through emails and Padlet (www.Padlet.com)
which is an online learning platform. However, as data generation in school was cut short, I had to consider any data generated from the making conclusions and taking actions stages with caution in terms of reliability. I was also compelled to consider alternative options to face-to-face focus group interviews. After some more reading around this area, I decided that the use of online focus group interviews was the best option going forward. Additionally, some additional data emerged in the form of parental input which was not set out to be collated from the start nor was permission sought from MERC on this. It will be mentioned as an additional extra in the analysis of findings but will be considered with caution and the evidence from the learners remains the central focus.

3.5 The Context of the Study

This case study was conducted with members of fifth class in a primary school setting over a five-week period. The school has recently amalgamated and all classes are co-educational. It is an urban, ethnically diverse primary school. The school is involved in the Green-Schools initiative run by ‘An Taisce’. Green-Schools is an environmental management and award programme (www.greenschoolsireland.org). This is particularly relevant to the study as it links to the theme of environmental awareness in the RQs. Green Schools promotes a whole-school approach to long-term action. It is also a student-led programme. The Green Schools Committee in the school comprises one child from each class starting in first class, up to sixth class. The school has been awarded the litter and waste flag, as well as the travel and biodiversity flags. While there were two representatives from the class on the Green Schools Committee, all the children in the class actively contributed to the process. It was a collaborative, whole-school approach.
3.6 Frame for Analysis of the Data

As introduced in the previous chapter, Murdoch’s (2010) inquiry cycle was used as a frame for data generation and will be used for analysis also. The data will be interrogated under all parts of this frame. This frame was chosen as it is a specific methodological approach associated with IBL.
The cycle in Figure 3 identifies key stages of inquiry through which the key themes of the RQs were explored. In this study, the children and I endeavoured to complete the unit of inquiry through engaging with each stage. However, there was an important caveat to this part of the research. Due to a school closure the making conclusions and taking action stages of the cycle were compromised (see p. 47). Therefore, the data from these stages cannot be treated in the same way as the other stages. Moreover, these stages will not bring the same reliability for analysis as the previous ones. However, it was important to follow through with these inquiry stages as a part of the curriculum and as the children had invested so much up to this point.

3.7 Population and Selection

The population selection of this study was purposive, as it sought to find the experiences of children in my class. Creswell insists that ‘the idea behind qualitative research is to purposefully select participants or sites...that will best help the researcher understand the problem and the research question’ (2018, p. 178). I had access to this group of 24 children as a mainstream teacher in fifth class this year, thus convenience was a factor in this selection. All consent and assent letters were returned with agreement to participate. The participants for the face-to-face focus groups were planned to be chosen through random selection. However, since the focus groups were conducted through video format because of school closure, the children and parents were contacted to seek further permission and once again, all students were invited to join. The parents of four students responded and they were involved in the online focus group interview via Google Meet.
3.8 Data Type and Generation Instruments

A case study approach was used to conduct this research. Observations, samples of children’s work and focus groups were used to generate qualitative data. Creswell illustrates that this design ‘is an approach for exploring and understanding the meaning individuals or groups ascribe to a social or human problem’ (2018, p. 4). It is most fitting for this piece of small scale, educational research.

3.8.1 Observations. According to Yin (2009), a case study presents the opportunity for observation as it occurs in the natural setting of the case and can vary from formal to casual types of data collection. Less formally, observations were made inside the classroom and outside during trips around the locality. Carefully selected samples of children's quotes, behaviours and actions were used as observational evidence in the findings and analysis chapter. Photographs were taken by children to capture their observations during outdoor learning experiences. Dabbs (1982) cautions that the researcher must seek permission to photograph students. While permission to use photographs was obtained from parents (see appendix B), I refrained from using the photographs in the findings which will be discussed later in this chapter. The data from the photographs still helped to answer the RQs which was paramount. Participants took photographs of the locality which promoted agency. Additionally, photographs were used as a stimulus for the focus group interviews. They captured moments throughout the inquiry and acted as a reference to support the researcher notes. It was evident to me that photographs were a valuable instrument in this study. Observations were used during interviews in the form of field notes to supplement the information around the interaction of the participants. Field notes and journal reflections were recorded in the one notebook. In contrast to methods such as questionnaires, observational research ‘draws on the direct evidence of the eye to witness events firsthand’ (Denscombe, 2010, p. 206). Despite not being face-to face with the children,
observed their participation, tone and feelings through the video software. Data from the observations were written up as soon as possible to ensure accuracy (Gillham, 2000).

I used a journal to document reflective comments and insights about the learners and the inquiry. Gillham insists that researchers ought to take the stance that reflective journals are open for inspection and organised to an extent that someone else could follow them (2000). The journal was key to maintaining a clear vision in relation to the RQs. I was surprised by how important the journal was in documenting thoughts, observations and questions. It also allowed me to reflect on my position as a teacher and researcher. As I was immersed in the learning engagements with the children I could not observe and take notes while the inquiry took place. Thus, it was important that I recorded the data as soon as the chance arose after each inquiry lesson. Through an iterative process, the journal allowed me to revisit my thoughts and keep me on track in terms of the RQs.

3.8.2 Samples of Children’s Work. The use of children’s work is a fitting, child-centred method to use in this IBL study. This method is suited to grasping children’s level of understanding, knowledge, interests and particular location in the social world (Greene & Hogan, 2005). Children are comfortable with this medium as it is familiar, comfortable and open-ended as opposed to questionnaires which are structured, closed and could be daunting for children. The documentation of children’s work becomes a means for communication as it visibly demonstrates children’s learning processes (Kim & Darling, 2009). For these reasons, samples of children’s work were chosen as an appropriate method to answer the RQs.

3.8.3 Focus Group Interviews. Greene and Hogan state that a focus group is ‘a discussion involving a small number of participants, led by a moderator, which seeks to gain an insight into the
participants’ experiences, attitudes and/or perceptions’ (2005, p. 2). This definition spoke to me as it illustrated that focus groups were key to answering the RQs, as they are effective in capturing learners’ understanding. They added a layer of depth and insight as to how the young learners experienced the unit of inquiry. Affording the participants this freedom to voice and elaborate on their experiences’ brought depth to the interviews and was used as for member-checking. Focus group interviews were chosen as opposed to interviews where the children are more exposed, and less likely to share experiences openly. They were due to take place in the familiar, comfortable setting of the children’s classroom. Mauthner argues that focus groups provide a safe environment among peers (1997). Equally, I envisaged that peer support in this setting would contribute to reducing the power imbalances between adult and child (Greene & Hogan, 2005). However, as stated previously an online focus group took place because of school closure (see p. 47).

A pilot study can be useful to assess possible problems and risks to a piece of research (Cohen et al., 2018). This study aimed to carry out pilot focus groups with a similar group to the participants in this research. They would have been a group of 4-6 students from another fifth class in the same school. However, due to the school closure, this was not feasible.

*Online Focus Groups.* I engaged in additional reading around online focus groups as face-to-face focus group interviews were not possible with school closure. Online focus groups via conferencing software were chosen as the best instrument that would answer the RQs in as much detail as possible. Denscombe (2010) asserts that the element of direct interaction is preserved through conducting focus groups ‘remotely’ (2010, p. 188). Like face-to-face interviews, information and ideas are exchanged in
‘real time’ among participants (2010, p. 188). I was attentive to issues of confidentiality when conducting the online focus groups interviews, but it must be stated that the content discussed in the was not of a particularly sensitive nature.

3.9 The Data Analysis Process

This section outlines the methods and tools used for analysing the data. The data were coded manually and were guided by Denscombe’s (2010) five stages for analysing qualitative data. Denscombe (2010, p. 288) argues that five stages ought to be used when analysing qualitative data. These bring:

- preparation of the data;
- familiarity with the data;
- interpreting the data (developing codes, categories and concepts);
- verifying the data;
- representing the data.

It is important to note the iterative nature of qualitative data analysis (Denscombe, 2010). Oftentimes, the researcher will go back and forth between the stages (Denscombe, 2010). I can relate to this as I found it was a recursive process. For instance, the preparation and interpreting stages played a key role in this respect. Organising the data using unique serial numbers meant that it was more manageable to relocate the material when interpreting the data. Next, the stages will be discussed in more detail.
Several steps were taken to prepare the data. They included; creating back-up copies of all original materials, the inclusion of a wide margin at the side of interview transcript and field note pages, and allocating serial numbers to each piece of raw data in order to navigate through the data (Denscombe, 2010). Next, I proceeded to develop familiarity with the data by reading and re-reading the field notes and the interview transcripts. Equally, it was important to examine and re-examine the samples of children’s work as well as the photographs taken. Upon further inspection of the data, it was important to cross-reference the data generated to search for ‘implied meanings’ (Denscombe, 2010, p. 291). While familiarisation continued to grow throughout the process, the initial phase of this stage allowed me to identify appropriate codes to apply to the data (Denscombe, 2010).

The focus groups were conducted in the form of semi-structured interviews. Questions were formulated and emerged during the unit of inquiry and were also derived from themes which emerged from the literature (see appendix E for schedule of questions). The use of semi-structured interviews meant that all participants were asked the same questions, while allowing participants to build on each other’s insights, which is a key element of IBL. I discovered that keeping the interviews semi-structured proved to be beneficial when analysing the transcripts question by question. The interviews were typed up, each transcript was coded, categorised and relationships between the codes and categories were identified (Denscombe, 2010). Any comments or quotes included in this chapter were transcribed verbatim from the focus group recording. Colloquial expressions and grammatical errors used by participants remain uncorrected to preserve a true representation of the discourse used to describe their experiences. Lastly, concepts were developed based on the patterns that emerged in the
data which were the themes illustrated in the Venn diagram at the end of the literature review (Denscombe, 2010).

I was selective with the data presented as Denscombe cautions that representing qualitative data can be a ‘complicated and messy process’ as it deals with the challenge of a ‘large volume of data based on words or images’ (2010, p.303). I chose the key parts of the data that seemed to best address the RQs and based my choice on the frequency of referral of key RQ themes in the data. I made efforts to reflect a fair, unbiased depiction of the data by using a systematic data analysis process set out by Denscombe (2010) as mentioned earlier in this chapter. I was also open to the emergence of unexpected findings.

I used all the steps outlined by Denscombe (2010) in the data analysis process. The systematic nature of the process was beneficial in maintaining structure for me during this process. However, it was not a linear process, recursion did occur. I would argue that Denscombe’s (2010) use of familiarisation feels like a surface level term compared to what Wellington more accurately refers to as ‘immersion’ in the data (2015, p. 267). Going through each piece of raw data section by section and reading the transcript line by line felt more like an immersive than familiarisation process.

3.10 Ethical Considerations

3.10.1 Researcher positionality. According to Sikes, ‘insider research’ refers to those who select a research project after gaining experience for several years of working in a particular field (2008, p.129). As the teacher and researcher in this study, I had to consider to what extent my role influenced the selection, data generation and analysis and interpretation of the data.
I was mindful of my part in the population selection. I had to be reflexive and ‘consciously…acknowledge’ my influence on the research (Cohen et al., 2018, p. 303). Deliberately selecting the participants helped me to understand this unique case on a deeper level. It was important to open the invitation for inclusion in the research to everyone in the class and inform the parents and children that there was no obligation to take part.

My position as the teacher presented an ethical challenge during the data generation process as the children associate me with a status of authority. Denscombe warned that disparities in power and status exist when conducting research with children (2010). He argued that ‘interviewees might supply answers which they feel fit in with what the researcher expects from them - fulfilling the perceived expectations of the researcher (Denscombe, 2010, p. 184). Consequently, I maintained open dialogue with the children through questioning and reflection. The children were continuously reassured that there were no right or wrong answers and that all their work and opinions were valued.

I considered the influence of my role on the data analysis and interpretation of findings. Sikes argues that researchers hold ideas and assumptions about what they expect to emerge from findings (2008). As the children’s teacher, I had to be aware of my own bias and exercise reflexivity (Sikes, 2008). I exercised this through a reflective journal and by maintaining an open dialogue with my supervisor. The element of familiarity between myself and the class also brought a potential risk of vulnerability to the findings in terms of objectivity. I was aware that my attitudes, experiences and expectations may have affected the lens through which I interpreted the data. However, Corbin and Strauss assert that drawing on personal experience can be an important tool in data analysis (2008, p. 80).
3.10.2 Consent. Prior to this study, a research ethics application was submitted and approved by the Marino Ethics and Research Committee (MERC). Furthermore, a letter was written to the relevant Board of Management on the 3rd of February 2020 seeking consent and was subsequently approved on the 5th of February 2020 (see appendix A). Next, letters were sent to seek the consent of parents/guardians of potential participants on the 12th of February 2020 (see appendix B). Plain language statements were provided to parents/guardians also (see appendix C). Additionally, informed assent was sought from the children (see appendix D). The children were fully informed of the nature of the research. I read the plain language statement and assent form to them in clear, simple language. The children also kept a copy of the information. The children were informed of their right to withdraw (BERA, 2011). Additionally, Skanfors (2009) convinced me that was important this to check for children’s active consent on a continuous basis.

3.10.3 Anonymity and confidentiality.

Precautions were taken to maximise anonymity and confidentiality. Creswell (2018) cautions around the notion of ‘backyard’ research and the risks of researchers disclosing information. Creswell’s point resonated with me particularly around the issue of using photographs to illustrate the findings. The photographs taken by the children captured the local environment and the children themselves which made them potentially identifiable. I reflected on this and made a conscious decision to fully refrain from using any photographs in the findings. Losing the richness that these photographs bring could be considered a limitation to the study. However, they were still valuable as a log of activities, a stimulus for focus groups and as an insight into the learners’ meaning-making as they were taken by them.
Other precautions taken included restricting the viewing of the data to myself and my supervisor. The data was stored on my personal laptop which is password protected. Next, hard copies of work were kept in a locked filing cabinet. Pseudonyms were used in the transcripts of the focus group interview to protect the identities of the participants. Additionally, all remaining data will be deleted after the thesis is submitted and marked. The data is kept by Marino Institute of Education for 13 months after examination.

3.11 Trustworthiness and Validity

Steps were taken to maximise the trustworthiness of the study through an audit trail, thick descriptions and member-checking (Denzin, 1989).

The audit trail of the data generation was mainly recorded in a notebook in chronological order of events from the start of the research. While they were in order of date, the process was recursive. I would often return and add questions or any changes to my thoughts. Entries were dated and made regularly and often. The content mainly consisted of observations in relation to the children’s behaviour, actions, quotes and work. It also noted my own questions, observations, reflection, reminders and plans. The research journal provided a ‘chain of evidence’ of the research process (Gillham, 2000). Meanwhile, the constant comparative method was employed for the data analysis process. The data analysis followed Denscombe’s (2010) five stage analysis as mentioned in the previous section of this chapter. They included: preparation of the data, familiarity with the data, interpreting the data by developing codes and themes, verifying the data and representing the data. Findings were presented in line with the conceptual frame of this study which was Murdoch’s (2010) inquiry cycle.
Geertz (1973) argues that thick descriptions include reflections on meanings attached to situations, turning an event into a written discourse which can be analysed and read repeatedly. The observations, journal, photographs and reflections on children's work allowed me to generate thick descriptions. These were recorded in my journal and used to illustrate the findings in this thesis. The journal was beneficial in documenting the context of the inquiry in relation to the children’s behaviour, feelings, actions, quotes and work. These allowed me to bring context and meaning when writing the analysis of the findings. I tried to ensure that the descriptions in the findings were rich in detail by explaining the context and interpreting the points made.

Member-checking was carried out both during the unit of inquiry and to a larger extent after the unit of inquiry was complete. The children were free to clarify issues during the inquiry and add any reflections they may have developed and were given regular opportunities through questioning. Then, the online focus group interview provided the space for member-checking as I had a chance to confirm the data I had gathered by discussing a brief summary of the findings and questioning the children to determine the accuracy.

3.12 Limitations

Undoubtedly, the issue of insider as researcher was discussed as a possible limitation of this study (Sikes, 2008). Thus, I strived to exercise reflexivity to maintain validity. Another anticipated limitation was identified in relation to the reliability of data generated after school closure (p.47). Additionally, there was a reliance on communication of work and learning via email and online platforms due to school closure. This could be considered a limitation as not all participants had equal
access to technology and family circumstances may impact their independent inquiry. This may have impacted on children’s ability to participate in the online focus group interviews also. It was possible that the new format of focus groups may not yield results as rich as it may have face-to-face interviews. However, it was important as a form of member-checking and gaining insights from the participants for deeper analysis of the findings. The decision to omit the photographs from the findings was anticipated as a possible limitation. While there was a lot of richness and depth in the photographs, a responsibility ensued as both the researcher and teacher to take precautions and actively avoid risks in relation to anonymity and confidentiality.

3.13 Conclusion

This chapter outlined how best to answer the RQs. It also examined the ethical considerations and data collection process. Importantly, it highlighted how the methodology was adapted to fit the revised RQs. It also mapped out how the research adapted to the changing circumstances. The next chapter will discuss the data generated and analyse the main findings.
Findings and Analysis

4.1 Introduction

‘Children’s inquiry acts provide a window to their thinking, allowing us to glimpse what they make sense of and how they are doing it, how they understand and how they use others to help them’ (Lindfors, 1999, p.16).

These words were presented at the very beginning of this study in the literature review (p. 17). I was struck by Lindfors’ (1999) words which captured the intention of the RQs in this study which asked: how can inquiry-based learning (IBL) deepen the understanding of young learners’ environmental awareness? The second question considered how can IBL promote agency for young learners? This chapter will firstly present the frame for analysis. Next, it will report and discuss the main findings from the study in response to the RQs.

4.2 Inquiry Cycle as a Frame for Analysis

The findings in this chapter will be presented and discussed using Murdoch’s (2010) inquiry cycle as a frame for analysis, as mentioned in the literature review and methodology. Each stage will be used to present the findings in light of the main themes in the RQ’s: IBL, environmental awareness and agency. The stages include tuning in, finding out, sorting out, going further, making conclusions, taking action and reflecting on personal understanding.
I used the themes that were outlined in the literature review and methodology chapters. It was difficult to separate the RQ themes in this chapter as there was a lot of overlap. Oftentimes, there was also more than one element of inquiry which emerged from the evidence. Oftentimes, more than one IBL element permeated the learning engagements which made telling a coherent account a challenging
one. For this reason, it was important to use the inquiry cycle as a frame to ensure continuity from the
literature review, to the methodology and then on to the findings and discussion. The frame coupled
with main RQ themes helped maintain structure and cohesion in this study.

4.2.1 Tuning in.

*IBL.* The data revealed that the learners actively developed key inquiry skills from the offset.
Arguably, these skills led to a deeper understanding of their local environment. The learners engaged
their observational skills by creating a sound map just outside of the school grounds. A sound map was
modelled in the classroom firstly. The children listened to any sounds they heard and mapped them in
the direction which they were heard on their page. The children were silent during the process to allow
for full concentration. The following is an example of a sound map created by Ruby.
It is evident from Figure 5 that Ruby identified several sounds including traffic, bicycles, birds, footsteps, chatter and wind. The children were asked to comment on their sound map in terms of the concept of form. This allowed for the extension of the activity from the explicit i.e. what was heard in the environment to an insight on a deeper level. Ruby commented that ‘cars make too much noise’, the area was ‘busy’ and that ‘nearly everything makes a sound’. Similarly, Jacob mentioned his surprise at the hustle and bustle in the area even around lunch time stating: ‘I thought like, since everyone would be in work like I wouldn’t hear so much cars’. They became acutely aware of just how much activity was going on at the doorstep of the school.

*Figure 5. Work Sample C5, Ruby’s Sound Map.*
On the other hand, I observed that one child was standing directly under a tree, from which a bird was chirping. We returned to class and through questioning it emerged that he did not notice or record the bird chirping directly above his head. The need for the explicit teaching and development of these skills is evident to me and IBL is an approach which promotes this. This is in line with Chiaratto (2011) who argues that teachers ought to provide these opportunities that may spark curiosity and wonder and to provide a context to exercise such skills. The development of these connection and observation skills allowed the children to create a new meaning of their environment. This highlighted for me that the use of samples of children’s work was a good way to critique their understanding of inquiry as set out in the methodology. The level of depth obtained from this approach demonstrated that it was the best means of answering the RQs.

**Environmental Awareness.** The following selectively chosen example highlights the effectiveness of questioning as a tool. Mentimeter is an interactive presentation software which provides real-time voting from an audience or in this case responses from the learners ([www.mentimeter.com](http://www.mentimeter.com)). Figure 6 shows the results of a Mentimeter presentation used at the start of the inquiry.
Figure 6. Results of Mentimeter Presentation on Children’s Prior Knowledge of the Environment. (www.mentimeter.com).

This open-ended form of questioning shown in Figure 6 demonstrated an insight into the children’s understanding of the environment. The biggest, most central words are the ones that have been submitted most frequently by participants using iPads. This platform enabled the children to engage and reflect on their own understanding of the environment. The terms that the children associated with the environment were predominantly: ‘climate change’, ‘trees’, ‘water’, ‘plants’ and ‘flowers’. It was evident that elements of the natural environment were at the fore of learners’
environmental awareness. This was an expected result as the Irish SESE Curriculum covers these strands extensively (www.curriculumonline.ie). However, it was an interesting finding that the main association of this group of fifth class learners was the environmental issue of ‘climate change’. This finding is consistent with the research conducted by Winograd, who maintains that the ‘environmental crisis’ has been brought to light by ‘growing social movements’ (2016, p. 4). It is apparent that the children have developed a conscience in relation to the environment. The data revealed that questioning was another key inquiry skill which provided an insight into the children’s prior knowledge on the topic of environmental awareness. More importantly, the questioning allowed the children to connect to their own current understandings of environmental awareness.

**Agency.** The learner-led nature of inquiry helped to facilitate agency for the learners. The children drove the inquiry from the offset as I provided them with several representations of Murdoch’s (2010) inquiry cycle to examine and critique in groups. They discussed, debated and teased out their thoughts on the cycles through questioning and collaboration. Each group agreed on a chosen cycle and then the whole class reached a consensus. The children asserted that the chosen cycle shown earlier in this chapter ‘helps through questioning’. They insisted that no starting point was a good element to this cycle, which meant you ‘don’t have to do it in steps’. They identified and welcomed the fluid nature of the IBL process. The children made connections and suggested that the hexagon shapes made it look ‘sciency’ and it looked like ‘cells in your body’. One child added that the shapes reminded them of the bonus part from the ‘Spiderman’ movie. They justified their choice by highlighting strengths and making connections. The ultimate question came down to which cycle worked best for our class. Arguably, this inquiry engagement amalgamated several elements of IBL such as collaboration and key inquiry skills.
Overall, it appeared that agency was evident in this stage as the children took ownership and seemed to enjoy the decision-making process. The responsibility of decision-making yielded a high level of engagement and motivation. These findings correspond with Chiaratto (2011) who argues that the decision-making process aids the development of students’ agency. Consequently, children feel motivated to acquire new knowledge (Chiaratto, 2011).

Unexpectedly, the children frequently referred to the assent forms discussed and signed at the beginning of the research as a way that they felt they had agency. They mentioned it in class from time to time, which highlighted how important it was to them. Additionally, it was mentioned during the focus group interview. Jacob states: ‘we had to sign like a paper for like, so we, so we could do it [the inquiry as a part of research]. If we said we didn’t want to, we could say we don’t want to do this’. In this case the children appeared to value and respond to their voices being considered.

4.2.2 Finding out.

*IBL.* According to Murdoch (2015), the finding out stage involves stimulating learners’ curiosity through new information and experiences, developing research skills and learning how to record new information. The children experienced all three of these at this stage. Firstly, we took our first trip into the locality together at this stage. Secondly, the children learned how to research digital archives and screengrab photographs of the local area from the National Library of Ireland website. They the worked in pairs and learned how to screengrab archival photographs of four streets and places in the locality. Next, they began to examine them through conceptual lenses in groups. They focused on form, function, connection and change. Thirdly, the children recorded what they had learned in groups.
The data demonstrates that multiple elements of IBL aided the process of delving deeper into an understanding of the environment here namely conceptual learning, central role of the learner, collaboration and the development of key inquiry skills such as research, questioning and observational skills.

**Environmental Awareness.** One group activity illustrated the results of learner’s collaboration through applying key concepts to the local environment. One group acknowledged that our environment was ‘urban’ (form), with lots of houses (function) and that it was ‘expensive to live in the city’ (connection). Adam commented that ‘some people can afford to live in this area and some cannot’. This connection demonstrated the richness that can emerge from using concepts. Another group made a connection between homelessness and the local environment as they regularly saw homeless people on the street on their way to school. These findings highlighted that the children were aware of social issues and demonstrated a conscience in terms of their locality using concepts as a lens. This is in line with Erickson’s contention that when learners work through a ‘conceptual lens’ they are compelled to ‘analyze, evaluate and investigate at deeper levels’ (2008, p.26). In comparison to the results of the Mentimeter presentation in the tuning in stage, there is a clear development of the learner’s environmental awareness. Their understanding has progressed from an acknowledge of ‘flowers’ and ‘trees’ to a richer understanding of how it looks, functions, has changed and how they connect to it.

**Agency.** This stage of the process facilitated agency through involving the children in the planning of our route around the locality. We used Google Maps to outline the boundary of our area. Next, the children suggested that we start at one point and work our way back towards the school. This
appeared to instill a sense of ownership of the journey for the children. Emma was leading the way as she affirmed ‘I know where that road is, I pass it on my way to school’. This showed the importance and benefits of using the local area as a starting point of environmental education as the element of familiarity is there among the children already.

Agency was also developed through responsibility and choice during our first outing. Séan reflected in an exit card after a trip in the locality. The prompt read: ‘one thing I like today was...going out with the iPads. It was evident that the children took ownership and were fully engaged. The children shared one iPad between each pair while the other child had the clipboard for recording notes. The children were trusted with the responsibility of school property which promoted agency. They took control by taking photographs of the local area to compare to the ones we had analysed previously. They had freedom to capture what stood out to them and what they were curious about.

4.2.3 Sorting out.

*IBL.* The pattern of conceptual learning and key inquiry skills in capturing how IBL deepened the learners understanding of environmental awareness is once again exemplified in the sorting out stage. The abstract nature of the four concepts introduced in class at the beginning of the inquiry was a challenge for students to grasp at first. Prompt questions aided the explanation of concepts such as form e.g. what is it like? However, it became clear to me that it was the application of the concepts to our local environment that was a very effective method of teaching conceptual understanding. One photograph particularly illustrated how the children began to apply concepts. It was taken by Séan during a trip in the locality. It captured his classmate Liam holding a leaf he had found at the foot of a
tree along the street. He insisted his partner take a photograph of him with the leaf to represent his success in making a connection. Through teacher questioning, Liam merged the concepts of form and connection to suggest that the shape reminded them of the leaf on the Canadian flag. The children captured their meaning-making by taking a photograph on the iPad. This finding is in line with what Erickson refers to as ‘essential questions’ which are instrumental to the development of concepts (2002, p.91). It is evident to me that concepts and questioning were key to extending the children’s environmental awareness of the local environment.

An unexpected finding emerged during our second trip to the locality when two local historians gave us an impromptu tour of a nearby museum. It appeared that this incidental inquiry broadened our community of inquiry and added history to our scope of integrated learning. We drew on history, geography, science language, orienteering (PE) art, social interaction and social issues. Evidently, various disciplines of knowledge were combined to facilitate meaning-making and connection for the learners, in turn creating depth in their understanding.

**Environmental Awareness.** The children used their concept maps (see appendix F) to make connections between the local environment and their own lives. They used orange post-its to add to their concept maps. Some examples of connections included ‘I saw a sign that said km [kilometres], we learned about km in maths’ and ‘we saw a building from 1916 and that was the start of the Easter Rising’. The children synthesised prior knowledge and new learning from our trips outdoors to make connections which is a key inquiry skill.
Furthermore, the learners’ environmental awareness was extended through reflection and assessment. The prompt ‘I used to think...now I think’ illustrates this awareness. Isabelle wrote ‘I used to think that everything was new...now I think buildings are kept from the olden days’. Ruby stated, ‘I used to think that the past was very similar to today...now I think it’s very different’. James reflected ‘I used to think that I knew about the world...now I think I don’t know as much as I thought’. The data revealed that the children processed their experiences in the locality and constructed new personal meaning. The children appear to have gained new insights through reflection which is a key inquiry skill.

**Agency.** Integrated learning played a role in allowing learners to deepen their environmental awareness. The focus learning was placed within a real-life context of the local environment rather than a topic on a specific subject. This integrated learning was solidified by the central idea which was ‘we can learn a lot about the environment by exploring our locality’. This conceptual frame provided an open-ended invitation to the children. The use of concepts such as form, function, connection and change were used to go beyond subject disciplines to focus on meaningful connections. It appeared that conceptual learning facilitated agency for the learners as it allowed them to explore their own questions within the theme of the local environment. It is important to note that the learning process met the objectives of the curriculum. However, as the learning was not restricted by subject boundaries, there was a freedom for the children to direct their own learning path.

Similarly, IBL helped to develop learners’ agency at this point in the inquiry when they identified which aspects of the local environment that they would like to pursue as a part of their individual
inquiries. During the focus group interview, Freya recalled ‘we chose the topic ourselves. We divided up the research’. The element of choice here places learners’ questions at the centre of their learning and provides yet another opportunity to empower learners in the decision-making process of their own learning.

4.2.4 Going further.

IBL. The jigsaw expert learning engagement highlighted that collaboration was significant in deepening the learners’ understanding of environmental awareness in the local environment.
Collaboration is exemplified in Figure 7. Children worked in groups to take notes and analyse the archival photographs of a nearby street against new photos taken by the children during the outdoor trips. There were four groups formed and each group discussed one street. Children chose

<table>
<thead>
<tr>
<th>What changes have occurred?</th>
<th>What changes have occurred?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. More trees today (Form)</td>
<td>1. Less trees today</td>
</tr>
<tr>
<td>2. More buildings today</td>
<td>2. No Trams today</td>
</tr>
<tr>
<td>3. No more trams (change)</td>
<td>3. Modern lights today</td>
</tr>
<tr>
<td>4. More cars today (Function)</td>
<td>Dublin</td>
</tr>
<tr>
<td></td>
<td>4. Bikes nowadays</td>
</tr>
<tr>
<td></td>
<td>5. There was aircoaches</td>
</tr>
<tr>
<td></td>
<td>back then</td>
</tr>
</tbody>
</table>

Why do you think the changes occurred?

<table>
<thead>
<tr>
<th>Why do you think the changes occurred?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Need more Co2</td>
</tr>
<tr>
<td>2. More people live in Dublin</td>
</tr>
<tr>
<td>3. Tram’s can’t fit lots of people in it.</td>
</tr>
<tr>
<td>4. Transport is getting more modern.</td>
</tr>
<tr>
<td>5. Trees are being cut down for space</td>
</tr>
<tr>
<td>6. We use cars now e.g. Buses</td>
</tr>
<tr>
<td>7. Tram’s was not a lot of electricity back then</td>
</tr>
<tr>
<td>8. Dublin bikes can be used for about (£2) for transport</td>
</tr>
<tr>
<td>9. We use Dublin buses today.</td>
</tr>
</tbody>
</table>
their preferred street and joined the appropriate group. They considered the street in terms of two questions i) what changes have occurred? ii) why do you think the changes occurred? This activity incorporated all the key concepts, with a focus on change. Once finished, children rejoined their original table. The following steps taken by the children demonstrated the collaborative nature of this activity. The children appointed a scribe to take charge of the writing within the group. Other roles included the leader, timekeeper and reporter which were also negotiated among the children in groups. The scribe wrote what the consensus was among the group. This activity was learner-led and it was evident that there was strong levels of engagement. The children demonstrated not only shared ideas but shared thinking. I observed the children re-reading the questions aloud. They offered and extended answers. Each child was clear about their role and there was a sense of ownership when it came to their turn. Moreover, the children expressed that they enjoyed this form of collaboration. It is evident to me that this sample of children’s work represents the rich collaboration that emerged during the inquiry. Subsequently, collaboration was an element of IBL that served to deepen the understanding of the young learners’ environmental awareness in the local environment. This corresponds with Short’s (2009) argument that inquiry involves going beyond our own understanding.

**Environmental Awareness.** The learners’ environmental awareness was extended during the jigsaw expert group activity. The data revealed that children identified reasons for changes in the environment and answered a number of their concept map questions during the collaboration. For instance, Emma (10/03/20) wrote: why weren’t the lights changed? She answered by suggesting that modern lights give off more light. She identifies that modern manufacturing has provided more effective lighting. It appears that the learners developed a greater understanding of their local environment by answering questions asked through collaboration.
Agency. At this stage of the inquiry, the learners were grouped according to a combination of the general direction they wanted to take for their personal inquiry as well as mixed ability. I felt strongly about this mixed ability grouping so that the less able students felt supported and because the collaboration skills had been progressing well. While the children were going to do some independent work at home for their groups, I would consider supporting learners to work more independently for the next inquiry.

4.2.5 Making conclusions.

The data generated from this point on must be considered with caution in terms of reliability (see p. 47). This was due to the extraordinary circumstances resulting in school closures. This became an independent inquiry as the children worked from home which made collaboration among peers an impossible task.

Inquiry. Murdoch (2015) suggests useful prompts to analyse this stage of the inquiry. At this stage, the children considered the following: what have I learned about the four concepts: form, function, connection and change? Did they help us to observe/understand the environment?

In her reflection journal (31/03/20), Freya stated that the concepts helped her to ‘observe and understand the environment’. She expressed that the concepts she used the most during the inquiry were ‘form’ and ‘change’. It is evident to me that Freya refined her own learning by creating a hierarchy of the concepts explored to suit her own personal inquiry. She exercised her agency and
decision-making skills here. Freya noted some interesting findings about the church in terms of form in her final research project submitted via email (01/04/20). Her research found that the church had ‘no ceiling when it first opened’. ‘Stained glass windows were gradually built into the walls of the church’. As well as that, Freya identified the main functions of the church as ‘mass, socialising and the priest giving advice to those who needed it’. She reflected on how her understanding of concepts changed: ‘I used to think concepts was another word for landmarks and a Latin word for world, now I think concepts are guides/plan on helping you learn about the environment’. This is in line with Macanas and Rogayan (2019) who insist that conceptual understanding is ‘the process of grasping ideas in a transferable way’ (p. 207). Arguably, this child appears has a firm grasp of the concepts. It appears that she understood and could apply the concepts to her personal inquiry.

**Environmental Awareness.** I responded to the school closure by setting up a Padlet to support the children in continuing the inquiry as mentioned in the methodology chapter. Padlet was used as a reference to remind the children of the central idea, lines of inquiries and questions. I also shared images and resources relating to the inquiry. Children’s topics chosen for the inquiries were posted as a reminder for them. They were able to interact and build on the inquiry on this platform. It served as a central space to communicate and continue the conversation around the inquiry. This mirrors Chiaratto’s argument that teachers ought to plan on an ongoing basis in a ‘flexible’, ‘dynamic’ and ‘responsive way’ (2011, p. 19). There was evidence of the children continued to extend their environmental awareness through questioning and making connections online.
The trajectory of Liam’s personal inquiry was evident from the Padlet platform. It followed what he would have continued with on his concept map in school in the form of questions, connections and new learning:

- ‘Why are there no more ducks in [the local] pond? How can we fix this?’ (questioning)
- ‘Seagulls, we need to find a way to control seagull population, because they have taken over the ponds and many streets’. ‘And since the [extraordinary circumstances] I’ve noticed that there’s not that many seagulls than before because we are much cleaner and there’s no food or mess for them to gather’ (connections)
- ‘Bird pest control, bird deterrents and repellents. Educate citizens to keep Ireland clean and how to use the tools we have correctly’ (new learning)

Following the school closure, Liam worked independently and continued to focus on ‘nature’ as the inquiry chosen by his group. He remained on track in relation to the central idea and lines of inquiry. The suggestion for a solution to the issue in Liam’s work highlighted that he intended to ‘take action’. Firstly, he reflected on a personal level and stated, ‘I will try not to litter and leave bins outside so I won't attract any seagulls’. Next, Liam suggested action on a community level, ‘Educate citizens to keep Ireland clean and how to use the tools we have correctly’. This is a sign of Liam’s thinking around the change that ought to be effected in the community to tackle an issue. This echoes the place-based education (PBE) approach within environmental education (EE) which was set out in the literature review. It reinforces what was found in the literature on environmental education and agency. Winograd (2016) stated that the best way to promote childrens’ agency is through basing them in issues in the local environment. Similarly, Chiaratto (2011) argues that developing ‘discerning, active citizens’ is a key objective of education (p. 56). Thus, it has been demonstrated that IBL can
enhance young learners’ environmental awareness and promote agency, as shown here within Liam’s work.

**Agency.** IBL promoted agency during the making conclusion stage. Learners were at the centre of the decision-making process around representing their inquiries. As a class, we brainstormed ways of representing our inquiries. The children suggested several ways such as: posters, books, podcasts, PowerPoint presentations, guided tours with younger classes, raps and through digital books. The children discussed in groups which option they would take and reached an agreement by consensus.

**4.2.6 Taking action.**

**IBL.** The taking action stage allows students the space to apply their learning and put it to use in other contexts (Murdoch, 2015). Short (2009) identifies that action taken because of learners’ new understandings are integral to inquiry. Due to the school closure, the children did not get the opportunity to implement some of the action they had planned through sharing their inquiries. However, it is worth outlining what they planned. Taking action was mentioned 11 times in various ways during the focus group interview. For instance, the children stated that they planned to have guided tours of the area with parents and younger classes so they could share what they had learned along certain stops in the locality, each would have a specific area of expertise. While this was not possible, the children may still take this type of action in the future which will equally be as valuable. David wrote in his reflection journal (01/04/20):

> I would use all the stuff I learned on our inquiry project when my cousins or my relatives come to Ireland. Because none of my cousins came to Ireland yet so I would give them a
private tour and tell them what place this is and when this was made and the history behind it so they will have some knowledge of Ireland’s attractions and tell them where my school is and how I get to school. Also I would wish I could give a tour to some tourists here in Ireland!

It appeared to me that David demonstrated excitement and plans on taking action with family members. This also shows the effectiveness of an IBL approach to learning about the environment. It suggests that David will self-regulate and self-direct further learning by taking action when his cousins or relatives come to Ireland. It appears that David is confident that his newly developed skills and real-life learning will be transferable to another time when his relatives visit.

**Environmental Awareness.** School closure allowed for parents to contribute and make comments (see p. 47). Unexpectedly, some interesting insights emerged from Adam’s mother (Parent Communication, (2), Marie). Marie wrote:

> This project has definitely given Adam a sense of connection. He has really opened his eyes to what is around him. He is clued into the street names as well as the landmarks. [The school] and the [the local] stadium were the only two things on his radar prior to this. Now he asks what buildings are for. For example, the labour exchange. He was able to tell me it was a barracks back in 1916. He recognises [local] road by name and not just “the road over there”. He is noticing random things like bins, and if they are overflowing. We are having conversations about not using the car unless we have to as we need to mind the environment. It was lovely to sit down with him and see him
mentally join the dots. It was a great project to clue them in to what is around them.

While this finding was unexpected, it was valuable as it demonstrated how the taking action was inbuilt for this student. Adam shared what he had learned and clearly developed a strong sense of connection and awareness. Thus, affirming that IBL can strengthen learners’ environmental awareness. I am fully aware that the RQs in this study seeks to investigate how young learners’ understanding developed. However, an investigation around a parents’ perspectives on the inquiry process for young learners could be an avenue of research to be explored in future studies. It also demonstrates the richness of this child’s learning as it became a shared endeavour with a parent.

Agency. During the online focus group interview, children were asked about any new skills they had learned. Jacob stated that they used iPads, ‘we, em, screenshots the, uh, the photos back then, then we took the photos what they look like, now. Then we went back to school to compare them’. He asserted that these skills could be used again in ‘different classes. The children were trusted with taking the iPads out of the school for our inquiry in the locality. It was evident to me that IBL facilitates opportunities to develop agency. The children relished the responsibility of using the iPads.

4.2.7 Reflecting on personal understanding.

IBL. Students are ‘reviewing, revising and reflecting on what and how they have learned’ at this stage’ of the inquiry (Murdoch, 2015, p. 80). It is important to note that this process occurred both
throughout the inquiry as well as at the end. When asked what questions he was left with, David wrote in his reflection journal (01/04/20) that:

I have some questions but not a lot because I learned so much on our class inquiry and our four concepts but I have some questions like where did these roads get their names and how exact long is the river under the [nearby] bridge. And hope I can learn more in the next few years about inquiry because we get to walk around our local environment and we get to go in groups for projects!

It appeared that David recognised that there was a certain amount of closure as some questions were answered and some were not. The comment ‘I can learn more in the next few years about inquiry’ affirmed for me that IBL has instilled a sense of life-long learning for David. Even though the unit of inquiry came to an end, David suggests that he will continue another time.

‘Importantly, students are sharing their awareness of how they are learning’ (Murdoch, 2015) p.80). The data yielded results that the children were aware of a variety of ways in which they were learning. During the focus group interview, they reflected on questioning which played a key role in how they learned. Gemma mentioned that posing questions ‘got easier’. While Jacob stated that ‘it was kind of hard and kind of easier sometimes’. This stage helped children to identify the growth in their questioning skills. Similarly, Sarah identified the development of her comparing skills: ‘comparing stuff to other things like when we compared the photos’. She extended this by maintaining that change was the concept that fitted here. Additionally, Jacob acknowledged that he was able to build on his
collaborative skills despite the school closure, ‘I was able to collaborate with my sister because she used to like, she was in college and she like explored everywhere’. This echoes Vygotsky’s idea of the Zone of Proximal Development (ZPD) (1978) which argues that learning develops with more capable peers, which was me earlier in the inquiry and Jacob’s sister in later stages of the inquiry for Jacob.

An unexpected finding emerged during this stage. It appeared that learner-led questions became a source of tension. This tension subsequently enabled the children to dig deeper in relation to their environmental awareness because they were compelled to act and think as learners rather than remain passive. This was a gradual process, particularly for one learner. Following a trip outdoors in the locality, the children were given an opportunity to add to their concept maps by using yellow post-its to write questions stimulated by this trip. Jane appeared to be uncomfortable in front of her map and at the time expressed ‘I have no questions’. This caused me to reflect and highlighted that children may have had difficulty with questioning as they have not been asked to formulate their own questions on a regular basis before. I learned that Jane was not alone in her challenge with questioning. Several children acknowledged a difficulty with formulating their own questions after this first trip. This was communicated by means of an ‘Exit Ticket’ used as a form of assessment.
Figure 8 shows an example of a child who responded to the second prompt with ‘I may need more practice with asking more questions’. Six other children wrote similar responses to the second prompt. I was struck by the obstacle, to which formulating questions created for the children. I observed a sense of rigidity or restriction when it came to questioning. This highlighted to me that the use of samples of children’s work was crucial in establishing how learners experience this part of IBL. It also highlighted the importance of using Murdoch’s (2010) inquiry cycle which places reflection at the centre. Thus, I adjusted the reflection process to more short and regular tasks and modelled more questioning. This reflects the literature discussed earlier on inquiry as a process. This is an example of
how I remained mindful that planning and teaching does not become overly prescriptive (Murdoch, 2015). Thus, my fluid approach to planning enabled me to implement more opportunities for reflection and modelling more questioning. It was important that a culture of inquisitiveness continued to develop questioning skills. I noticed that formulating questions became more manageable for children as it permeated each inquiry lesson and indeed the school day. Some children almost filled their concept maps with post-its and others progressed steadily. The findings here yielded parallels with the literature. While the learner is placed at the centre of their learning, they must be equipped with the key inquiry skills to direct their learning. Chiaratto’s perspective is in line with the evidence here in that teachers are responsible for sparking curiosity for children but also ensuring that students’ critical thinking skills become habitual (2011).

**Environmental Awareness.** Conceptual learning was key to guiding the reflection process. One group created questions for their group inquiry and questioned if climate change was present in their environment. We collaborated to refine this broad question to ask what the signs of climate change were in the local environment. The children identified the general effects of climate change in the environment such as more frequent and severe storms. While an interest in environmental awareness on a global level was evident among the children, it was important to draw their attention back to the central idea which stated: ‘we can learn a lot about the environment by exploring and becoming familiar with our locality’. It was important that the children’s inquiry was derived from this. Reflection helped the them to review their thinking by linking back in with the central idea. I also had to reflect to find the balance between guiding the children and still allowing their agency and decision-making. Climate change was acknowledged as a keen interest and the children were reassured that this would be considered in future inquiries. This evidence suggested the importance of conceptual
development in relation to children’s environmental awareness and as a useful tool with which I facilitated agency.

Agency. It appeared that a strong degree of agency was identified by the children after the unit of inquiry was complete. During the focus group interview, children were asked about the ways they may have had control or freedom during the inquiry process. Sarah stated:

There's no right or wrong answers and that kind of is like a more of an adult thing because [inaudible] children are usually told that like you can't do that because something and something. So like we had like the right to have our own opinions.

Sarah reviews how she learned and shares her awareness of the promotion of agency throughout the process. Sarah’s words struck me, particularly because she made a comparison to adults who are typically the ones who make the decisions. It appeared that Sarah held a strong sense of agency.

4.3 Conclusion

This chapter has illustrated how the elements of IBL have facilitated children’s environmental awareness and promoted agency. Evidence was demonstrated through samples of children’s work, observations, photographs and an online focus group. They were represented in light of the stages of Murdoch’s (2010) inquiry cycle. The following chapter will discuss the conclusions generated from the data, in addition to recommendations for possible further action.
At this point, it is worth returning to the definition of IBL for this paper. Following the data
generation and analysis I was compelled by the findings to refine the definition I had adapted in the
literature review.

Inquiry-based learning is a stance which places learners at the centre of
meaningful, real-world learning which is conceptually-driven. It is dynamic and
requires teachers to foster a habit of key inquiry skills for learners such as: questioning,
observing, investigating, reflecting and taking action. It engages learners through
collaborative and transdisciplinary learning’ (amalgamation of Pedaste et al. 2015,
Short 2009 and Chiaratto 2011).

Real-life learning was added to the first line of this definition as I felt it described what I meant
by meaningful learning more accurately. The data appeared to yield strong results for conceptual
development as a way that IBL contributed to the learners' understanding. Thus, I felt it was
appropriate to place it more prominently in the first line to highlight its significance.
Chapter Five: Conclusion

5.1 Introduction

The research sought to investigate:

1. How can inquiry-based learning (IBL) deepen the understanding of young learners’ environmental awareness in the local environment?

2. How can IBL promote young learners’ agency?

This section will outline the conclusions of this study which have been based on an integration of the study findings, analysis, interpretation and synthesis.

5.2 Key Findings

The data yielded results that indicate the extent to which the RQs have been answered. The first key finding showed that the themes from the data reflect the themes examined in the literature review. The second significant finding found that the research revealed a hierarchy of findings in relation to the RQs. Conceptual development and key inquiry skills were the most significant elements which demonstrated how IBL can deepen the understanding of young learner’s environmental awareness. The third key finding revealed that the data weighed more heavily on the first RQ and to a lesser extent for the second RQ. Next, the themes will be discussed in order of the RQ questions set out in this study and in relation to weight in the findings.
5.2.1 The predominance of conceptual learning and key inquiry skills

The data affirmed the argument that conceptual learning goes beyond information to reach a deeper understanding (Short 2009, Murdoch 2015). Conceptual learning permeated the entire inquiry journey. A central idea and concepts were used to frame the inquiry. The four specific concepts of form, function, connection and change formed the basis for a lot of questioning. Concepts were also used to scaffold the children and facilitate agency. I referred them to the central idea on one occasion so as not to lead their inquiry. Concepts also extended the children’s learning and required them to analyse. This was evident as the data revealed that the learners went from associating the environment with trees and flowers to evaluating the reason it was so busy was because it was densely populated. Concepts facilitated their awareness of social issues in the locality also. The children recognised the usefulness of concepts in learning. It seemed that they welcomed concepts as they understood them to be a guide or lens. Conceptual learning worked in tandem with the theme of integrated learning as the learners gained a broad perspective of the skills, knowledge and concepts related environmental awareness. Their learning was not restricted to content relating to one subject. There was ample evidence to show that conceptual learning drove the inquiry and was arguably the most prominent way that IBL deepened the young learners understanding of environmental awareness in the local environment.

The most significant key inquiry skills which contributed to the young learners’ understanding of environmental awareness were questioning, reflecting, comparing, connecting, investigating, and taking action. The inquiry cycle scaffolded the reflecting and questioning inquiry skills. Children acknowledged the growth in these skills. However, the need for the fostering of these skills was evident in this study. This affirmed Chiaratto’s (2011) argument that critical thinking skills must be
taught explicitly. The findings provide an insight into how skills like reflecting compelled learners to consider their environment in a new light. Each skill drove learners to shift from the position of passive to active learner. Subsequently, children actively engaged in the process and delved deeper into their understanding of environmental awareness in the local environment.

5.2.2 The predominance of the role of the learner in promoting agency

Despite the findings weighing less, there was evidence that IBL facilitated agency for young learners. Central to the evidence of agency in the data was the role of the learner. It emerged that these themes were inextricably linked. Children began to pose their own questions from early in the inquiry giving them agency over their own learning. A high degree of agency was evident at the end of the inquiry also.

Moreover, collaboration was beneficial in extending the learners’ environmental awareness before school closure. However, it was an impossible task from the making conclusions stage onwards.

5.3 Drawing Conclusions

By conducting a case study, the emergence of an in-depth analysis of this group of fifth class students has helped develop a rounded picture of how IBL is an effective approach to learning. This analysis was obtained using observations, samples of children’s work and an online focus group. In particular, the samples of children’s work provided snapshots into their thinking and were invaluable to the analysis of the study.
This study has concluded that conceptual learning and key inquiry skills were the most evident ways in which IBL contributed to young learners’ environmental awareness.

The findings have demonstrated that IBL promoted learners’ agency. The findings showed that the children developed agency through the learner-centred nature of IBL. Evidence such as posing learner-driven questions and leading decision-making demonstrated the opportunities which an IBL approach afforded for learners.

5.4 Study Limitations

A number of limitations of this study warrant discussion. Firstly, school closure was a limitation of the study (see p.47). I acknowledged that the data gathered after the making conclusion stage was to be considered with caution in terms of reliability. Thus, I responded to this situation through interrogating the data from the stages before this event on a deep level and in great detail.

Secondly, another limitation related to the trustworthiness and validity of the study. The use of triangulation during the data collection process was employed. The research was well informed by Denscombe (2010) and subsequently used an audit trail, thick descriptions and member-checking to maximise trustworthiness and validity of the study.

Thirdly, it was important to note that this was a small-scale study. Thus, the conclusions that I have come to need to be set against the scale of the study. Therefore, I clearly set out the boundaries in the methodology and the case study was analysed using thick descriptions.
Finally, this study acknowledged the issue of insider as researcher as a limitation. Familiarity brought risk to the study as I was the teacher and researcher. However, I addressed this through seeking consent from parents, assent from children and through practicing reflexivity. I took caution to what Creswell referred to as ‘backyard research’ and made decisions to maintain the integrity of the study e.g. I refrained from using the photographs in the findings to avoid risk of identification. This may have detracted from the richness that visual data brings. However, I made the decision to omit them from the study to ensure anonymity and confidentiality.

5.5 Further Research

Arising from the findings of this research, further research is warranted in the following areas:

1. Due to the circumstances which led to school closure, insights on how a student was learning through IBL emerged unexpectedly. This highlighted to me that there is scope to investigate how parents or guardians experience their children’s learning through IBL. Thus, there is a need for further research in this area.

2. The literature demonstrates that students are living in an age where they are bombarded with information and with unlimited access to this information. It also acknowledged that we are in the midst of an environmental crisis. Given the effectiveness of IBL on extending young learners’ environmental awareness, there is a need for further research studies that explore how learners understand environmental issues and how they may be mobilised to effect change in relation to these ongoing issues.
3. Further research is needed regarding a population that differs from this data set. It would be beneficial to carry out a comparative study between primary learners in an urban and rural setting in two different schools.

4. This was a small-scale study, restricted to 24 participants. It would be beneficial for this study to be replicated on a larger scale across various school types.

5.6 Final Thoughts

Some final thoughts on this thesis journey. Firstly, it is my experience of working with young learners that has driven this research. This research was motivated by my curiosity as to how best children learn and how effectively they can be taught. For me, ‘inquiry acts’ have provided a ‘window’ into how best the children in my class learn, which I will take forward into my practice (Lindfors, 1999, p.16). The research findings and process were always going to be of value to me professionally. Additionally, this study has added to the literature by giving a snapshot of the impact of IBL on young learners’ environmental awareness and agency.

Reflecting on the whole experience, I believe there was something to be learned from the school closure. This represented the tension in the inquiry process as learners had to adapt to this new way of learning. I believe that their experience of IBL enhanced how they adapted to the changes. This was found in the case of Liam who continued his personal inquiry with gusto. It was also evident in the words of Adam’s mother who shared how he continued to take ownership of his learning outside of school.
The literature argues that societal changes warrant a need for new strategies to enhance our approach to teaching and learning (Savage and Drake, 2016). The conclusions drawn from this study assists in our understanding of the impact of IBL on teaching and learning. The significance of this research relates to its relevance in an Irish context. According to the NCCA report on curriculum overload in primary schools, evidence ‘suggests that the overload issue is very much a reality for teachers’ (2010, p.7). This study offers an approach to mediate the Irish Primary School Curriculum through an IBL approach. More specifically, conceptual learning could offer a means to reconcile the challenge of curriculum overload.
References

https://curriculumonline.ie/getmedia/484bcc30-28cf-4b24-90c8-502a868bb53a/Aistear-Principles-and-Themes_EN.pdf


*Childhoods Today, 3*(1), 22.


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Appendices

Appendix A: A Letter to the Board of Management seeking permission to complete research.

3rd February 2020

Dear Board of Management,

I am currently completing a Master’s Degree in Inquiry Based Learning at Marino Institute of Education. I am researching how inquiry-based learning can deepen the understanding of young learners’ environmental awareness and agency in the local environment.

As a part of my research, I wish to teach a unit of inquiry over 4-5 weeks. It will involve opportunities for the children to connect to the local environment by going outside the classroom for observation. Children will pose problems and questions in relation to environmental issues in our locality. Furthermore, they will collaborate to critically consider actions as agents of change based on their investigations.

This unit is in line with the curriculum objectives and all children will be involved. The main strands and strand units to be covered include:

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I also plan to conduct focus groups with students in my 5th class. I will contact parents/guardians to seek consent (see letter of consent for parents and plain language statement attached). Furthermore, I will provide a form of assent for the participants (see assent form attached).

Anonymity of participants’ data will be upheld. Participation in the study will be voluntary and students will have the right to withdraw at any time. The focus groups will comply with all school policies and legislation Data Protection, Child Protection and Freedom of Information. If you have any queries relating to this research, do not hesitate to contact me on XXXXXXXXXXX or my supervisor Karin Bacon at XXXXXXXXXXX.

*This study has been considered from an ethical perspective by the Marino ethics in research committee. Should you have any questions or concerns about the ethical approval or conduct of this study, please contact MERC@mie.ie*

Yours sincerely,

____________________________________

Niamh Horan
Appendix B: Letter of consent for parents/guardians

12th February 2020

Dear Parents/Guardians,

I am currently completing a Master’s Degree in Inquiry Based Learning at Marino Institute of Education. I am researching how inquiry-based learning can deepen the understanding of young learners’ environmental awareness and agency in the local environment.

I would like to invite your child to take part in a unit of inquiry based-learning as well as a focus group interview as part of this research. The inquiry learning will take place as part of our Science and Geography lessons. The objectives of the curriculum will be met. It will involve opportunities for the children to connect to the local environment by going outside the classroom for observation. Children will pose problems and questions in relation to environmental issues in our locality. Furthermore, they will collaborate to critically consider actions as agents of change based on their investigations. All information will be kept anonymous. Participation in the study will be entirely voluntary and you are free to withdraw your child at any time.

Please read the attached information and return signed consent forms to me at your earliest convenience. If you have any questions relating to this research please do not hesitate to contact me on XXXXXXXXXXXXXXXXXXXX or my supervisor Karin Bacon at XXXXXXXXXXXXX.
This study has been considered from an ethical perspective by the Marino ethics in research committee. Should you have any questions or concerns about the ethical approval or conduct of this study, please contact MERC@mie.ie

Thank you for your help in this study.

Yours sincerely,

________________________________________
Niamh Horan

--------------------------------------------------------------------------------------

Child’s Name:___________________________

☐ I give consent for my child to participate in this study

☐ I do not give consent for my child to participate in this study

Please tick all that apply:

☐ I consent to photographs of my child being taken.

☐ I consent to audio recordings of my child being taken.

☐ I consent to audio-visual recordings of my child being taken.
☐ I consent to use of my child’s work samples.

Signed: _______________________________  ______________________

Parent/Guardian  Date
Appendix C: Plain language statement for parents

Details of involvement required by study:

- Participants will engage in our usual Science and Geography lessons for 4-5 weeks. These lessons will focus on the topic of the environment for this period.
- Participants will engage in activities through inquiry-based learning. Their work will be used as evidence for the research. Their real names will not be used at any point in this study, pseudonyms will be used instead.
- Focus group interviews will take place in school and will last for approximately 45 minutes.
- Participants will be audio recorded during the focus groups to facilitate the data collection and analysis.

The research study:

- The research question is: How can inquiry-based learning deepen the understanding of young learners’ environmental awareness and agency in their local environment?
- Inquiry based-learning involves a student-driven process using a learning cycle as a guide. The stages involve asking questions, investigating a problem, discussing the findings and reflecting on what they have learned. It involves problem-solving, making connections with their learning and working with classmates.

Arrangements for protection of confidentiality and data:
● Participants’ identity will be protected at all times. The results of the study will be coded so anonymity is maintained.

● The real names of the participants will not be used in the study.

● All data will be collected and analysed by the researcher (Niamh Horan) alone.

● This study will comply with Children First: The National Guideline for the Protection and Welfare of Children 2017 (Department of Children and Youth Affairs, 2017) and the Child Protection Policy of St. Christopher’s Primary School. Audio recordings will be typed up and electronic data will be stored on a password protected laptop. Hard copies of work will be stored in a locked filing cabinet. Also, all research will be destroyed once the thesis has been submitted and corrected. The data is kept for 13 months after examination.

Voluntary participation and withdrawal statement:

Please note that your child’s involvement is entirely voluntary and that you are free to opt not to give consent for your child to participate. Should you give permission for their participation, you can withdraw at any stage without any consequences.

Questions relating to the study:

Should you have any questions or queries relating to your child’s participation in the study please contact Niamh Horan at XXXXXXXXXXXXX or Karin Bacon at XXXXXXXXXXXXX.

Researcher’s Name: Niamh Horan  

Supervisor’s Name: Dr. Karin Bacon
Appendix D: Form of assent for participants

23rd January 2020

I understand that I have been asked to participate in a study about using inquiry-based learning to learn more about environmental awareness in our local area. We will work on this as a part of our Science and Geography lessons. It will involve inquiry based-learning and focus group interviews. I have read the information sheet given to my parents/guardians. My teacher has read the information out loud to me and I have been given a chance to ask questions about it. My parents, teachers, or anyone else will not know what I have said or done in the study. No one but the researchers will know.

I understand that I do not have to participate. If I sign my name and tick the ‘I give assent to take part in this study box below’, this means that I agree to participate in the study but can stop at any time.

----------------------------------------
I give assent to take part in this study

----------------------------------------
I do not give assent to take part in this study

Signed: ___________________________ ______________________
Student Date
Appendix E: Schedule of online focus group interview questions (Questions arising from unit of inquiry recorded in reflective journal)

Section 1: Warm Up

● Greetings, friendly chat to put students at ease
● Reminder of central idea and lines of inquiry and concepts
● Shared screen of photographs taken by children of the local environment as a stimulus
● What phrases and words do you think of when you think about the local environment?
● What was your favourite part of the inquiry? - part of process, favourite feature or place.

Section 2: Main Body

● What skills do you think you’ve learned throughout the whole process?
● How do you think that you had a say in our inquiry, in what ways? How did you have your voices heard?
● Did you answer the questions that you asked during the inquiry?
● Are there any other lines of inquiry that you would add in or would you have liked to have helped me to create those lines of inquiry?
● Do you think it is helpful to use concepts?

Section 3: Cool Down
• Do you think that your understanding of the environment has changed? If so, why do you think it has changed?

• If you were to do the inquiry again, would you do anything differently?

• How did you take action? How would you take action differently if the circumstances were different?

• Do you have any questions for me?

• Offer thanks and appreciation
Appendix F: Sample of Ruby’s Concept Map

All identifiable locations have been removed.