The Use of Mobile Devices to Help Young Children Learn About Indigenous Perspectives Through Environmental Inquiry

by

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Chair of Examining Committee	Dr. Robin Kay
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The above committee determined that the thesis is acceptable in form and content and that a satisfactory knowledge of the field covered by the thesis was demonstrated by the candidate during an oral examination. A signed copy of the Certificate of Approval is available from the School of Graduate and Postdoctoral Studies

Abstract

Technology is part of everyday life for many young children in Canada, and the use of technology in early childhood education has been progressing. This research explores how mobile devices can support young children in learning about Indigenous perspectives through environmental inquiry. Learning about Indigenous perspectives is an ongoing effort towards truth and reconciliation in Canada. Early childhood educators (ECEs) can gain confidence in planning and implementing teaching practices related to Indigenous content when they understand teaching about Indigenous perspectives. A case study design was used to investigate ECEs' perceptions of mobile device use in early childhood education. Semi-structured interviews were used to gather information from the seven ECEs who took part in this study. The findings revealed meaningful experiences and barriers for integrating mobile devices in early learning. This research contributes to a new space in early childhood education, with technology, Indigenous perspectives, and environmental inquiry being considered collectively.

Keywords: Indigenous Perspectives; Mobile Devices; Environmental Inquiry, Early Childhood Educators, Early Learning

Author's Declaration

I hereby declare that this project consists of original work of which I have authored. This is a true copy of the work, including any required final revisions, as accepted by my committee.

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Statement of Contributions

I hereby certify that I am the sole author of this thesis and that no part of this thesis has been published or submitted for publication. I have used standard referencing practices to acknowledge ideas, research techniques, or other materials that belong to others. Furthermore, I hereby certify that I am the sole source of the creative works and/or inventive knowledge described in this thesis.

Dedication

I would like to express my sincerest appreciation to my supervisor, Dr. Ann Lesage, co-supervisor, Dr. Brenda Jacobs, and committee member Dr. Kaitlyn Watson, for sharing their knowledge, guidance and encouragement over the last few years. The collective dedication and support from everyone involved in this thesis study has resulted in an incredible amount of knowledge gained. I thank you all for your patience and kindness throughout this learning journey, which is appreciated.

To my two beautiful daughters, who are my inspiration, this would not have been possible without your support and love. Being your mother has made me a better person and given me the strength to overcome many obstacles. I want to express my deepest gratitude and appreciation to my parents. I cannot express how grateful I am for your continuous encouragement and unwavering belief in me. Thank you, my friends, for the continuous laughter and constant support. You are my rock and I am forever indebted to you.

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Chapter 1: Introduction

The use of digital technologies and learning is rapidly increasing for children aged three to six years at home and in their early childhood education programs (McGlynn-Stewart et al., 2020). There are considerations for how digital technologies can enhance learning to support young children's outdoor explorations, discoveries and connections (Johnston & Highfield, 2017). This research examines the experiences of early childhood educators (ECE) who use mobile devices to help young children learn about Indigenous perspectives through environmental inquiry. Having conversations to understand ECE's perspectives is important because they are the ones to decide how mobile technology can support their programs (Nikolopoulou, 2021). These conversations may bring to light some benefits and challenges of using mobile devices with young learners. In this study, my conversations with ECEs extended beyond using mobile devices in the classroom, and focused on using mobile devices to explore connections between Indigenous perspectives and environmental inquiry.

In this thesis, I explored the relationship between how teaching about Indigenous perspectives through environmental inquiry might capitalize on the outdoor environment to teach Indigenous ways of knowing alongside Eurocentric approaches. I focused on teaching about Indigenous perspectives through environmental inquiry because Indigenous ways of knowing can be shared with Indigenous and non-Indigenous young children (Government of Canada, 2018). For the purpose of this study, Indigenous refers to First Nations, Métis, and Inuit peoples living in Canada; these are peoples who inhabited the lands before colonization and their descendants. Appreciation for cultural differences is part of the early year's curriculum to establish belonging, wellbeing, engagement, and expression for Indigenous and non-Indigenous children (Ontario Ministry of Education, 2014). It is important that all Canadians, including

young children, understand that Canadian education has imposed a Eurocentric model of learning that has excluded content about and for Indigenous peoples (Battiste & Bouvier, 2013).

That being said, there has been a growing reconciliation movement, including in education policy, partially in response to the Truth and Reconciliation Commission (TRC), established in 2008 as part of the Indian Residential Schools Settlement Agreement. The TRC's final report includes 94 calls to action regarding the moral and ethical obligations of the Canadian government and society towards truth and reconciliation between Indigenous and non-Indigenous peoples (Kinzel, 2020). The final report from the TRC (2015) included a call to action for culturally appropriate early childhood education programs. Developing culturally appropriate programs refers to teaching about Indigenous perspectives in a respectful way, and addressing settler biases, racism, and harmful stereotypes (Webb & Mashford-Pringle, 2022).

The 94 calls to action will only be fulfilled when Indigenous peoples and non-Indigenous peoples have balanced relationships (McGregor, 2018). The twelfth call to action expresses a need for culturally appropriate early childhood education programs for Indigenous families (TRC, 2015). ECEs have expressed concern about Indigenous cultural knowledges not being passed on to children (Stagg-Peterson et al., 2019). ECEs have a responsibility to value and protect children's cultural knowledges and provide inclusive learning environments (Ontario Ministry of Education, 2014). All children need opportunities to learn about Indigenous perspectives and to understand why reconciliation is necessary (i.e., Indigenous-settler relations, including residential schools). Children can grow and learn from the land and develop a spiritual connection to their world (Anderson et al., 2017).

When teaching about Indigenous perspectives, educators can consider Kirkness & Barnhardt's (2016) four Rs of teaching: 1) respect for who Indigenous peoples are, 2) relevant teachings related to Indigenous views of the world, 3) reciprocity teaches relationship building,

and 4) responsibility for real-life decision making. The guiding principles of the four Rs ensure that every child feels respected and that their cultures are represented, with the curriculum incorporating the cultural backgrounds of all children. Recognizing that teaching and learning is bi-directional, educators need to strive to learn from and build upon the cultural background of the children and families in their programs and apply this to children's educational needs for the future (Kirkness & Barnhardt, 2016).

For ECEs to develop culturally appropriate learning programs, it is important that they understand culturally appropriate teachings before integrating Indigenous perspectives. This had been a challenge for myself while working as an ECE, but through this research I am developing a better understanding of culturally appropriate learning programs. As a researcher, I engaged in conversations with ECEs to gain insight into how mobile devices facilitate young children's learning about Indigenous perspectives through environmental inquiry. By discussing my learning journey, my positionality as a researcher, and the motivations behind my decision to pursue this important research, I aim to offer a comprehensive understanding of my work

1.1 Learning Journey

As an ECE who works with Indigenous and non-Indigenous children in a preschool program, I am invested in this research. In my capacity as an ECE and by acknowledging the peoples and the land of the Anishinaabe Algonquin Nation where I live, I am in relationship to Indigenous peoples despite not having personal insight into their experiences, cultures, or histories. Influenced by my settler worldview, I approached my research from an Anglo-Canadian lens. Raised in a rural Anglo-Canadian home, I grew up in the Eastern portion of Southern Ontario, Canada, where all the children in my school and town had European heritage. As a child growing up in the 1980s, it was common to use the term "Indian" to refer to an

Indigenous person. Children pretended to be “Cowboys or Indians” by dressing up in stereotypical fashion for Halloween. Since childhood, I have developed a clearer understanding of Indigenous histories and cultures through my educational journey. As an educator, I am passionate about teaching Indigenous perspectives to all the children in my programs. I seek to inform other educators of potential opportunities where mobile devices may support teaching about Indigenous perspectives through environmental inquiry.

Since beginning my ECE career in 2012, I have consistently been a strong advocate for the rights of young children. As an advocate for inclusive practices, I aim to inform ECEs, researchers, and policy makers about the ways in which mobile devices can support inclusion. As someone who has worked in childcare settings that maintain policies for diversity and inclusion, I firmly believe that policy without action is worthless. I am taking action by means of this research study. The House of Commons of Canada (2024) enacted Bill C-35, aiming to ensure accountability and inclusion for its Canada-wide early learning and childcare system. The policy aimed to support ECEs’ integration of Indigenous perspectives by addressing collaboration with Indigenous peoples across every province. In addition to implementing policies, ECEs can learn from Indigenous researchers through a knowledge-sharing process, which is a long-term commitment (Smith, 2021). It may be challenging for ECEs to access Indigenous researchers directly, but this can be done through community connections within local colleges and universities. Starting a knowledge-sharing process would be beneficial for teaching my preschool class, even though it may take time. My curiosity lies in understanding the relationship between organizational culture, policies, and ECEs’ ability to use mobile devices. Based on my experiences, the promotion and use of technology in early learning is not widespread. Despite this, I feel that technology skills are essential for children’s development, and believe that ECEs and young children can use mobile devices to facilitate learning.

To ensure success for all students in a digital society, digital technology skills are necessary. According to Nikolopoulou (2021), children demonstrate an intensified curiosity and engagement while learning through digital tools. As noted by Anderson et al. (2017), children learn through inquiry and engagement. This research aims to demonstrate how inquiry and engagement can be nurtured by utilizing the multi-modal affordances offered by mobile devices, as discussed by McGlynn-Stewart et al. (2020). However, given ECEs facilitate this learning, their perceptions of technology use for young children influence their decisions on how mobile devices are used for teaching (Nikolopoulou, 2021). This research delves into how perceptions of technology, shaped by the experiences of seven ECEs, impact the use of mobile devices for teaching. For instance, ECEs play a crucial role in shaping how technology is utilized in the learning environment; nevertheless, their views on technology may be biased if they have not had prior exposure to integrating it (Schriever et al., 2020). ECEs must explore a variety of mobile devices and applications in order to evaluate technology for learning, since children can learn in different ways. In order to advance the literature for this research topic and promote best practices in early childhood education, the interviews conducted in this study offer insights from seven ECEs who use mobile devices, teaching about Indigenous perspectives, and have experience facilitating environmental inquiry.

The information shared by the seven ECE participants helped me gain a deeper understanding of using mobile devices to teach about Indigenous perspectives through environmental inquiry for my personal growth. Having the opportunity to inquire about Indigenous histories and cultures, my graduate studies have furthered my career goal of teaching early learning at the postsecondary level. As a person who identifies as a settler, I initially felt fear and hesitation while venturing into Indigenous perspectives in the early learning sector. During my educational and professional experiences, I have received conflicting information on

how to teach in a culturally appropriate way. For example, one belief is that only Indigenous peoples can teach Indigenous activities and knowledges. However, I have also been taught that with permission from an Indigenous person, I can teach some Indigenous content directly. This left me with uncertainties that I wanted to clarify. I was afraid to make mistakes because I am non-Indigenous, but I was compelled to do this research as ECEs are often the first formal educators children encounter. ECEs have the potential to reduce the marginalization of Indigenous children by including Indigenous perspectives into their programs. In selecting this research area, my intention was to empower future ECEs to teach about Indigenous perspectives. With that being acknowledged, I am aware that there is still a lot for me to grasp in terms of Indigenous perspectives. As I navigate my learning process, I approach my work with caution and conscientiously evaluate it for any potential cultural appropriation. My study was guided by evidence-based research, not personal opinions, and by ECEs' perspectives regarding their experiences teaching about Indigenous perspectives to young children.

1.2 The Research Goals

The purpose of this research is to gain meaningful insights from practicing ECEs' experiences using mobile devices for learning about Indigenous perspectives through environmental inquiry. ECEs are educators who work with or have experience working with young children and families to provide childcare. The early year's sector can include registered early childhood educators, early childhood educator assistants, ECEs working in kindergarten classrooms, teaching assistants, and learning support professionals. ECEs' perspectives are essential because they are responsible for teaching according to the Ontario Child Care and Early Years Act. Canadian education systems have started to support learning about Indigenous histories and cultures, recognizing the significance of incorporating Indigenous perspectives into curricula (Anderson et al., 2017). This research will explore how mobile devices can enhance

early learning and address the TRC's call to action to provide culturally appropriate Indigenous curriculum. By engaging with ECEs and speaking with them about their experiences, we can gain insights and potential strategies for managing barriers or challenges in using mobile devices for learning. Educators may be encouraged to implement mobile devices in their programs by understanding how mobile devices have been used by other ECEs to support early learning.

ECEs can use mobile devices to support learning by harnessing the children's interests in technology to teach twenty-first-century digital skills. Included in these skills are vocabulary acquisition, emergent writing, knowledge of digital print, problem solving, and complex reasoning for mathematical concepts (Herodotou, 2018). However, the overarching culture and theories of early childhood education reside in "pre-digital" times, as such there is a gap in observing and assessing the significance of technology to support early learning and environmental inquiry (McGlynn-Stewart et al., 2020; Nuttall et al., 2015). Therefore, the research questions this study will address are:

1. How are mobile devices used to help young children in Ontario learn about Indigenous perspectives through environmental inquiry?
2. What barriers may affect the integration of mobile devices in early year's programming? What supports could provide opportunities for ECEs to facilitate the use of mobile devices while teaching about Indigenous perspectives through environmental inquiry?

1.3 Description of Key Terms

The following list includes a brief description of the key terms included in this study. These concepts will be discussed in more detail throughout the thesis.

- Early learning pertains to the educational development of children in their early years. This study focuses on Indigenous and non-Indigenous children ages three to six attending childcare and kindergarten programs.
- Early Childhood Educators (ECEs) are educators who work with or have experience working with young children and families to provide childcare. The early year's sector can include registered early childhood educators, early childhood educator assistants, ECEs working in kindergarten classrooms, teaching assistants, and learning support professionals.
- Mobile Devices include tablets, iPads, laptops, cellular phones, digital cameras, smartwatches, and other digital devices that differ from traditional desktop computers. They are mobile, handheld devices with user-friendly touchscreens which are easy to maneuver (Neumann & Neumann, 2014).
- Indigenous perspectives refer to the Indigenous knowledge frameworks that provide culturally appropriate learning experiences for Indigenous and non-Indigenous people (Hare, 2012).
- Environmental inquiry is an inquiry-based approach to learning where children engage with their environment. Children construct meaning by placing themselves at the center of their learning (Anderson et al., 2017).
- Experiential learning is learning through an experience and emphasizes a student's real-world application of the learning (Nippolt, 2012).

- Passive screen time refers to the period when children are engaged in sedentary activities while using digital devices (Ponti, 2023). Children sit or lie down for extended periods of time watching device screens with no screen interactions.
- Active screen time involves interactive behaviours, where children are engaged and interacting with technology.

1.4 Outline of the Thesis

This research will delve into the ways ECEs use mobile devices to assist young children in learning about Indigenous perspectives through environmental inquiry. To address this topic, I organized my thesis into the following chapters. In Chapter 2, I outline the importance of Indigenous perspectives and environmental inquiry for early learning by providing a review of the research and a historical overview of mobile device use in the early years. In Chapter 3, I provide insight into the research process by detailing the methodology and theoretical approaches. In Chapter 4, I discuss the analysis of the data collected comparing research literature and my field research. In Chapter 5, I present a discussion of the findings and provide conclusions to my work. The findings encompassed new approaches for increasing knowledge transfer on Indigenous perspectives and environmental inquiry for young children's learning, all of which were supported by mobile devices.

In the preceding introduction, I described my learning journey, personal goals as a researcher, research goals and questions, a description of key terms, and an outline for the research presented in my thesis. Through the literature review, readers will gain insight into earlier research that explores how mobile devices can support young children in learning about Indigenous perspectives through environmental inquiry.

Chapter 2: Literature Review

This review of the literature provides an overview of the existing research in areas related to my thesis work. To establish a background for Canadian early learning, I start by recognizing the historical context of the following three components. Studies presented include those investigating (a) how Indigenous perspectives are taught in early learning, (b) the importance of environmental inquiry for young children, and (c) how mobile devices support early learning.

2.1 Acknowledging the History

In this section, I share insights into the history and background of Indigenous perspectives, environmental inquiry, and learning with digital technologies in early childhood education in Canada.

2.1.1 Acknowledging the History of Indigenous Perspectives

When Europeans arrived in the 1400s, they began the colonization of Turtle Island. Due to sustained efforts of colonization, including the development of the reserve system, Indigenous people lost access to their lands. The imposition of a Eurocentric system of education was intended to disconnect Indigenous children from their families and communities. For over 150 years, this disconnection occurred in day schools and residential schools called Indian Residential Schools (Petoukhov, 2023). Indigenous children were forcibly taken from their families and subjected to a relentless cycle of violence, exploitation, and forced assimilation in these educational institutions (Battiste, 1998). The purpose of residential schooling was to remove Indigenous cultures, languages, and Indigenous ways of knowing and being, and to teach Indigenous children Christian beliefs and Eurocentric culture (Hare, 2012). Colonization and residential schooling have impacted how Indigenous families view the current educational

system. For example, Indigenous families have expressed concern about how the Canadian education system represents Indigenous ways of knowing (Hare, 2012). In educational institutions today, Indigenous children need opportunities to understand and embrace their unique worldviews.

Learning about Indigenous perspectives provides Indigenous children opportunities to develop their identity, culture, and sense of self (Ball, 2012). ECEs can reduce the potential for Indigenous students to feel inadequate, isolated, and disengaged as they mature by introducing Indigenous perspectives in early learning programs (Cherubini, 2020). An inclusive educational system, which practices respect, collaboration, and creativity, offers an equitable education that addresses Indigenous knowledges and heritage (Battiste, 2013). The Government of Canada is engaged in reconciliation efforts and is taking action to address the historical maltreatment of Indigenous peoples (MacEachren, 2018). The professional responsibility of ECEs involves upholding the rights of Indigenous children and families, while also fostering the development of their native language and cultural identity (CECE, 2017). Cherubini (2020) argues that establishing culturally inclusive classrooms in the early years avoids later segregating Indigenous children into Indigenous-only programs and alternative schools throughout their education, thus promoting solidarity.

ECEs can establish solidarity and culturally appropriate programs through their professional development (PD). Preston et al. (2012) argued that "strong collaborative efforts need to be put forth by multi-level leaders to ensure that quality Aboriginal early childhood education is actualized throughout Canada" (p.13). The Government of Canada (2023) has actively engaged in conversations with Indigenous partners, Provinces, and Territories to advance the TRC's calls to action. For example, in 2018, the Government of Canada and

Indigenous peoples collaborated to design the Indigenous Early Learning and Child Care Framework (IELCCF). The IELCCF offers Indigenous children enhanced culturally appropriate early years programming and services, as the government has provided funding in support of these initiatives (Government of Canada, 2018). The IELCCF identified improved documentation to ensure accountability for ECEs and other community organizations in delivering culturally appropriate content, providing PD for employees, and granting families access to information and services (Government of Canada, 2018).Culturally appropriate content plays a vital role in contributing to quality early learning curriculum. Additionally, Munroe et al. (2013) argued that improving curriculum is necessary, stating that decolonization necessitates a thorough transformation of education, where learning is based on Indigenous knowledges rather than treating them as an additional or alternative way of knowing. In relation to education, decolonization means including Indigenous ways of knowing in teaching, and valuing them as equal to Western knowledges (Held, 2019). "Decolonizing education entails identifying how colonization has impacted education and working to unsettle colonial structures, systems, and dynamics in educational contexts" (Poitras Pratt et al., 2018, p. 1). With the continued emphasis on Indigenous perspectives in education, ECEs have a professional responsibility to collaborate and ensure that their programs incorporate holism, spiritual interconnectedness, shared knowledge, and natural connections (Anderson et al., 2017).

Before introducing Indigenous perspectives to children, ECEs need to learn about Indigenous ways of knowing. Understanding Indigenous ways of knowing entails appreciating the value of multiple perspectives and actively seeking knowledge from various cultural worldviews (Battiste, 1998). ECEs can participate in the Continuous Professional Learning

(CPL) program (CECE, 2017) to improve their knowledge about Indigenous perspectives and demonstrate their commitment to decolonizing education.

CPL programs are offered by various organizations, or alternatively, they can be developed in-house. Reconciliation Education (n.d.) offers an online CPL program called 4 Seasons of Reconciliation, designed to educate professionals about truth and reconciliation. The CPL includes modules created specifically for school-age educators and can be adjusted for an ECE context. In the upcoming section, I will explore how ECEs can deepen their understanding of Indigenous perspectives through environmental inquiry.

2.1.2 Acknowledging the History of Environmental Inquiry

Ontario's pedagogy for the early years supports environmental education including an emphasis on outdoor explorations (Ontario Ministry of Education, 2014). Outdoor explorations take place on the traditional lands of at least one of many Indigenous groups (MacEachren, 2018). Environmental inquiry is the learning approach I chose for this research because it aligns with Indigenous epistemologies: learning from the land, passing on cultural traditions of caring, and being engaged in meaningful ways of learning (Stagg-Peterson et al., 2018; Hare, 2012). Children's interests in nature flourish when they engage in learning activities that challenge their understanding of the outdoor environment (McGlynn-Stewart et al., 2020). The outdoors offers more than just a playground for children; it is a landscape to explore and create new understandings. Environmental inquiry includes making connections between outdoor learning and indoor classroom practices by bringing outdoor learning experiences into the classroom for further investigation (Anderson et al., 2017). ECEs can foster environmental inquiry by leveraging children's natural curiosity and by allowing children the autonomy to investigate and

experiment with nature (Anderson et al., 2017). Children need time outdoors for environmental inquiry, allowing them opportunities to connect with nature, to learn how to respect the environment, and to care for all living things (Cherubini, 2020). In the upcoming section, I will delve into the ways in which mobile devices can facilitate children's environmental exploration. For instance, nature apps can be utilized to foster their inquiry and establish connections with the natural world.

2.1.3 Acknowledging the History of Learning with Digital Technologies

For more than a decade, families have been introducing their children to digital devices starting in infanthood by using mobile devices to read bedtime stories, teach songs, and play games (Hare, 2012). According to Johnston & Highfield (2017), "…children incorporate technologies into their play experiences naturally, based on what they see in the lives around them – the way children have always done with traditional resources" (p.16). ECEs can enhance digital skills that children have acquired at home by implementing mobile devices to support learning, whether it is led by ECEs or children themselves. By using mobile devices, educators can support environmental inquiry through activities such as digital storytelling, capturing videos, and taking photographs to document learning. Educators can also introduce and use nature applications such as iNaturalist (iNaturalist Network, 2024), eBird (Cornell Lab of Ornithology, 2024), PictureThis (Glority Global Group, n.d.), or Google Lens (Google, n.d.), to identify plants, insects, and animals; provide scientific information for learning; and store findings on the cloud for future reference. According to Edelson et al. (1999), utilizing computer technologies in inquiry-based learning allows for efficient data management, engagement through visual and audio features, execution of complex computations, and seamless communication between users. Johnston & Highfield (2017) found that children can benefit from

engaging with mobile devices to support their environmental inquiry and extend their outdoor investigations and explorations.

Weather permitting, ECEs spend ten or more hours a week teaching children outdoors (Government of Ontario, 2018). Even with time for outdoor learning, mobile devices are not being used consistently to support environmental inquiry. In their research, Slutsky et al. (2021) discovered that early childhood education programs dedicate less than 2.5 hours a week to using technology for learning. The measurement of technology use has traditionally focused on passive screen time, leading to the development of guidelines that aim to decrease sedentary behavior (Daugherty, 2014). There is a new understanding that mobile devices support learning in interactive and engaging ways (Daugherty, 2014). Even though there has been a shift in understanding how mobile devices can support learning, ECEs are still teaching through traditional hands-on inquiry-based learning most frequently (Slutsky et al., 2021). To help ECEs feel more confident using mobile devices to support student learning, it is important to address issues or concerns regarding the integration of digital technologies.

Although curriculum policies in early learning value technology to support young children's learning, pedagogical concerns are widespread, as many ECEs lack experience teaching with technology (Caldwell & Bird, 2015; Fox-Turnbull, 2019; Slutsky et al., 2021). ECEs are concerned with children's over-exposure to digital devices outside of their childcare program. As such, ECEs value traditional resources to support early learning experiences (Slutsky et al., 2021). Traditional resources refer to tactile materials to support learning, such as books, blocks, puzzles, and other manipulatives (Herodotou, 2018). Continuous technological advancements can affect how knowledge is constructed and shared (Johnston & Highfield, 2017). Thus, research shows that ECEs need to address several factors for integrating mobile

devices into their program. For example, Nikolopoulou (2021) found that to teach with technology, more resources and equipment are required (e.g. tablets, smartphones or iPads), smaller group sizes are important, regular maintenance of equipment is necessary, and age and educationally appropriate apps need to be sourced before use. Educators who taught using mobile devices with a group of twenty-three children found smaller group sizes are required to support learning with digital technologies (Nikolopoulou, 2021). Beyond classroom logistics, ECEs also require training and PD specific to digital technologies to develop their confidence in using mobile devices to support their teaching (Fox-Turnbull, 2019). PD can improve the integration process for mobile devices by demonstrating the benefits and functions for use in early year's programs (Herodotou, 2018).

2.2 How Mobile Devices Support Play

This section focuses on how digital technologies have become a part of children's play. I delve into the literature to discuss benefits of using mobile devices to support children's play. I identify the potential barriers and benefits for integrating mobile devices in early learning.

2.2.1 Transformation of Play

Play is a natural and enjoyable way for children to learn and develop. Play can be unstructured and free or be structured with specific learning goals (Smith, 2013). Friedrich Froebel, known as the Father of Kindergarten, created the first "kindergarten" program. The word kindergarten is derived from the German language, which means "children's garden." Froebel's theories explain children's self-directed play and how children construct their understanding of the world through connections with nature. Currently, the Froebel Trust organization which recognizes and contributes to Froebel's original work has found positive aspects to young children's use of digital technologies (Flewitt & El Gemayel, 2023). For

example, children can develop gross motor skills in their exploratory play as they dance to music played on digital devices. In today's digital society, adults can support children with using digital devices to enhance children's creativity and self-expression when learning (Flewitt & El Gemayel, 2023). By offering a diverse range of learning opportunities, educators empower children to discover happiness in both digital and non-digital activities (McNair, 2021).

In 1979, a conceptual model of play called "Taxonomy of Play" was developed by Corinne Hutt, a British psychologist (Marsh et al., 2016). Refining Froebel's prior research, Hutt's theories of play categorized play into three broad categories: epistemic play, ludic play, and games with rules, which include games of skill and chance (Marsh et al., 2016). Epistemic and ludic play are spontaneous, voluntary, pleasurable, and flexible activities that promote the holistic well-being of children (Smith, 2013). When games have rules, they are more organized, with greater emphasis on the process and goal for the game. These three categories contribute to a better understanding of how children learn through play.

With time, the categories of play evolved to include technology. Marsh et al. (2016) explain how they expanded the categories of play to incorporate digital devices. Their work stemmed from Bob Hughes, an ECE from the United Kingdom. In 2002, Hughes created "A Playworker's Taxonomy of Play Types," which is a guide for categorizing 16 types of play (Marsh et al., 2016). Hughes' concepts of play shared some similarities with play that included digital technologies. For example, Hughes made observations of children trying to gain control over their physical environments during play, which is similar to the app Minecraft (Marsh et al., 2016). In the Minecraft game, users use blocks to gain control of their virtual environment. Marsh et al. (2016) adapted Hughes' framework to apply digital play to each of Hughes' 16 categories of play.

Digital play is a contemporary type of play that draws on both the digital and non-digital ways that children play (Marsh et al., 2016). Children can use digital resources such as a GPS, compass, microscope, or camera/video for digital play (Johnston & Highfield, 2017). For example, children can use a camera during dramatic play to create a movie or a compass for a scavenger hunt during exploratory play. Digital play differs from traditional play as it uses digital devices as a tool that extend possibilities for children's learning through play (Palaiologou, 2016). For example, digital play offers children the opportunity to test their resilience and experience fear in the Minecraft game, with the option of leaving the game if it becomes too stressful (Marsh et al., 2016).

Even though digital play can be integrated with traditional play, a reconceptualization is needed for digital play to support environmental inquiry in early learning (Johnston & Highfield, 2017). ECEs often view digital play as a "false dichotomy when considering technology as a structured indoor experience, while outdoor play is often seen as 'free play'" (Johnston & Highfield, 2017, p.2). As such, digital play is often relegated to only indoor learning experiences. Educators are slowly shifting the debate on whether technology should be used in early learning towards discussing the types of mobile devices and applications (apps) that can be included for digital learning (Johnston & Highfield, 2017). Opportunities for digital play have progressed at a slow rate in early childhood education. As such, a new conceptualization of digital play may be needed to motivate educators to use digital technologies for environmental inquiry (Nuttall et al., 2015).

A reconceptualization of digital play could arise from cultural factors that recognize the value of digital play for environmental inquiry in early learning. Pedagogy is influenced by a variety of cultural factors, such as beliefs, attitudes, and traditions. Cultural factors impact the

way children are taught and how they learn to engage with others in their surroundings (Smith, 2013; Lawrence, 2018). Canada is a multicultural country that is home to diverse cultural perspectives. However, according to McCoy (2022) the degree to which countries are effectively recognizing diverse cross-cultural perspectives and whether national policy frameworks genuinely reflect local values and priorities or those of elite decision makers with potentially Western perspectives remains ambiguous. Indigenous perspectives can provide young children with opportunities to learn about ecological and pedagogical activities specific to regional and sustainable land-based knowledges (MacEachren, 2018). Indigenous perspectives promote connections with nature and learning from the land, with a focus on respecting and caring for the land (Stagg-Peterson et al., 2018). When children spend time in nature and revisit the places they play, it teaches children to deepen their relationship with place, and strengthen their understanding of the world and their place within it (Anderson et al., 2017). Consequently, ECEs could consider cultural factors as they develop their curriculum alongside considering how mobile devices could be incorporated to support environmental inquiry.

Mobile devices are one tool that can support children's digital play during environmental inquiry. Mobile devices provide open-ended and multimodal affordances to support children's learning and development, as children interact with their outdoor environment (McGlynn-Stewart et al., 2020). When children feel comfortable using mobile devices, the mobile device is transformed into a child-centric learning tool. For example, children may show a high level of engagement when using a mobile device to take photos to document their outdoor adventures (Harris, 2018).

2.2.2 Barriers for Integrating Mobile Devices

Even though children may be comfortable using mobile devices, ECEs' perceptions about children using technology can be a barrier for integrating mobile devices into early

learning programs. ECEs have expressed conflicting ideas about integrating mobile devices to support their programs. Some ECEs express positive views of mobile devices when the learning activities have a clear purpose and when ECEs feel they have a specific teaching role (Lindeman et al., 2021). However, other ECEs argue against integrating mobile devices in childcare, advocating for traditional learning methods that prioritize imaginative play, social interactions, and exploring nature to support children's play (Palaiologou, 2016). These ECEs place importance on children dedicating more time to outdoor activities that promote inquiry-based learning, where children collaborate together exchanging ideas (Anderson et al., 2017). For example, outdoor education programs have been found to lead to higher scores on standardized tests in math, reading, writing and listening, and shown increases in children's creativity, concentration, and social skills (National Wildlife Federation, n.d.).

The increased availability of technology to children at younger ages adds to ECEs' concerns regarding the integration of mobile devices for educational purposes. ECEs perceive that young children have too much access to technology at home, as such there is resistance to a technology-driven mainstream curriculum in the classroom. The term "technology-driven" pertains to the modern digital era, where students rely on digital technologies for connectivity, communication, play, and creativity (Grimus, 2020). Mainstream curriculum refers to the dominant, Eurocentric culture at the centre of Canada's education system (Wilson, 2008).

Kindergarten and early childhood education programs now incorporate technology-based curriculum for young children. Canada is part of the Organisation for Economic Co-operation and Development (OECD), which is comprised of 38 countries that work together for economic growth and share statistical data. "Evidence across OECD countries suggests that children's exposure to digital technology often starts before age 3, and that by ages 3 and 4, significant proportions of children are using digital devices and going online daily" (OECD, 2023, p. 42).

With technology-driven mainstream curriculum, Indigenous learners may be affected if a more holistic and relational approach to curriculum implementation is not considered (Anderson et al., 2017). Technology-driven mainstream curriculum may create cultural barriers for Indigenous children's learning. For example, early learning curriculum is often driven by collaborative group activities based on programmatic restrictions (e.g., student-staff ratios), whereas Indigenous children often learn through observation, as they sit quietly watching and listening to others (Anderson et al., 2017).

Apart from ECEs' perceptions and potential cultural barriers, ECEs have come across several difficulties when trying to integrate mobile devices into their programs. Nikolopoulou (2021) highlights that there are several multidimensional issues that affect ECEs' willingness to integrate mobile devices. Educator perceptions, skills and self-efficacy, pedagogical practices, infrastructure, appropriateness of apps, and curriculum policies are among the issues that are included. For example, Palaiologou (2016) found that, when integrating mobile devices, ECEs felt a lack of control over the learning process and believed they could not support or coach children during activities. The influence of service directors, families, and external regulatory bodies created a sense of powerlessness for early childhood educators, who felt they had little input in how technology was implemented in their teaching methods (Johnston et al., 2018). In addition to feelings around the lack of control, ECEs identified families' negative attitudes toward mobile device use as affecting educators' morale and demotivated ECEs' inclusion of technology for teaching (Johnston et al., 2018). Beyond lack of control, Nikolopoulou (2021) cited other barriers for integrating mobile devices including: (1) digital play was perceived as sedentary, causing missed opportunities for hands-on experiences that promote movement and physical activities for learners, (2) cyber safety posed a concern for the safety and well-being of the young children learning online, and (3) a lack of funding for resources and training. Despite

the funding constraints, educators stand to gain from participating in annual cyber security training, as there are a wide-range of strategies to safeguard online information (Kennedy, 2016). Training for cyber security helps educators to enhance children's comprehension of online safety and privacy as part of their educational objectives for integrating technology in classrooms (Mertala, 2019). Educators initiate the gradual process of teaching young children online safety by encouraging them to ask questions about navigating through applications which are provided by the educators (Kennedy, 2016). Aside from cyber security and online safety concerns, there were concerns from educators about children's physical safety when using technology in outdoor settings. For example, if a child fell on a structure while using a device and was injured, or if a device got wet and damaged outdoors (McGlynn-Stewart et al., 2020). This led to concerns specific to repair or replacement costs when mobile devices are used outdoors (McGlynn-Stewart et al., 2020).

Considering the aforementioned challenges, I redirect the discussion towards the perception of digital play involving passive screen time. Research by Nuttall et al. (2015) reveals that adults often believe young children can only thrive through learning methods that do not include digital technologies, and children need to be protected from excessive screen time. Screen time refers to the time children engage with any type of screen, including television, computers, or mobile devices. Ponti (2023) discussed screen time as the family media environment with screen media exposure for young children. Children's interactions with the screen are either active or passive. Ponti (2023) defines passive screen time as sedentary behaviours, whereby children sit or lie down for extended periods of time watching device screens with no screen interactions. Passive screen time poses risks for children's health and wellness, as such activities can lead to obesity, language delays, behavioural issues, executive functioning delays, or other issues affecting children's learning and development (Poitras et al.,

2017). Screen time is not adapted for educational purposes, as only passive screen times have been considered for recommended screen time. In 1999, the Canadian Paediatric Society (CPS) recommended less than two hours of screen time per day for children ages 2-5 years, which decreased in the 2022 CPS report to less than one hour recommended screen time daily (Ponti, 2023). Recommendations for screen time were reduced to promote active play and reduce sedentary behaviours.

A reduction in screen time was also recommended to improve children's health and wellness. The increase use of technology by children has raised concerns about its detrimental effects on their mental health and wellbeing. Johnathan Haidt (2024) states that children's increased access to digital devices spiked with the invention of the smart-phone. Before the smartphone, children's screen time exposure evolved from the radio, to television, personal computers, the Internet, and then the iPhone (Twenge, 2023). Now, smartphones and other digital devices are ubiquitous. Consequently, children have easy access to communicate with friends and search information throughout the day (Haidt, 2024). This constant exposure to digital devices has resulted in children experiencing social deprivation, sleep deprivation, attention fragmentation, and addiction (Haidt, 2024).

Oswald et al. (2020) found similar negative outcomes to children's increased exposure to digital devices. In particular, they conducted a systematic scoping review of the psychological impacts of screen time compared to exposure to natural elements for children and adolescents. For young children, under the ages of five years, 12 of 14 studies concluded that screen time had harmful effects on children's cognitive development, effortful control, language, and communication skills (Oswald et al., 2020). These same 12 studies also found unfavourable associations between screen time and children exhibiting problems with their self-regulation and prosocial behaviours (Oswald et al., 2020). Moreover, four of the 14 studies

confirmed that access to natural spaces improved mental health and wellness for children, particularly for children in low-socioeconomic situations (Oswald et al., 2020).

Beyond the research, provincial governments have expressed concerns over the use of personal devices (e.g. smart phones) in the classroom. For example, the Government of Ontario's education policy has increased restrictions on cell phone use because they are viewed as a learning distraction (Ontario Newsroom, 2024). Social media networks have also been banned on all school websites, and beginning in September 2024 students in kindergarten through grade six will have a cellphone restriction for the entire school day, unless permission is granted by an educator (Ontario Newsroom, 2024). These concerns for mental heath and children's ability to focus are valid reasons to reduce screen time related to sedentary behaviours.

2.2.3 Benefits for Integrating Mobile Devices

Although the list of barriers seems extensive, there are benefits associated with integrating mobile devices to learn about Indigenous perspectives through environmental inquiry. For example, recent research highlights the benefits of using technology to support early years' STEAM education. STEAM is an educational approach that integrates science, technology, engineering, arts, and mathematics to guide student inquiry and problem-solving opportunities in early childhood (Trina et al., 2024). STEAM helps to guide students' environmental inquiry to the next level by adding evidences related to math, engineering, and technology (Trina et al., 2024). Early learning STEAM programs offer young children learning experiences that can be supported by technology (Cohrssen, & Garvis, 2021). One example of environmental inquiry that incorporates STEAM learning is wildlife exploration. During wildlife exploration, children investigate living things (birds, insects, plants and animals) and observe features of the natural

world (clouds and rock configurations), and they can use mobile devices to help identify and document their findings (Trina et al., 2024). Mobile phones are easy to use outdoors, making mobile phones a common way technology supports children's environmental inquiry by taking a photo or a sound recording (Correia et al., 2024).

By discussing learning benefits, it may be possible to shift reluctant ECEs' attitudes toward more positive outlooks on learning with technology (Lindeman et al., 2021). In contrast to passive screen time, active screen time involves interactive behaviours, where children are engaged and interacting with technology. For example, children can use apps on a tablet to engage in a nature scavenger hunt where they search the outdoor environment for insects and wildlife. Mobile devices can provide opportunities for active screen time during environmental inquiry. Young children actively engage and display high motivation for learning when mobile devices are used for active screen time (Fox-Turnbull, 2019). Understanding the difference between passive and active screen time is important because not all screen time results in sedentary behaviour. When using mobile devices for educational activities, ECEs can plan active screen time for their curriculum and the recommended screen time (passive) will not be an issue.

Educators who have taught using digital devices have seen benefits to their integration. For example, Nikolopoulou (2021) found that children were engaged in learning and exhibited excitement when there were opportunities to learn using mobile devices, such as an iPad or camera in the classroom. Beyond student engagement and excitement, mobile devices can be used by teachers to create interactive lessons and multimodal video presentations, or play music and movement applications, or engage students in learning activities at the click of a button (Nikolopoulou, 2021).

Similarly, mobile devices can be a learning tool allowing children to explore and investigate their environment and discover new understandings through virtual worlds (Yelland

& Caja, 2017). For example, children can use mobile devices to take pictures and videos to document their learning and reflect on their experiences for further investigation (Johnston & Highfield, 2017). A recent Canadian longitudinal study (3 years in length) by McGlynn-Stewart et al. (2020) followed 27 educators in 14 Ontario kindergarten classrooms as they used open-ended tablet applications to support literacy skill development during indoor and outdoor play. The study found that although children ages 4-5 do not have strong reading and writing skills, some students excelled at using mobile devices to document their learning. The children were comfortable taking photos and using audio to share information on tablets. Children could use mobile devices to document their indoor and outdoor learning experiences. The results indicated that no children experienced any physical harm, nor were there any devices damaged while using tablets indoors and outdoors during this 3-year study (McGlynn-Stewart et al., 2020). Young children can thrive and achieve when they are provided with opportunities to incorporate mobile devices into their outdoor learning activities.

2.3 Environmental Inquiry

Mobile devices enhance the level of engagement in children's exploration of nature, because of their attraction and familiarity with them (Harris, 2018). This section will discuss learning through an inquiry-based approach with a focus on environmental inquiry. I will then discuss mobile devices and how they can be integrated to support young children's environmental inquiry.

Children are empowered to be active learners through inquiry-based learning. As children engage with their environment, they construct meaning by placing themselves at the center of their learning (Anderson et al., 2017). Children's natural curiosity helps them feel more comfortable using mobile devices to make connections outdoors (Harris, 2018). For example,

children can identify and record the number of species they find during a nature walk, and document their findings using mobile devices. Children's interests, ideas, and questions lay the foundation for inquiry-based approaches to learning (Harris, 2018). Inquiry stimulates and focuses a child's curiosity. Educators can support children's inquiry by providing guiding questions, probing children to foster new ideas, creating opportunities for explorations outdoors, and making connections between the classroom learning and environmental inquiry (Anderson et al., 2017). When inquiry-based learning is encouraged, it can have far-reaching results and lead to a lifelong passion for learning (Caruthers Den Hoed, 2014). Inquiry-based learning and experiential learning are similar in that they both relate to scientific inquiry, but they differ in the way they gather information about the phenomenon (Nippolt, 2012). Inquiry-based learning focuses on gathering information, while experiential learning emphasizes the student's real-world application of the learning (Nippolt, 2012).

Experiential learning is learning through an experience. Theorist John Dewey (1916) shared that learning is a constructive process where children explore their environments. Dietze & Kashin (2019) expanded on Dewey's theory, asserting that learning emerges best through natural explorations outdoors. Experiential learning requires children to understand why their experiences are important, have time to make observations and reflect on these experiences, and have meaningful discussions with adults to encourage learning through nature (Anderson et al., 2017). Experiential learning is a foundational component of Indigenous pedagogy as it aligns with educational activities about learning from the land. Indigenous pedagogy focuses on practical life skills, traditional crafts and designs, songs and dances, and oral storytelling (Preston et al., 2012). Similarly, experiential learning focuses on creating quality educational experiences to help children build skills and abilities to use in their communities.

Children's interests and curiosity lead to experiential learning, which could resemble learning about animal life-systems through nature camps, wildlife hunting, storytelling, art, or other environmental explorations (Preston et al., 2012). Anderson et al. (2017) present compelling evidence in their book *Natural Curiosity* (2nd ed.), demonstrating how children learn about their environment through natural curiosity. An innate spark of curiosity ignites within every person, but nurturing a child's ability to channel and direct their curiosity unleashes a powerful tool for learning. Natural curiosity is a skill of noticing that is cultivated through environmental inquiry experiences (Speldewinde et al., 2021). Harris (2018) described young children's natural curiosity as infectious. For example, children feel enticed to work together and create a snow fort or build a leaf pile to jump into. Through a child's eyes, there is a majestic aura about exploring mud, water, forests, and other natural elements (Harris, 2018). When children spend time in nature, they develop new neurons in the brain, which results in more energy and creativity emerging from their natural curiosity (Harris, 2018). Recent research supports the importance of nurturing children's natural curiosity. In particular, Speldewinde et al. (2021) found that children can develop knowledge in science, technology, engineering, and mathematics (STEM) as they spend more time noticing nature. Planting a garden is an example of a STEM activity that encourages natural curiosity. Through planting flowers or plants, or growing vegetables, children can observe the growth of their garden each season and keep a journal of the patterns, such as colour changes, recent growth and loss of vegetation. In the same way as their students, educators also need to develop their noticing skills in order to closely observe the children's environmental inquiry. Educators can make detailed observations, documenting children's learning, and planning future opportunities to advance children's natural curiosity (Anderson et al., 2017; Speldewinde et al., 2021). However, children cannot

explore nature on their own. It is the responsibility of educators and school administration to ensure children have access to natural spaces in order to nurture child-nature connections.

Environmental inquiry offers children opportunities to learn and develop through natural explorations. Children's learning develops in spaces they encounter daily. In these familiar spaces, children build memories that are connected to relationships built with family, peers, and educators (Diaz-Diaz, 2021). Regular and repeated access to natural spaces can create learning opportunities and establish memories for children to understand their world and their place within it (Anderson et al., 2017). Children's interests in nature flourish when engaging in learning activities that challenge their understanding of the outdoor environment (McGlynn-Stewart et al., 2020). Environmental inquiry provides children with risk-taking opportunities, meaningful interactions with nature, and promotes respect for wildlife (Coe, 2016). Educators can bring the outdoors in and extend environmental inquiry into the classroom (Anderson et al., 2017). This indoor inquiry could be group discussions about what children observed on a nature walk. These discussions help children reflect on the outdoor places they explored and create memories of those places. Educators can share stories about the history of the land and people where children spend time each day. This connection is important in fostering children's identity by teaching the history of that place.

With mobile devices, one can delve into the historical background of various places and document significant moments by capturing photos. Mobile devices need to be re-conceptualized as a resource to facilitate and support environmental inquiry. Since mobile devices are a part of children's daily lives, they can be a useful tool to support environmental inquiry because it provides a connection to living things (Miller, 2015). Technology also captivates children, as evidenced by the increased number of children's applications and the frequency of mobile device use by young children (Slutsky et al., 2021). Given children's

combined interest in nature and technology, mobile devices are a valid tool to support children's autonomy for learning through environmental inquiry (Johnston & Highfield, 2017). However, many ECEs are hesitant to include mobile devices into their programs (McGlynn-Stewart et al., 2020). ECEs may need time to re-conceptualize their preconceived notions about mobile devices, as it takes time to learn how to integrate mobile devices properly and adapt teaching strategies (McGlynn-Stewart et al., 2020).

When integrating mobile devices, ECEs can incorporate environmental inquiry into the classroom. For example, digital photos of the children's environmental inquiry can be created outdoors and used in the classroom to create posters, books, or drawings (McGlynn-Stewart et al., 2020). Mobile devices can provide a medium for children to extend their environmental inquiry. For example, Harwood (2017) studied a group of 4-year-olds at the Children's Centre, University of New Brunswick, Fredericton that used iPad minis to explore the wooded areas around their childcare program. The children used the iPad minis to record dramatic skits and poems using natural elements. They pretended a tree stump was a witch cauldron and made a recipe for poison soup. The ECEs and children researched vocabulary for their skits and poems using the iPad minis. These digital play experiences demonstrate the different ways children can use mobile devices to support their environmental inquiry. In recent years, the focus has shifted away from whether mobile devices belong in early childhood education, toward discussions on how to select mobile apps and integrate them into the early year's curriculum (Johnston & Highfield, 2017).

With this transition in mind, educators try to select appropriate mobile devices and apps that support children's environmental inquiry (Daugherty, 2014). Mobile devices that are chosen with specific learning goals can improve reading, mathematics, science, motor skills, and other areas of academic development (Daugherty, 2014). By collaborating, environmental

inquiry can take place as children share devices, promoting interactive use of technology, which appears to have positive effects on social skills (Daugherty, 2014). When children share a device, they have more opportunities to work collaboratively to improve their social skills and their digital skills (McManis & Gunnewig, 2012). Whether children have their own device or are sharing a device with a peer, educators must be available to interact with the children and support their environmental inquiry. To extend this discussion on mobile device use to support environmental inquiry, the next section will delve into Indigenous perspectives.

2.4 Indigenous Perspectives

Indigenous perspectives refer to the Indigenous knowledge frameworks that provide culturally appropriate learning experiences for Indigenous and non-Indigenous people (Hare, 2012). The term Indigenous in Canada refers to three distinct populations: First Nations, Inuit and Métis, all of whose experiences with colonialism have been different (Ball, 2012). This section discusses Indigenous perspectives including how mobile devices can be used to support young children learning about Indigenous perspectives.

Decolonizing education allows ECEs to gain an understanding of Indigenous teachings of the earth and how to connect nature to pedagogy (MacEachern, 2018). By understanding Indigenous perspectives of the land, ECEs can help teach children reciprocity and respect for their environment (Anderson et al., 2017). Children can learn traditional practices, including environmental activities specific to regional, sustainable, and land-based knowledges (MacEachren, 2018). For example, Indigenous peoples gather materials from the land to make toys, canoes, snowshoes, or other functional items using their hands (MacEachren, 2018). Everything gathered and used from the land serves a purpose in life. The land provides natural materials that give life to the people. For example, in the spring, children can learn about the value of a maple tree by tapping the tree, collecting the sweet sap it produces, and boiling it

down to create maple syrup. ECEs can work with Elders and community members to provide children opportunities to learn traditional activities and encourage environmental inquiry. Indigenous peoples engage in traditional activities, such as hunting, fishing, plant gathering, beading, preparing medicines, and communal practices associated with traditional life (Hare, 2012; Stagg-Peterson et al., 2019).

Indigenous children have the right to learn about their cultural heritage and traditional knowledge (Battiste, 2013). Indigenous knowledges have a strong foundation for community relationships and intergenerational practices, which are continuously evolving to consider changes for future generations (Battiste, 2002). The Seventh Generation Principle is an example of how all things are interrelated (Clarkson et al., 1992). This principle reminds us that whatever we do to the earth today will affect seven generations in the future. Through Indigenous stories of creation, one can grasp the intricate web of relationships between the earth, the spirits, and humanity (Battiste, 2002). The Seventh Generation Principle teaches people to respect and care for the earth so that our spirits, which we will carry forward, can pass on the teachings of the earth to future generations (Clarkson et al., 1992). ECEs can work with Indigenous peoples to teach these principles and enhance children's environmental inquiry.

ECEs can work with Indigenous peoples by establishing connections with community Elders. Elders play a significant role in the community. Elders are highly regarded, as they are the knowledge keepers responsible for passing down knowledge through the generations (Battiste, 2002; MacEachren, 2018). Teaching multicultural content is complex, therefore collaboration with Elders and Indigenous community members is essential to ensure teachings are culturally appropriate (Demmert et al., 2011). Children learn from the Elders by observing them making crafts or functional items, and then practicing these teachings during their pretend play (MacEachren, 2018). Elders teach children how to connect to the land, and establish

cultural understandings to build relationships with the land, water, and all living things (Bowra et al., 2021). Teaching Indigenous perspectives to Indigenous children at a young age can foster healthy development. As children mature, they can pass on Indigenous teachings to future generations (MacEachren, 2018).

Storytelling is a means to teach all children about Indigenous perspectives of the world and relationships within it (Hare, 2012). Young children are interested in and engage with stories that are shared through song, poetry, dance, and other symbolic representations. Stories can take several forms. For instance, a story may have vivid and elaborate scenes relating to the natural environment that allow children to create a clear mental image while listening (Allen & Lalonde, 2020). According to Cajete (2017), Indigenous stories serve as a tool for learning, enabling children to gain insight into others' experiences, values, and cultural understandings. Children are often taught the foundations of listening and thinking for learning, knowing, and relating to everything in the world through stories. Acknowledging the sacredness of Indigenous peoples' stories, we can gain an understanding of a natural place and the stories connected to it.

Sharing stories of the land is common practice in Indigenous cultures. Indigenous peoples often share stories about growing up and learning from the land to pass on cultural traditions of caring, understanding, and connecting with nature (Stagg-Peterson et al., 2018). Indigenous peoples share stories about climbing trees, fishing, or star gazing to help children to connect with different places and build meaningful connections to the land (Anderson et al., 2017). Educational digital storytelling has been identified as an alternative tool useful for teaching children about their community and nation. Research indicates that children can relate to other people's experiences and different cultures through digital stories (Wu & Chen, 2020). Mobile devices can be used to share educational digital stories. For example, websites such as Raven's Quest by TVO Kids (2024) includes a repository of digital stories by Canadian Indigenous

children who talk about their families and traditions. These stories can be viewed on iPads with small groups to engage in meaningful conversations about Indigenous perspectives.

Through storytelling, traditional activities, and community events, children can learn about Indigenous perspectives, yet there is not a strong connection to learning supported by technology. Upon reviewing the literature, little evidence was found for the use of mobile devices in teaching young children about Indigenous perspectives. When it comes to ECEs' PD for early year's curriculum, a study by Corntassel et al. (2020) recognized the potential of Indigenous learning through technology. This study explored social media as a platform that could be used by Indigenous land-based practitioners to share Indigenous culture related to foods, lands, waterways, languages, and Indigenous living histories. Indigenous virtual communities and networks highlight the value of treating information sharing with the utmost respect, in order to maintain media content that presents Indigenous communities in a positive light (Carlson & Frazer, 2020). As the popularity of social media continues to grow, there is a responsibility to protect Indigenous knowledges by using credible information when teaching about Indigenous perspectives (Corntassel et al., 2020). ECEs could also use social media as an information exchange platform to promote culturally appropriate resources for teaching children about Indigenous perspectives through environmental inquiry. However, educators need to be mindful of and sensitive to marginalized populations, including Indigenous communities. The lack of accessible and affordable Internet services in some Indigenous communities, combined with financial limitations, could be contributing factors to the limited adoption of technology (Cherubini, 2020). PD offers opportunities for ECEs to expand their knowledge on integrating mobile devices into lessons centered around Indigenous perspectives and environmental inquiry.

Children can learn similar skills and knowledge through environmental inquiry and Indigenous perspectives, as children explore nature, receive advice from adults, and become

stewards of the land. Despite this, Indigenous perspectives are different from environmental inquiry. As an illustration, environmental inquiry takes into account environmental sustainability by focusing on recycling and globalisation, whereas Indigenous perspectives prioritize the preservation of land and water, as well as cultural and community well-being (Wilson, 2008). Indigenous perspectives teach children about connections to the land, spirit, and all living things, and provide knowledge that extends beyond the children's physical and social surroundings (Anderson et al., 2017). One method for children to learn about Indigenous perspectives is by learning from the heart, which involves a holistic approach to develop intrinsic interests and inner spirituality (Anderson et al., 2017). Learning from the heart develops an intrinsic bond between children and nature. Intrinsic interests and learning from the heart are what matter most deeply to the child (Anderson et al., 2017). Learning from a holistic approach involves a learning environment where children feel safe and accepted by addressing their needs for mind, body, and spirit (Stagg-Peterson et al., 2018). Indigenous perspectives acknowledge that all things are connected, as we are linked to everything around us (Anderson et al., 2017). Including Indigenous perspectives in programming for young children can help them understand the importance of relationships and making connections between family, community, land, ancestors, and spirits.

In this chapter, I outlined the literature specific to Indigenous perspectives and environmental inquiry in early learning. I shared how Indigenous perspectives are deeply connected to nature, where children can observe and practice traditional teachings from the land. Elders and members of Indigenous communities can work with ECEs to share the history of the land through traditional activities and storytelling. Even though mobile devices were not found to support teaching about Indigenous perspectives in the literature, I provided an overview of how

ECEs can use technology to support their PD. In the next chapter, I describe the methodology, methods, and theories used to design this research study.

Chapter 3: Methodology

In this chapter I provide the context by explaining how this study's research methodologies are supported by my paradigm position as a researcher. Following this, I discuss the theoretical framework. I conclude the chapter with an overview of the research process, including the design, data collection and recruitment procedures, as well as data analysis process.

3.1 Context

The study examines the ongoing effort to decolonize Western education in the area of early childhood education. The goal is to promote the inclusion of Indigenous perspectives in early childhood education, emphasizing truth, reconciliation, and decolonization. In order to respect the rights of all young children, it is important to keep in mind that they should be able to learn about their individual cultures and knowledges. A qualitative case study methodology was chosen to investigate participants' personal experiences and perspectives. The purpose of the study was to gain insight into how ECEs foster learning about Indigenous perspectives through environmental inquiry, and to examine their use of mobile devices to support this learning. I hope that this research will bring new insights and knowledge to the early childhood education community.

I approached this study with the knowledge that my beliefs and epistemological position about the nature and production of knowledge underlie the inquiry and each step of the research process (Yazan, 2015). When determining the methodology for my study, I considered my spirituality and worldviews (Walt, 2020). As an ECE, my lived experiences shape my positioning in this research. While learning through the experiences of other ECEs, my research aims to promote inclusion and diversity for all young children. While

research is not static, I aim to contribute valid and ethical research, as it has the potential to influence educational knowledge and future research studies (Wilkinson et al., 2019). Next, I will discuss my paradigm position and methodological approach for this study.

3.1.1 Paradigm Position

The paradigm position, comprising the researcher's ideas and beliefs, shapes how they perceive the world and influences their research action and investigation (Kivunja & Kuyini, 2017). From my perspective, my spirituality drives me to advocate for equal educational opportunities for children, while also valuing and acknowledging their unique characteristics. I am dedicated to children's learning and inquiry; considering this, my paradigm position will inform how I examine technology to support early childhood education. I believe young children can benefit from the use of mobile devices to support learning about Indigenous perspectives and environmental inquiry. I incorporated research paradigms that offered different viewpoints to gain an understanding of human nature and gather insights for addressing my research questions.

Initially, I was interested in framing my research through an Indigenous research paradigm because I wanted to teach Indigenous worldviews, Indigenous knowledge, and respond to Indigenous needs in early childhood education (McGregor, 2018). However, I now understand that my Eurocentric position does not afford me the privilege of approaching my research from an Indigenous paradigm, nor does it allow me to draw conclusions about Indigenous ways of knowing. I attempt to resist and redress the potential for research to be colonial by advocating for the recovery of traditional Indigenous ways and knowledges (Hart et al., 2009). Decolonizing theory, in education, proposes that Indigenous knowledges in education would be equal to all other educational approaches (McGregor, 2018). Decolonizing education involves three key elements: 1) recognizing the role of Eurocentric assumptions in

perpetuating racism, 2) challenging the use of culturalism to maintain the status quo, and 3) promoting the inclusion of Indigenous perspectives in mainstream education (Battiste, 2013). However, in the past Eurocentric research methodologies have produced Western knowledge that dehumanizes Indigenous knowledges, languages, and cultures (Smith, 2021). To help decolonize research, the TRC advocates for Indigenous and non-Indigenous researchers to work together, taking action for truth and reconciliation (TRC, 2015).

As such, while conducting my research, I actively pursued the guidance and assistance of an Indigenous scholar who could lend their skills and expertise to enhance my research. Despite my efforts, I was unable to find an Indigenous scholar who was available to serve in a supervisory role. One member of my supervisory committee, who is a settler, has previous experience working with Indigenous communities. I sought advice from this committee member, along with acknowledging my Eurocentric perspective. As an ECE, my background equips me with the necessary knowledge and guidance to interpret information and comprehend the early learning sector. Nonetheless, I have remained aware of potential biases and strived for honesty throughout the research process (Kivunja & Kuyini, 2017).

Using the constructivist paradigm, I interpreted and created meaning from the participant's experiences. I chose the constructivist paradigm for its emphasis on understanding individuals and how they interpret the world around them (Kivunja & Kuyini, 2017). Constructivism holds that there are multiple socially constructed realities (Chilisa, 2012). Reality is not defined as one concept, as there are multiple interpretations of reality. Kivunja & Kuyini (2017) explain the constructivist paradigm as having a "subjectivist epistemology, a relativist ontology, a naturalist methodology, and a balanced axiology" (p. 33). To further explain these elements, a subjectivist epistemology involves the researcher interacting with

participants during conversations about their ideas and experiences to gain knowledge to address the research. By examining the belief in multiple realities within a relativist ontology, researchers aim to understand how people construct their realities and make sense of their world (Merriam, 1985). In a naturalistic methodology, data is obtained through means of communication with participants, such as interviews, observations, or focus groups, where the researcher takes on the role of an observer and recorder (Denzin & Lincoln, 2013). Recognizing the risk that the findings will reflect the beliefs of the researcher, a balanced axiology aims to offer an unbiased report of the findings (Kivunja & Kuyini, 2017). The elements of the constructivist paradigm allowed me to interpret ECE perspectives and gain understanding of their experiences using mobile devices to support learning about Indigenous perspectives through environmental inquiry.

To promote all young children learning about Indigenous perspectives, I incorporated the critical theory paradigm into my research to complement the constructivist paradigm. Critical theory is considered transformative because it promotes change, equality, and social justice (Koro-Ljungberg et al., 2009). Critical research aims to add value over time to change society. By challenging world views, critical theory aids in developing questions and strategies to foster moral action (Steinberg & Kincheloe, 2010). ECEs have an opportunity to use teaching strategies to influence how people act. For example, understanding Indigenous perspectives emphasizes the significance of fostering relationships and valuing familial connections (Wilson, 2008). The critical theory paradigm strives to bring about social change, empowering ECEs engage children in learning about Indigenous perspectives. Kivunja & Kuyini (2017) explain the critical theory paradigm as having “a transactional epistemology, (in which the researcher interacts with the participants), an ontology of historical realism, especially as it relates to oppression; a methodology that is dialogic, and an axiology that

respects cultural norms" (p. 35). Held (2019) goes into more detail, explaining that a transactional epistemology is a method that examines and discusses. It emphasizes the researcher's interactivity and goal to uncover the truth about knowledge that is socially or historically situated. The ontology of historical realism refers to reality that is socially constructed through past happenings. A dialogic methodology gives meaning and interpretation to data from qualitative or mixed methods research. Respecting cultural values and norms, critical theory axiology also supports social emancipation, offering a perspective of producing knowledge that can benefit disadvantaged people. Taking into account these aspects, I concluded that by embracing its transactional approach, the critical paradigm would afford my research with the potential to have a meaningful influence on child care programs. In my research, by adopting a decolonizing approach, the critical theory paradigm aims to empower children with the opportunity to explore Indigenous perspectives.

I bring together the constructivist and critical theory paradigms with a decolonizing approach (Kovach, 2009) to guide my interest in learning about Indigenizing early learning curriculum. Decolonizing theory challenges deficit thinking, advocating that there is more than one worldview which adds value to society (Held, 2019). These paradigm positions support my research to interpret individuals' values and beliefs, and to promote change in early years programs (Koro-Ljungberg et al., 2009). I have a stake in this research, and in the next section I share how I designed this study to reflect the decolonization theory and advocate for social change in the early childhood education profession.

3.2 Design

3.2.1 Research Design

Taking into consideration my paradigm positions and findings from the literature, I used the case study methodology for my research design. Case study methodology allowed me to

focus on examining a particular phenomenon within a given context: how mobile devices help young children learn through environmental inquiry. Stake (1995) describes case study as "a study of the particularity and complexity of a single case, coming to understand its activity within important circumstances" (p. xi). The purpose of case study is not to make generalizations for an entire population, rather to draw conclusions for a particular case (Stake, 1995). Case study requires the research to look at data from different views and perspectives. According to Stake (1995), case study considers multiple perspectives to understand qualitative research. The constructivist and critical theory paradigm supports the case study methodology by recognizing the importance of diverse perspectives, beliefs, and social conventions in society. By conducting a qualitative case study, my goal was to gather and interpret the experiences of ECEs specific to my research topic.

Being an ECE, I had a range of ideas and questions about research topics related to teaching and learning, such as integrating technology by children for learning. But, after much reflection and conversations with my thesis committee, I narrowed the scope of my study to three research questions.

1. How are mobile devices used to help young children in Ontario learn about Indigenous perspectives through environmental inquiry?
2. What barriers may affect the integration of mobile devices in early year's programming?
3. What supports could provide opportunities for ECEs to facilitate the use of mobile devices while teaching about Indigenous perspectives through environmental inquiry?

The case study methodology was employed to explore these research questions. I will now discuss the research procedure in the following section.

3.2.2 Procedure

The research procedure summarizes the strategies implemented to undertake this study. The first step of the methodological procedure was the planning phase. I created a plan for my research and submitted it to the Ontario Tech Research Ethics Board (REB) for ethics approval. Upon reviewing the application, the Research Ethics Board (REB #16970) issued the letter of approval (Appendix A) for this research. The following materials, which were designed in advance and approved by Ontario Tech REB, includes participant recruitment documents, purpose and objectives for the study, and a detailed account of the research process. By setting the foundation for the study, the planning phase ensured the integrity of the research process.

The initial stage of my plan was recruitment, which was completed virtually. I spent three weeks posting my research advertisement (Appendix B) to social media platforms (Appendix C) to promote the study and find participants. I created a short video explanation of the research topic to help bolster the recruitment process. A few people inquired about the study; however, this recruitment strategy was unsuccessful and did not yield any committed participants. Therefore, I shifted my strategy to reaching out to my professional contacts, ECEs I had worked with or studied with in the past. I contacted this potential group of participants through Facebook Messenger. This strategy resulted in several volunteers interested in participating. However, securing commitments to schedule interviews and meetings remained a challenge. I did not have any participants after one month of launching my research advertisement. With two failed attempts to recruit participants, I reached out to my thesis committee for assistance. My committee suggested I reach out to a few of their professional

contacts (Appendix D) who may be interested in my research topic. This strategy yielded results, including one participant from an Ontario school board. However, in order for this ECE to participate, I had to complete an access form for the school board (Appendix E). In the end, through a multi-step approach, I successfully recruited seven ECEs willing to participate in the interviews.

Data collection marked the beginning of the next phase of the study. Semi-structured interviews were conducted to collect data. Semi-structured interviews allowed me to pose specific questions pertaining to my research themes while also creating an environment for participants to freely share their personal anecdotes and perspectives (Gagnon, 2010). I conducted semi-structured online interviews, using the platforms Zoom and Google Meet. I conducted the interviews over an eight-week period. The interviews were prolonged due to the five-week school board procedure required to obtain approval for participants to take part in my research. To provide flexibility, I allowed the participants to determine the interview time that best suited their schedules. So that the participants could make an informed decision to participate in the research, I sent a recruitment email (Appendix F) with the consent form (Appendix G) prior to the interview. The consent form provided the participants with information about the study to ensure that they were aware of the purpose of the research, their rights as participants, and expectations of the researcher (Wilkinson et al., 2019). The consent form was sent early in the process to ensure participants had time to review and bring forward any questions or concerns. If participants had questions, I answered them via email or through Windows Live Messenger online chat. If a participant did not return the consent form prior to the interview, I reviewed the form at the beginning of the interview then asked the participant to either sign the form and email it to me or to provide verbal consent. I also required participants

to consent to being audio recorded during the interview, as the interviews generated significant data for analysis. Participants could also decide to join the recording of the interview using video or just audio. I provided each participant a videoconferencing guide (Appendix H) to prepare for the interview. Six of the seven participants agreed to the video recording without any hesitation. The interview data was transcribed verbatim for analysis purposes (Denny & Weckesser, 2022). After completing and transcribing the interviews, I began the analysis using NVivo qualitative data analysis software.

3.2.3 Participants and selection criteria

I selected a small sample size for this case study research for two reasons: first, I faced challenges recruiting willing participants, and second, interviewing a larger number of participants was too time consuming and would generate an unwieldy amount of data. Seven participants volunteered for this study, and the seven interviews provided sufficiently rich data for analysis. Since the sample size was small, I focused on one geographic region: Ontario. Participants in the study were educators with current or previous experience working in an ECE setting in Ontario, Canada. Having familiarity with this region helped me better interpret the findings and relate to the experiences of the ECE participants.

I used purposive sampling for selecting participants. The inclusion criteria for participation were broad, including ECEs who work with, or had experience working with children ages 3-6, and their families. I was interested in the perspectives of ECEs with varying levels of teaching experience, as their individual experiences using mobile devices could provide insight into different strategies for teaching with mobile devices. Other criteria for choosing participants included identifying ECEs who fostered learning about Indigenous perspectives through environmental inquiry, and ECEs who used mobile devices with children or allowed

children to use mobile devices for learning. The participants included Indigenous and non-Indigenous ECEs, as this research focused on strategies for teaching about Indigenous perspectives through environmental inquiry, not teaching about Indigenous knowledges.

Each participant received an invitation to participate through my Ontario Tech university email, or through Facebook messenger. Once an individual asked about the study and met the criteria to take part, the consent form (Appendix G) was emailed to the participant. The consent form may have caused issues for recruitment. For example, one potential participant was not comfortable with the criteria listed on the consent form because they felt they did not have sufficient experience teaching about Indigenous perspectives. I attempted to explain the meaning and context for Indigenous perspectives to the potential participant, but it was challenging to articulate through email.

3.2.4 Data collection tools

The last step in designing this research involved collecting data through semi-structured interviews. I conducted all interviews online via ZOOM, as it was the most efficient method for data collection. Semi-structured interviews were used to gain insight into the participants' perspectives and allowed ECEs opportunities to share their stories and experiences (Wilkinson et al., 2019). The semi-structured interviews allowed for a guided conversation but provided opportunities for new information to be brought forth from the interviewee (Denny & Weckesser, 2022). The semi-structured interviews provided a rich discussion with each participant volunteering an average of 45 minutes of interview data. Open-ended interview questions were used to allow participants flexibility to share their stories and experiences. The interview guide (Appendix I) included 11 (open-ended) discussion questions. Each interview question aligned with one or more of the study's three research questions. During the interview,

if participants requested clarification in understanding a question, we took time to discuss the terminology and I provided explanations to support the interviewee. By clarifying the terminology and allowing for some explanation, I hoped to make the interviewee more comfortable sharing their perspectives.

3.3 Data Analysis

In this section, I outline how I analyzed the interview data, including the sequential procedure and the programs and strategies used. The process of coding qualitative data is an important part of the analytical process, as coding allows the researcher to interpret, organize, and structure observations and interpretations into meaningful theories (Wilkinson et al., 2019). To make sense of the data collected, I created a sensitivity for the data (Wilkinson et al., 2019) by reading the interview transcripts several times, and listening to the interview audio files twice for each participant. Deductive and inductive coding provided theory- and data-driven codes to assist in the coding of research interviews (Xu & Zammit, 2020). The subsequent sections discuss this hybrid approach of deductive and inductive coding in more detail.

3.3.1 Deductive coding

The deductive codes used for analysis reflect the themes that emerged from a review of the literature (Wilkinson et al., 2019). The literature review and research questions were used to identify five categories of data or themes: barriers, mobile devices, curriculum, environmental inquiry, and Indigenous perspectives (Table 1). I developed a coding scheme to organize ECE responses to the interview questions. I created an initial list of 28 codes that emerged from the five categories. The codes included definitions and descriptors to explain each code. The qualitative data analysis software program NVivo was used to organize and code the data. NVivo allowed me to run keyword searches, Boolean searches, and identify relationships within

and between interviewees' responses. Modifiers such as "and" and "or" were used to combine phrases, such as "mobile device and outdoors" to perform more detailed searches that produced further results. Even though software such as NVivo support data analysis, the meaning and interpretation of the evidence can only be completed by the researcher (Gagnon, 2010).

Table 1

Codes for Deductive Analysis

	Code	Description
	Parent Code: (Research Question 1) Mobile Device Use	How are mobile devices used to help young children in Ontario learn about Indigenous perspectives through environmental inquiry?
1	Explore	How children investigate with mobile devices
2	Photos	Take images of what is being observed
3	Applications	Using online programs to support learning
4	Play	Specific to play-based learning, this is when play is purposeful, there is a goal for learning through play
5	Outdoor	Ways mobile devices are used outdoors
6	Documentation	Ways mobile devices help document learning
7	Skills	Ways young children and ECEs use mobile devices
	Parent Code: (Research Question 2) Barriers	What barriers may affect the integration of mobile devices for teaching Indigenous perspectives through environmental inquiry?
8	Cultural appropriation	When Indigenous teachings are not done respectfully or correctly.
9	Time	ECEs feel they do not have time to integrate mobile devices
10	Policy	Rules and regulations that cause difficulty for integrating mobile devices
11	Resources	Lack of devices, space or materials needed
12	Fear	Resistance to use mobile devices, or teach Indigenous perspectives
13	Lack of PD	More training is needed for Professional Development
14	Exposure	ECEs feel children spend too much time on mobile devices. Children do not have an opportunity to use mobile devices.
15	Management – Barrier	There was not support or flexibility to try new ways for teaching
16	Passive	Sedentary use of technology where learning is not the main goal
	Parent Code: (Research Question 3) Supports	What supports could provide opportunities for ECEs to facilitate the use of mobile devices while teaching Indigenous perspectives through environmental inquiry?
17	Responsive Teaching	Connecting children's cultures and ways of knowing to their learning
18	Community	Support from the community for teaching Indigenous perspectives
19	PD	Professional Development training that has been helpful in teaching
20	Activities	Past activities that demonstrate how learning happens
21	Experience	Opportunities for ECEs to practice using mobile devices

22	Knowledge	Ways ECEs became knowledgeable about mobile devices
23	Confidence	How ECEs built confidence
24	Management – Support	Supportive management that are flexible to try new ways of teaching
25	Policy	Rules and regulations supported integration of mobile devices
26	Planning	ECEs have planning time for integration of mobile devices
27	Culture	Beliefs, attitudes, and traditions that characterize teaching children's societal values.
28	Land	Land-based learning is involvement with nature and learning from the land

3.3.2 Inductive coding

Equally important, inductive coding is a bottom-up approach for data analysis that codes the data without trying to fit it into a pre-existing framework (Xu & Zammit, 2020). NVivo software was useful for inductive coding to run keyword searches to identify the frequency of used words that could create new codes. Using the NVivo software, I completed line-by-line coding of all the transcripts multiple times. Repeating the coding process was important because information overlaps and often the same sentence required multiple codes. The inductive coding method resulted in three new codes (Table 2) that were derived from reading and interpreting raw contextual data. This coding process allowed themes, concepts, and theories to be developed from interpretations of the data that may have implicit meanings (Xu & Zammit, 2020). After completing the inductive and deductive coding, I separated the data into categories (Appendix J) to reveal patterns and themes that emerged from the data. The data was ready for thematic analysis.

Table 2

Codes for Inductive Analysis

Code		Description
	Parent Code: Mobile Device Use (Research question 1)	How are mobile devices used to help young children in Canada learn about Indigenous perspectives through environmental inquiry?
1	Online Safety	Opportunities to learn online safety in early years
2	Behaviour Changes	Shifts in behaviour when using mobile devices and learning about Indigenous perspectives through environmental inquiry
	Parent Code: Barriers (Research question 2)	What barriers may affect the integration of mobile devices for teaching about Indigenous perspectives through environmental inquiry?
3	Resistance	Perceptions and beliefs that do not support technology or digital play for early learning.

3.4 Thematic Analysis

Thematic analysis was used to summarize the findings in terms of themes, interactions, and patterns within the data. I identified and articulated themes (Table 3) from the data set to draw meaning from the data (Xu & Zammit, 2020). I then synthesized the data to create a story that linked back to the research questions.

Table 3

Thematic Analysis: Themes

Research Question #1 Mobile Device Use	Research Question #2 Barriers	Research Question #3 Supports
Educational Use Supporting outdoor play Environmental inquiry Benefits for learning Safety of children	ECE fears Lack of professional development Policies Lack of connection to Indigenous perspectives Attitudes of resistance	Culturally appropriate activities Collaboration with community Exploring in nature Digital skills

After creating an initial set of themes, the data analysis transitioned to the write-up stage. However, before I wrote, I needed to ensure that my analysis maintained a decolonizing approach. To prevent the perpetuation of colonial practices, I made an effort to include Indigenous perspectives in my research and considered the impact of my research on Indigenous communities (McGregor, 2018). As such, I revisited the existing literature to remind myself of Indigenous perspectives and Indigenous-settler histories to situate the results of the research within the existing literature. I felt this was an appropriate way to bring forward Indigenous perspectives, and understand Indigenous-setter histories and present relationships (Wilkinson et al., 2019). Revisiting the literature helped me relate to the research participants' experiences. For instance, prior to this study, my understanding of establishing connections with Indigenous communities for early learning was limited. My initial perception of Indigenous community members in my child care program was that they were ad hoc members, primarily involved in organizing activities that celebrated Indigenous heritage. I now realize that my connection with Indigenous communities needs to be continuous and collaborative, involving them in every aspect of curriculum development (Kinzel, 2020). Building these connections is essential since it

helps me understand the participants' experiences. With a thorough understanding of the literature, I was able to construct a thematic analysis.

By laying out the theoretical framework and providing a rationale for using the case study methodology, I have established the foundation for conducting my research process. Drawing from constructivism and critical theory paradigms, the case study methodology is approached through a decolonizing lens. The subsequent section delves into the insights gathered from the interviews with participants.

Chapter 4 Findings

4.1 Overview

The seven research participants have unique experiences working with young children. As such, it is important to review their perspectives to identify themes and interpret meaning from the interview questions. The following sections outline the interview data related to the research questions, as well as other barriers and methods related to teaching about Indigenous perspectives as shared by the research participants. The organization of the findings followed the same thematic analysis approach utilized in the literature review and the three research questions. The research questions for this study are:

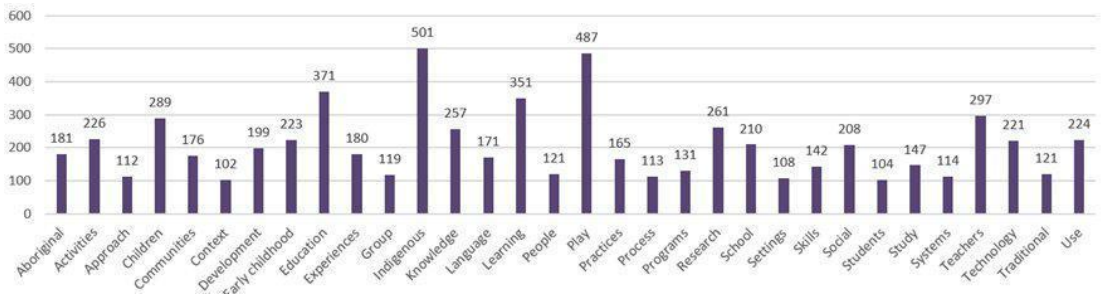
- How are mobile devices used to help young children in Ontario learn about Indigenous perspectives through environmental inquiry?
- What barriers may affect the integration of mobile devices in early years programming?
- What supports could provide opportunities for ECEs to facilitate the use of mobile devices while teaching about Indigenous perspectives through environmental inquiry?

I used NVivo software to organize the data, enabling me to observe trends and develop themes for analysis through multiple methods to compare the research data. NVivo demonstrates its efficiency by rapidly analyzing massive amounts of data, allowing for the evaluation of word similarities and data frequencies. The frequency count showcases the frequency of occurrence for specific characteristics. Employing NVivo, I conducted a keyword search for the literature review, which revealed certain words with an average occurrence of around 300 words, as indicated by Table 1. These results are not surprising considering these

words are the main focus of the study. The most frequently cited words used throughout the literature, which aligns with the research topic, were Indigenous (n=501), play (n=487), learning (n=351), and education (n=371). Despite my extensive NVivo search, I was unable to uncover any novel or distinctive terms that could potentially add novel themes or concepts to the dataset.

Table 4

Literature Review: Word Frequency



Using NVivo software, I organized the participants' interview data into codes or groups of information. I reviewed all of the data line by line and separated the information into the codes. A total of 643 references, spanning across 31 codes, were identified as essential pieces of information to be considered. However, prior to discussing the findings, I have included a brief introduction to the participants to provide the reader with an understanding of the participants' contexts.

4.2 Participant Characteristics

To attract ECE volunteers for this study, I used broad selection criteria. I considered educators who met the following criteria: 1) having current or previous experience working in an ECE setting, 2) possessing work experience in Ontario, 3) demonstrating experience in teaching about Indigenous perspectives through environmental inquiry, and 4) showcasing

experience in using mobile devices. Although formal collection of demographic information did not take place during interviews, participants offered information about their educational background. Through the use of pseudonyms, I introduce the seven research participants.

Lucy is an ECE who worked in the Durham region. The Durham region is 40 minutes east of Toronto. Just prior to the start of the study, Lucy had retired. With 30 years experience in the education field, Lucy brought a wealth of experience to the study. Lucy had experience working in a variety of educational settings, from high school to adult learning; however, her primary focus has been front-line work with preschool children. Her educational background includes a Bachelor of Arts in Education and Digital Studies, with a specialization in Early Childhood Studies. During the time of the study, Lucy was completing a Master of Education (M.Ed.). She has experience working in Indigenous childcare centres as an educator and as a supervisor. Just prior to the study, Lucy was recognized for her dedication to teaching truth and reconciliation and technology through her work in early childhood education. Lucy is engaged in researching how technology can facilitate social situations for students in early education.

Kelly is an ECE working in the Ottawa area. Kelly has been working in early years programs for over 15 years. Her educational background includes a diploma in ECE and a Bachelor of Arts in Child Studies. Kelly has experience working with a variety of ethnicities, including Indigenous children. She has also worked with families from varying socioeconomic backgrounds. Kelly enjoys working with preschool children, as well as working in administrative roles, including shift manager and assistant director.

Julia is an ECE working in the Ottawa area. Julia has worked in the early learning sector for over 35 years. Throughout her career, Julia has worked in licensed non-profit childcare centres. During her career she worked in an administrative role for two years, but she missed teaching and has since returned to working directly with children. Julia completed her Bachelor

of Arts in Education and contemplated studying for her M.Ed., but decided not to pursue a graduate degree, as she determined it was unnecessary for her role as an ECE.

Aisha immigrated to the Ottawa area 15 years ago, and has since been working with young children. Aisha began her Ontario teaching career working as a support staff that occasionally permitted her to teach. She then transitioned to a full-time unqualified ECE position. Five years ago, Aisha took a leave of absence from working full-time to pursue her ECE diploma. She is now registered as an ECE professional in Ontario. At the time of the study, Aisha was working as an ECE in a kindergarten classroom in Ottawa.

Zara immigrated to the Ottawa area 31 years ago, and has been working with young children for the past 10 years. At the time of the study, Zara was completing her ECE diploma, including a practicum with preschool children. She was also working in a school board while completing her studies. In the school board, Zara works with a team of educators who strive to incorporate Indigenous perspectives into their curriculum. For example, they have a relationship with the local Indigenous community to ask questions and have conversations about Indigenous ways of knowing.

Vivian has been teaching in Renfrew county in Southeastern Ontario for 20 years. Most of Vivian's teaching experience has been with kindergarten students. Her school has a multicultural group of students, including Indigenous students. Vivian enjoys working with kindergarten children because she believes "the growth between the start of their first year of kindergarten and then the end of the second year is just amazing…"

Nyla is an ECE who works in a remote First Nation community in Northwestern Ontario. For the past six years, Nyla has worked as an ECE in the kindergarten classroom of a small community school. She has also worked as an education assistant in the same school, providing individual support for special needs children. Nyla has not obtained her ECE diploma, as such,

she works as an unqualified ECE. In Ontario, working as an unqualified ECE is common, with 27% of ECEs being unqualified in licensed childcare centres (Malatest, 2017). Nyla has worked only on the reservation. Therefore, all of her ECE experiences are in an Indigenous context.

The seven research participants were all experienced ECEs living in Ontario. Despite their different career journeys and the diverse communities where they work, they share a determination to improve learning experiences for young children. For instance, Lucy is conducting research for her M.Ed. that will contribute to the early learning community, while Nayla is committed to advancing her knowledge through her teaching practice working with kindergarten students. I believe it is important to recognize the contexts of the participants as their unique experiences bring valuable insights into my research.

The research participants' views provide valuable insights into the research topic and help environmental inquiry supports young children learning about Indigenous perspectives through

4.3 Perceptions on Indigenous Perspectives

Research question #1 is "How are mobile devices used to help young children in Ontario learn about Indigenous perspectives through environmental inquiry?" Initially, I describe the participants' comprehension of Indigenous perspectives, followed by an exploration of how mobile devices can enhance the learning of young children. I coded research question #1 with nine categories of information. Refer to Appendix J for details on how I organized the initial codes to explore trends in the data. The data was organized into the 9 codes, down from 37 categories of information that emerged from the participants' experiences. Due to the broad scope of Indigenous perspectives, there were diverse viewpoints. The following are a few responses that participants shared.

Lucy could articulate her opinion of Indigenous perspectives with ease during the interview. Lucy said, "I think learning through Indigenous perspectives is just really good teaching. I think we all need to be doing it, and I don't even think we need to put a label on it."

Lucy views Indigenous perspectives as an integral part of her teaching practice. By contrast, Nayla expressed feeling nervous when asked to respond and she requested that the question be repeated. She then answered, “I feel that [Indigenous perspectives] would include a lot of outdoor learning, and with any culture, being aware and respectful, having gratitude towards the things around you.” Nayla described the importance of nature and connecting to the land, while Aisha related to the importance of Indigenous perspectives on intergenerational teaching and learning. She stated, “this is the carry-on from their ancestors, and these activities are passed on from generation to generation. It’s important to pass on the knowledge and education to other generations who will take over the land.” Understanding the different ECE views on teaching about Indigenous perspectives exemplifies the different ways ECEs approach their teaching.

4.4 Perceptions on Mobile Device Use

Beyond teaching about Indigenous perspectives, the participants discussed how mobile devices could support early learning. Mobile devices were used to support ECEs in teaching about Indigenous perspectives through environmental inquiry, however, they provided only a few examples of how the children used mobile devices independently. For example, the children in Kelly and Vivian’s classes utilize mobile devices to take photographs to document their learning experience. The ECEs shared a few experiences of mobile devices being used outdoors for learning. For example, Vivian shared that although children are permitted to use iPads, they are not allowed to take them outdoors. Most often, the ECEs described using personal mobile devices to support outdoor education for the entire group. Regardless of who uses the mobile device, the participants described how they facilitated learning through mobile devices. For example, the participants shared experiences researching cultural traditions and learning about different countries using mobile devices with their young learners. Lucy’s class researched traditional celebrations held during the first year of life for a First Nation child. The class then

used a stuffed bear to celebrate the milestone occasions of the bear's first year. An Elder worked with Lucy's class to ensure the celebrations were acknowledging and representing Indigenous perspectives appropriately. Lucy also shared an application she discovered called Teachers With Teachers, which is an early learning project that uses mobile devices to connect teachers from different countries. The app allows students from other countries to learn about Canada, and Canadian children to learn about other countries in return. Children can discuss the land and what it is like to live in different climates. The Teachers With Teachers application no longer exists, but there are several similar programs, such as Go Pangea (PenPal Schools, 2022) and ePals (Cricket Media, n.d.). As in Lucy's class, Aisha's students used mobile devices to research a variety of topics, including seeking information on cultural celebrations and traditions.

Overall, the participants shared only a few experiences regarding mobile device use to support teaching about environmental inquiry. Two participants, Lucy and Vivian, shared their experiences using mobile devices to support children's learning through environmental inquiry. Lucy discussed a program to create 3D Playgrounds that teaches ECEs and children how to construct a playground using natural resources (Playground Ideas, n.d.). ECEs can research plans for constructing a playground. After designing a suitable plan, the teacher and children map the specific locations for the playground equipment and then they build a wooden playground outdoors. For example, they find small logs to fit together for a teeter totter and use loose materials such as ropes to construct swings in trees. Lucy's class could extend their learning over multiple weeks with this project because it was in the forest and uninterrupted by others. This activity enhances scientific, technological, engineering, artistic, and mathematical skills, while building social skills for collaboration and engagement. When spending time in the forest, it is convenient to have access to a mobile device to take photos or research surroundings such as

insects, plants, or animals the children discover. For this purpose, Lucy recommended the app called Seek to identify rocks, plants, and other salient information. The Seek app can also identify sounds in nature, for example, which bird call is being heard.

Similar to Lucy, Vivian shared her experiences using technology outdoors. For example, Vivian used mobile devices to teach her class about safety around bees and beehives. Vivian explained, “we bring [abandoned beehives] inside to let the kids examine them more closely, because we’re not going to just allow them to explore beehives outside.” Vivian discussed safety with the children, by explaining that the beehive can only be brought indoors to examine if no bees live in the hive. However, children need to be safe if playing near beehives to protect themselves and the bees. Vivian could use the iNaturalist (iNaturalist Network, 2024) app on mobile devices to document encounters with bees and other species in nature. Reporting bee sightings teaches children about the need to preserve bees, which are at risk of extinction. The experiences Lucy and Vivian shared illustrate how mobile devices can help young children learn about Indigenous perspectives through environmental inquiry. However, the interviews uncovered other advantages of teaching with mobile devices.

4.4.1 Benefits for Mobile Device Use

The interview questions revealed more information than expected, including detailed discussions about the overall advantages of mobile device use for young children. The participants highlighted the potential uses of mobile devices for learning, without showing children digital screens. This is important, as most participants (n=5) indicated that their early years programs have specific policies in place that do not allow children to view digital screens. Even programs that do allow children to use mobile devices experience challenges for ECEs to utilize them for educational purposes. For example, Nayla shared that she would

like to have more consistency with the rules and expectations for mobile device use. Children do not have a designated schedule for device usage and availability varies as other programs also require them. Often Nayla's program accommodates students with a wide range of skills and abilities. Implementing a consistent digital learning schedule would benefit Nayla's students, allowing her to further support their learning through various digital applications. Despite these types of limitations, participants described how they adapted and continued to use mobile devices in their classrooms. For example, Julia discussed using auditory stimulation, where her preschool students used music and sounds from nature to enhance indoor and outdoor learning. Julia plays sounds of birds, babbling brooks, crickets, and thunder; she then observes how children respond to the sounds and how they might identify what they are hearing. Julia expressed her preference for the convenience of having a variety of sounds available on her mobile device to enhance conversations with the children. Despite this, she believes that mobile device usage should be guided by the child themselves, emphasizing the importance of a natural and an organic approach to learning. Similar to Julia, Aisha used auditory features on her personal mobile devices. For example, she played music to encourage children to dance and move outdoors, which increased children's physical activity. Conversely, Aisha used soothing music to help calm the children during rest times and reduce the noise level during free play time.

Participants also shared how they used mobile devices beyond the auditory features. Two participants shared how they used mobile devices to support their teaching and classroom management. For example, Kelly discussed how she uses voice recognition and language translation apps to communicate with her English Language Learners. Aisha used mobile devices to support classroom routines and activity transitions. For example, Aisha

used digital timers to count down as children prepared to go outside, take washroom breaks, or as reminders to come indoors.

Aside from pedagogical purposes, participants discussed affordances offered by mobile devices to support daily administrative tasks that need to be completed while supervising the children. Establishing effective communication channels among colleagues, families, and the community is essential when working with young children. Mobile devices support ECEs with documentation and reduce communication tasks. For example, ECEs used mobile devices to document and post children's learning to their online learning portfolios in real time. Similarly, when children are participating in a group activity, ECEs can post the activity online for families to view versus emailing the activities to parents individually. As such, the technology is used to reduce workload and improve efficiency because ECEs are not required to write the same message multiple times for every family. In addition to communicating with parents, ECEs are required to report daily on children's toileting, sleep times, or food consumption. This type of communication can be repetitive, as such the participants highlighted how they use mobile devices to streamline communication. For example, Nayla uses her class' online portfolios to track children's attendance because her school documents all children's learning online. Nayla uses her personal mobile device to access the online portfolios.

Beyond tracking attendance and student activities, participants discussed a variety of applications used to support their administrative tasks. The participants identified several beneficial apps, including Learning Stories, Seesaw, Brightspace, and Storypark. These apps support ECEs with program planning, documenting learning, communicating with families, and daily documentation for their program. For example, Vivian discussed an innovative feature offered through the Brightspace app that reduces ECE's administrative workload. Brightspace provides kindergarten students with the autonomy to document their own learning, which can

then be shared with the class as students discuss their activities and showcase their learning. The Brightspace app supports ECEs by documenting children's learning and providing ECEs more time to engage with students. Lucy shared similar experiences using mobile devices to document learning. When working as a Supervisor in a facility, she described the experiences of the ECE stating, "since they [ECEs] didn't have to do that [paper-based documentation], they got to spend more time with the children." The participants in this study shared experiences of how mobile devices reduce administrative workload and provide more time to work with the children in their care.

Although research question #1 focused on how mobile devices can be used to support learning about Indigenous perspectives through environmental inquiry, the interviews uncovered additional ways in which mobile devices facilitate early learning. In the next section, I discuss research question #2: "What barriers may affect the integration of mobile devices in early years programming?" In order to support learning about Indigenous perspectives, I first discuss the general barriers to mobile device integration before I consider potential solutions and improved educational practices.

4.4.2 Barriers Integrating Mobile Devices

Technology continues to advance and offer benefits, yet the research participants in this study discussed numerous barriers they faced related to integrating mobile devices in early years programs. One barrier identified by the participants was ECEs' attitudes and beliefs, specifically a fear of using mobile devices with young children. For example, Lucy described her initial distaste for technology use in the classroom, stating, "I hated technology and felt it should not be in child care. Nope. You're not going to convince me to use any kind of technology." It was not until Lucy completed an undergraduate course about teaching with technology that her

perspective shifted. Now, Lucy is a technology advocate, and she challenges policies that stand opposed to learning with technology.

Unlike Lucy, Zara and Julia discussed a fear of false information when researching online to create educational resources for children and families. Both participants wanted to ensure that the content they taught was accurate and legitimate. Julia struggled to sift through the vast amount of online information while developing educational resources. Before she uses online information, she considers the legitimacy of information and identifies credible sources of information. Julia was also fearful of cultural appropriation. She stated, "[I am hesitant to share] stuff because I have this deep seated need to be very respectful and I don't want to be disrespectful by accident…" By contrast, Kelly's supervisors were fearful of outsiders' perceptions; for example, what onlookers might think about her using a mobile device outside while working with children. The fear was that if the public sees an ECE using a mobile device outside, onlookers may think the ECE is not paying attention to the children. This fear resulted in the creation of a facility policy restricting the use of mobile devices outside.

Zara shared a fear from the perspective of Indigenous children. She expressed her belief that Indigenous children are hesitant to trust the mainstream education system because education opportunities had been removed in the past. This fear is valid for children today because colonial education still exists even though residential schools have been closed (Poitras Pratt et al., 2018). Although less noticeably, colonial education exists through the hegemonic assumptions and Western approaches embedded in curriculum (Poitras Pratt et al., 2018). Next I address the fears that participants had about employing mobile devices as tools for their pedagogical endeavors.

The participants' fears about teaching using mobile devices stem, in part, from their childcare policies and procedures. For five of the seven participants these policies did not support the use of mobile devices by children. Julia's childcare centre did not allow children to

have any screen time or direct access to digital devices. Julia stated, “there was a no technology kind of polic,.... No screen time. There’s no computer, there are no movies, there are [no digital devices] that sit the child in front of the screen.” That said, every educator had an iPad provided by the program, but the children were not permitted to use mobile devices. Parents at this facility were opposed to their children having any screen time while they were in childcare. This is an example of how family views and expectations can affect childcare policies and procedures.

Aisha had a comparable experience to Julia’s, where parents were unsupportive of screen time for their children. Aisha explained that on one occasion she shared a video during class. As a consequence, one family decided to end their child’s enrollment at the school. She stated, “[A parent] sent an email of concern [to the school principal] and the principal came to observe [my class]. We explained to the parents about the [purpose of the] learning videos, but the child [still left] the school.” This incident could illustrate that the organizational culture of the school is opposed to screen time and does not support the educator’s actions to use technology at their own discretion. It also demonstrates the potentially powerful position parents or paying clients hold within early childhood education programs.

Zara’s childcare centre also had “a no technology policy.” This policy did not permit preschoolers to use any type of technology independently for learning purposes. The center’s philosophy emphasizes the importance of traditional, technology-free play as a means of learning for young children. By contrast, Kelly’s current workplace supported the use of technology as a learning tool. Prior to joining her present childcare centre, iPhones and tablets were already being utilized by ECEs and children. However, Kelly acknowledged that her previous workplace did not support technology use, stating “… it was very faux pas. Don’t do

it." Nayla's kindergarten students were also not permitted to use mobile devices. However, Nayla used technology as a tool to seek information for her students when they showed interest in a particular topic. Nayla offered an example of a student who was interested in marine biology. Nayla went against school policy and utilized her personal cellular device to gather information for her student. This example illustrates how Nayla used her personal device with students, yet throughout the interview expressed discomfort because her centre's technology use policies did not support the use of mobile devices. In contrast to Nayla, Julia and Zara were at ease instructing without the children using mobile devices. However, they have not been exposed to the valuable learning experiences that can arise when children are encouraged to use mobile devices for their educational activities. Julia and Zara might have a change of perspective if they were given the opportunity to receive professional development on the educational benefits of mobile devices.

The participants indicated that PD is necessary to shift ECE perceptions of mobile device use. For example, Lucy believed new ECEs may be comfortable using technology, yet they do not have experience teaching with technology. As such, Lucy believed PD should focus on online safety tools and guidance for choosing educational resources for children. Zara participates in self-directed professional development and takes initiative to identify her own learning needs and gaps in knowledge. Zara stated, "I always think I'm up to date with everything, but you're really not. There are so many things I don't know [about technology]." By contrast, formal PD would be helpful to shift Nayla's perceptions specific to mobile devices as learning tools. Nayla is concerned about the children's young age and their abilities to learn using mobile devices. She believes that the classroom requires more adults to support young children in learning different applications and programs. Nayla has not experienced teaching

with children using mobile devices, yet she had strong perceptions why it would be challenging. As Nayla commented, "....I think depending on how many devices you have, sharing would be a challenge….[the children] are younger and they're not as independent yet, you would have to kind of help them through it. A lot of one-on-one support, and that would be challenging if there are not a lot of adults in the classroom to help with transitions or behavioral management." Unlike Nayla, Vivian was permitted to allow children regular use of mobile devices in her classroom. However, she felt the need for more time to learn how to use the various programs and applications. Yet, like Nayla, Vivian believed that supporting students' use of the technology was challenging given time constraints and the demands of the curriculum. Vivian found it difficult to find the time required to sit with the children and teach them using mobile devices because ECEs have demanding schedules with many daily tasks.

ECEs can allocate less time to traditional teaching methods and more time to demonstrating the educational possibilities of mobile devices, empowering children in the process (Nikolopoulou, 2021). PD would be valuable for providing ECEs with tools and strategies to teach young children using mobile devices and demonstrate applications that would add value to early learning. The viewpoints provided by ECEs offered valuable insights into the obstacles impacting the integration of mobile devices. Building on those viewpoints, I examine further barriers unveiled during the interviews.

The second research question focused on barriers for integrating mobile devices in early year's programs. However, the interviews also uncovered barriers that participants experienced when teaching about Indigenous perspectives. In most cases, the participants understood the early year's curriculum policies and interpretations of policies specific to Indigenous perspectives. Zara did not understand why her school board policy did not allow her to teach

Indigenous perspectives. Her school only permitted Indigenous peoples, Elders, or Indigenous community members, to share activities involving Indigenous perspectives. Zara stated, “in the past, I learned how to make a dreamcatcher and I was going to pass it to our kids, but apparently with our board, now they're saying the [Indigenous peoples] who are involved with this don't want anyone to do it, but themselves.” In Zara’s situation, she had previous experience creating dream catchers and believed she could appropriately explain how dreamcatchers were used to protect people from spirits while they sleep, however, the school policies did not permit her to do so.

Zara shared another experience that, she believed, posed a barrier for teaching about Indigenous perspectives. She discussed an Indigenous-focused activity that required collaboration with an Elder or community member. The school principal informed her that members of the Indigenous community would not agree to visit the school for a classroom activity. Zara felt defeated by this response, because she was trying to teach about Indigenous perspectives in a respectful way. Zara shared her frustration during the interview, stating, “if you want us to get these kids more into knowing who [they] are... How are we supposed to do this [when we are faced] with all these walls and boundaries? What can we do?” Although teaching about Indigenous perspectives was challenging for Zara, the school board policy protects against misrepresentation of Indigenous perspectives. To ensure the respect of Indigenous perspectives and other ethnic groups, early year’s policies and procedures have been established to support ECEs and set boundaries against cultural appropriation.

4.5 Strategies for Successful Integration of Mobile Devices

ECEs can support the integration of mobile devices in early learning by demonstrating a positive perspective in their value. The following section explores research question #3: “What supports could provide opportunities for ECEs to facilitate the use of mobile devices

while teaching about Indigenous perspectives through environmental inquiry?" Lucy offered various insightful viewpoints based on her extensive educational and professional background. She recalled a valuable lesson she learned about using technology. Lucy stated, "the less you have to remember and do, the more space you have, cognitively, to expand and be creative and explore." Lucy expanded on this perspective and explained that mobile devices can perform lower order thinking tasks for ECEs, allowing them to find information with the click of a button. Thus, the technology frees up time, allowing ECEs to spend more time interacting with children and families, and less time on administrative tasks. Having fewer time restrictions, Lucy could provide the ECEs in her program more opportunities to experiment with different teaching methods. They would test a new program or app and continue to work with it, or revert to the old process if the trial was unsuccessful. ECEs were always seeking the most time efficient software programs to use with their mobile devices. According to Lucy, ".... having a supervisor or director that will allow you to explore, that makes the difference I think." Lucy's quote emphasizes the crucial role of positive attitudes in leadership, especially when integrating mobile devices into early year's programs.

ECEs' positive attitudes influence the early year's curriculum, particularly for teaching about Indigenous perspectives through environmental inquiry. For example, Lucy discussed the early childhood education curriculum, and explained that all early learning should include Indigenous perspectives. Lucy stated, "....our entire Ontario curriculum is based on [inclusive practices]...." Lucy argues that incorporating Indigenous perspectives is an essential aspect of inclusive teaching in early years of education. As such, it would be beneficial if all stakeholders had a positive attitude toward teaching about Indigenous perspectives.

The combination of positive mindsets and notable participants, such as supportive parents, Elders, and other community members, has the potential to strengthen early years

programs. For example, Lucy added, “at my centre, we used to have a First Nations Elder that would come in and do the teaching on the land for us. Whatever he gave us, we just expanded on while he wasn’t there.” Through these types of opportunities, it is not only the children that learn, but the ECEs also learn from the Elders. Zara related a similar experience, explaining that her school invites Elders to teach lessons. She described a presentation focused on the Seven Grandfather Teachings, which are a set of teachings on how people should treat one another and show respect for all living things. Zara asserted, “for the younger children, I am looking up information for them and talking to Elders for more information.” Zara takes the time to ensure her teachings are culturally appropriate and values feedback from Elders. Vivian’s school does not need to invite an Elder to teach as they have an Indigenous teaching lead. Vivian tries to use the teachings from their Indigenous teaching lead in the classroom, but admits she does not teach the lessons with the same level of expertise. When Elders, Indigenous teaching leaders, or Indigenous community members share Indigenous teachings, this reduces barriers for ECEs, as they begin to develop their confidence and comfort integrating Indigenous perspectives in their programming.

4.6 Teaching About Indigenous Perspectives

The research participants shared their experiences teaching about Indigenous perspectives through celebrations and activities. Participants gained knowledge about Indigenous history, their deep connection to the land, and the cultural importance of ceremonies and traditions. For example, Aisha’s kindergarten students learned about Inuit culture by discussing the history of Inuit people and living in igloos. This discussion led to children sharing their experiences of ice fishing with their families. Her students also celebrate Indigenous perspectives by recognizing the National Day for Truth and Reconciliation, on September 30th. Throughout the year, Aisha strives to teach about Indigenous perspectives by

reading Indigenous stories and watching videos about Indigenous cultures. Similarly, Kelly's program painted different rooms specific colours, with each colour holding significance for Indigenous cultures. Indigenous cultures believe that colour holds meanings and symbolism, such as identifying specific characteristics of ethnic groups or symbolizing bearers of evolutionary knowledge (Bakieva & Popova, 2019).

Vivian also discussed initiatives she is leading to foster cross-cultural learning. Her class activities support English and French students, and she was designing activities to engage Indigenous students. These initiatives include providing her students with access to Indigenous children's books, posting images with preschool-level signage with Indigenous languages, and including activities, such as counting in Indigenous languages. Vivian plans to expand her initiatives by creating learning stories in Indigenous languages. As a result, their relatives will have a better understanding of the children's learning experiences. Learning stories are narrations created by the ECE of a child's experiences that explain the skills they are developing. Vivian stated, "we're going to make sure that we have stories that are in [Indigenous children's] languages, stories that represent them." This statement demonstrates Vivian's commitment to creating inclusive learning environments. Further, all of the examples shared by Aisha, Kelly, and Vivian demonstrate different ways the participants teach young children about Indigenous perspectives.

Teaching about Indigenous perspectives requires educators to continually reflect on their approach and ensure it is done in a respectful manner. To develop a thorough understanding, it is crucial to engage in continuous self-reflection on one's teaching practice (Peltier, 2021). An important component of developing a thorough understanding is to reflect on ways to connect with the community. Making connections with the community will allow for a localized

curriculum that aligns with the cultures present in the program. For example, Vivian shared how the Indigenous teaching lead in her school visited her class to lead traditional songs and conduct activities with the students in their language, Algonquin. The Indigenous lead talked to the children about Anishinaabe culture, and Vivian learned alongside her students about Indigenous perspectives.

The study participants all agreed that teaching about Indigenous perspectives involves connections to the land. This connection includes acknowledging that all land is Indigenous land, and respecting that the shared land is Indigenous territory. For example, Nayla's students live on a First Nations reserve in Northern Ontario and, as such, have abundant opportunities to connect to the land. Nayla's students learn how to trap beaver and mink, (net) fish, and engage in other traditional practices of living off the land. By contrast, connecting to the land is different for children living in urban and suburban environments. For instance, Aisha's class lacks sufficient time to explore nature around them. Her students' outdoor time is restricted to only one outdoor inquiry class every Friday. Throughout their nature walks, Aisha's class pays close attention to the changes happening in each season, including fluctuations in temperature and the shifting hues of the foliage. Despite the varying activities, both Nayla and Aisha are finding ways to establish connections with the land. The process of decolonizing education requires embracing connections rooted in land, culture, and community, which foster the health and well-being of Indigenous peoples (Corntassel & Hardbarger, 2019).

Environmental inquiry supports children's connections to nature by allowing time to explore their natural environments and enjoy the nature that surrounds them. Julia identified teaching practices that were helpful for teaching about environmental inquiry. For example, Julia teaches from a holistic approach and reflects on different ways to teach Indigenous perspectives.

She shared, “To me [environmental inquiry] is very holistic, … it’s just setting up an environment with materials and [exposing children] to things that kind of peak the child’s curiosity…” By encouraging children to freely explore their interests, Julia is able to provide holistic education that nurtures their mind, body, and spirit.

The participant interviews provided an overview of how ECEs use mobile devices to help young children learn about Indigenous perspectives through environmental inquiry. In the following chapter, I discuss the interview data and compare it with the existing research literature.

Chapter 5 Discussion

5.1 Overview

The aim of my research was to examine the experiences of seven Ontario ECEs who use mobile devices to help young children learn about Indigenous perspectives through environmental inquiry. In this chapter I interpret and explain the research findings presented in Chapter 4, and discuss how they provide evidence to answer the research questions. Additionally, I explore how the findings correlate with the literature review in Chapter 2. In the concluding sections of Chapter 5, I summarize the purpose and significance of the study. Additionally, I disclose the study's limitations and offer recommendations/implications for practice. I end with closing remarks to conclude this study, which has been guided by the research questions.

This study examines the use of mobile devices to help young children learn about Indigenous perspectives through environmental inquiry. Constructivist and critical theory paradigms guide this discussion, in which I seek to gain an understanding of individual perceptions and experiences that can inform early childhood education. I initiate the conversation by discussing the participants' personal views and experiences in the field of ECE, with the intention of understanding their individual perspectives.

5.2 Interpretation of Findings

5.2.1 ECE Perceptions

Nikolopoulou (2021) emphasizes that ECE perceptions of mobile device use play a vital role in the successful integration of mobile devices to support early learning. According to Nuttall et al. (2015), digital learning advances slowly, prompting a need for a new conceptualization of digital learning. A revised conceptualization of digital learning may

encourage educators to explore the potential of digital technologies. For example, educators often overlook the potential of digital tools in facilitating environmental inquiry but readily embrace them for structured indoor learning activities (Johnston & Highfield, 2017). However, young children learn through exploration and manipulation of materials regardless of their environment, and mobile devices can support these explorations, be it indoors or outdoors. As a result, I suggest that early childhood educators reassess their curriculum to identify areas where mobile devices can enhance children's environmental inquiry.

However, ECEs will need to shift more than their own perspectives if they choose to integrate mobile devices into their programs. They may need to advocate for changes within their organizations. The participants in this study were not content with their organizations' policies and procedures for mobile device use. However, integrating mobile device use for early learning can be a complex and time-consuming process. For example, supervisors and policy makers are generally making all policy decisions in childcare centres and schools, operating from a top-down approach. As such, ECEs do not have the freedom to implement learning activities that may disrupt the established curriculum or go against existing policy. This situation can lead to ECEs feeling demotivated and adopting the existing policies and educational framework, resulting in fewer opportunities for innovation. For example, Julia approved of her center's policy on mobile device use, which did not allow children to have direct access to mobile devices. The families in Julia's program showed resistance to children using mobile devices or engaging in any type of digital learning, and Julia supported the decisions of her supervisors and the families in her centre. If she had been given the option to explore digital learning further and allow children to use mobile devices within her program, would her perceptions have shifted?

Given ECEs' limited decision-making power specific to policies on mobile devices, it is challenging for them to shift their perceptions of digital learning. With increased access to mobile devices for teaching, the participants in this study could have had more meaningful pedagogical discussions. Rather than focusing on policies and restrictions, it would be beneficial to gather more information on how mobile devices and apps can be seamlessly incorporated into the curriculum for young children (Johnston & Highfield, 2017). As the findings indicate, a transformation in mindset will result in a corresponding transformation in action, prompting early childhood educators to create approaches for promoting children's learning using mobile devices. Shifting my focus, next I explore how ECEs approach teaching about Indigenous perspectives in the curriculum.

The findings of this research highlighted a range of viewpoints regarding Indigenous perspectives and their importance. The participants had differing definitions of Indigenous perspectives; however, their responses consistently involved connections to the land, respect, spirituality, and community. All of the participants shared positive perceptions of fostering inclusive classrooms. For example, Lucy viewed the incorporation of Indigenous perspectives in early childhood education as inclusive learning. Vivian described Indigenous perspectives as part of an inclusive classroom environment. Vivian fosters an inclusive classroom by incorporating elements of her students' cultures, such as incorporating visual representation in the classroom environment. Research asserts that ECEs promote inclusivity in the classroom culture by having standards of respect and kindness. Cherubini (2020) discussed how culturally inclusive classrooms build solidarity in the early years, which promotes successful experiences throughout children's school-age years.

However, ECEs require more PD and guidance on how to build inclusive classrooms and teach young children about Indigenous perspectives. The twelfth call to action from the TRC

urges all Canadian governments to work together in creating culturally appropriate early childhood education programs for Indigenous families (TRC, 2015). Although the recommendation is in place, ECEs need the tools and training on how to develop culturally appropriate education programs. Even though ECEs have positive perceptions of inclusive education, they need training and development to understand teaching strategies to provide culturally appropriate learning opportunities for children. The IELCCF and additional government funding help support Indigenous education programs and aid in Indigenous early childhood education (Government of Canada, 2023). These initiatives work towards bridging the gap by integrating Indigenous perspectives into early learning. However, these initiatives primarily cater to Indigenous education programs, which potentially: 1) excludes Indigenous children from attending other early years programs, and 2) does not allow for non-Indigenous children in other programs to benefit from this learning. While living in both urban and rural areas, not all Indigenous children reside on a reserve or participate in a childcare program dedicated to Indigenous education. Therefore, the funding allocation for Indigenous education programs might serve Indigenous students better if allocated to each Indigenous child, rather than centre-based allocation.

The aim of decolonization in early learning is to offer all young children the opportunity to explore Indigenous perspectives. The next section will discuss how integrating mobile device use during environmental inquiry could enhance strategies for learning about Indigenous perspectives.

5.2.2 Mobile Device Use in Early Learning

Given the strong connection between the land and Indigenous ways of knowing, it is important to explore how young children learn about Indigenous perspectives through environmental inquiry (Anderson et al., 2017). However, there are challenges for ECEs who

attempt to integrate mobile devices to teach young children about Indigenous perspectives through environmental inquiry. Despite my efforts, it was a challenge to find any relevant research on using mobile devices to teach young children about Indigenous perspectives. However, the literature provided evidence of mobile devices being used to support environmental inquiry. For example, Johnston & Highfield (2017) noted that children can benefit from actively engaging with mobile devices to support their environmental inquiry and extend their outdoor investigations and explorations. Despite the connection between mobile devices and environmental inquiry, the literature is siloed into three distinct bodies of research: mobile device usage, environmental inquiry, and Indigenous perspectives. These silos created challenges when seeking connections regarding mobile device use for supporting teaching about Indigenous perspectives and environmental inquiry, simultaneously. Moreover, the experiences study participants shared during the interviews were also siloed in the same manner as the literature review.

The research participants provided limited examples of mobile devices used to support young children's learning about Indigenous perspectives through environmental inquiry. However, by utilizing the 3D Playground program, Lucy's story of constructing a wooden playground is an example of place-based learning (Playground Ideas, n.d.). Before colonization, the traditional Indigenous way of learning involved experiencing and being on the land, with no interruptions from clocks and bells (Freeland Ballantyne, 2014). Lucy and her class researched how to build a playground in nature; then created a plan using the 3D Playground program; and referred to the plan while building the playground outdoors (Playground Ideas, n.d.). As I listened to Lucy, I found it difficult to imagine young children building a playground in a forest. Since my experiences have been restricted to urban areas, Lucy's story initially seemed implausible. However, as Lucy continued to recount the event and describe the children's

experiences using mobile devices to build the playground outdoors, I understood that access to natural spaces provides children with unique learning opportunities. Lucy's class had access to a large, private forest, as such were able to return to the forest daily without interruption. The playground was an authentic learning experience.

Lucy's playground illustrates one example of how mobile devices can facilitate children's learning by allowing them to explore and design in their natural environment (Yelland & Caja, 2017). Despite the potential benefits, children typically may not integrate mobile devices into their outdoor learning experiences. For example, five of the seven participants in this study asserted that children in their care were not permitted to use mobile devices independently or in small groups, as their centres had strict policies on screen time or children's direct contact with digital devices. Despite this, the five participants navigated around these policies and used mobile devices in other ways to support children's learning or experiences. For example, the participants used auditory stimulations to promote children's inquiry related to sounds in nature, utilized music to encourage movement and dance, and incorporated soothing sounds during rest times. Even though some childcare centres' policies restrict mobile device use outdoors, ECEs found alternative solutions. For example, Vivian's students could use mobile devices indoors, but they were not permitted to take the devices outside. Vivian circumvented this policy by allowing her students to bring natural elements indoors, and then used mobile devices to investigate the natural elements in the classroom.

By integrating mobile devices into outdoor activities, children can engage in auditory, visual, and kinesthetic interactions, enhancing their overall learning experience. For example, Lucy discussed an app called Seek, which children used on nature walks to identify birds by utilizing the auditory feature or visually identifying them by pointing the camera at a bird. By showcasing a variety of learning options, the Seek app demonstrates how mobile devices can

facilitate open-ended and multimodal learning experiences. Encouraging children to discover and interact with their environment can be done by using mobile devices (McGlynn-Stewart et al., 2020). Although 5 out of the 7 childcare programs had policies in place to limit children's use of mobile devices, they still permitted ECEs to utilize mobile devices for educational purposes.

Findings from this study illustrate that mobile devices support ECEs' teaching practices in several ways. For example, ECEs can conduct research and source information about unfamiliar topics to ensure the content they are teaching is appropriate. As shared in Chapter 4, Lucy discussed her students learning about the celebrations held during the first year of life for a First Nations child. This is an age-appropriate example because celebrations for the first stages of life are something that a preschooler can relate to and understand. Teaching children how Indigenous perspectives are relevant in the child's real-world context helps Indigenous and non-Indigenous children develop a deeper understanding of their cultural identities. Lucy and her students discovered this when using mobile devices to contact an Elder in the community to help explain the first year of life celebrations.

By sharing examples, several participants demonstrated how they used mobile devices to document learning, communicate with family members, and communicate with the broader community. Vivian discussed the Brightspace app, which is used to document and communicate the children's learning experiences with families. Children can use the Brightspace app independently to show their families projects they are working on, while the families can access the child's information through the app. ECEs can also use the learning stories created using Brightspace for kindergarten assessments. ECEs can share these experiences in report cards to explain the unique skills children are developing, including digital skills. Brightspace is efficient

and allows ECEs to allocate more time to interacting with children and teaching, and less time on administrative tasks.

While mobile devices are practical for ECEs in terms of administrative tasks, they also hold the potential to offer children valuable educational experiences. When children use mobile devices, they have an intense focus allowing them to remain connected to their device for long periods of time and return to them again without hesitation (Fox-Turnbull, 2019). This level of concentration can prove advantageous when the child is engaged in educational activities through active screen time. Mobile devices also enhance learning experiences through online resources, which can enhance traditional materials like reference books and information posters (Johnston & Highfield, 2017). Using mobile devices to support learning is a recent trend in early childhood education. In the next section I discuss the barriers affecting the integration of mobile devices.

5.2.3 Barriers to Integrating Mobile Devices

In this study, the barriers found for integrating mobile devices in early learning were largely based on perceptions of screen time. Nuttall et al. (2015) found that adults often believe that young children can only thrive through learning strategies that do not include digital technologies and that children need to be protected from excessive exposure to screen time. As shared in Chapter 4, Aisha described how her school was opposed to screen time and did not support her decision to use a learning video. Similarly, Zara, Kelly, and Julia had all worked in centres that did not permit children to have any screen time or direct access to digital devices for educational purposes. The parents in Julia's centre did not want their children to have any screen time while they were in childcare. This decision is logical considering the growing interconnectivity of the world, which requires parents to make choices regarding technology

usage (Johnston & Highfield, 2017). At home, children typically use mobile devices for entertainment purposes, as such parents relate screen time with sedentary behaviours. These perceptions of passive screen time impact policies for early childhood education programs, where children are spending less than 2.5 hours per week using technology for learning (Slutsky et al., 2021).

ECEs have expressed concerns about children's over-exposure to digital devices, particularly when used both in and outside of their childcare setting (Mertala, 2019). As such, these ECEs value non-digital learning experiences for young children's development (Slutsky et al., 2021). Vygotsky's (1978) theories of play, discusses rich learning experiences that require children's everyday life to be embedded into their early learning programs (Edwards, 2011). This holds true today because digital devices have become integrated into children's daily routines and become an integral part of their identity (Lindeman et al., 2021). Chapter 4 revealed Vivian's approach to teaching young children about beehive safety using mobile devices, also fostering their curiosity by bringing a real beehive into the classroom for examination. This example demonstrates how mobile devices can support environmental inquiry and extend early learning experiences. ECEs' interactions with mobile devices are reshaping their understanding of mobile device use, leading them to create meaningful learning experiences supported by these devices (Lindeman et al., 2021).

Increasing understanding for integrating technology into curricula helps reduce fears and challenges that ECEs experience. During the interviews, participants shared a variety of experiences where they were fearful of teaching about Indigenous perspectives using mobile devices. For example, Julia discussed fears of presenting false information and engaging in cultural appropriation. She did not want to misrepresent anyone's culture. I have experienced the

same fears as Julia, but I feel it is helpful to conduct preliminary research and then review the content with an experienced community member. As part of my journey to teach about Indigenous perspectives, I reached out to an Indigenous teacher to gain insight on cultural appropriation. During the conversation, I came to understand that my role as a settler does not qualify me to educate others about Indigenous activities, ceremonies, or practices, given that I lack lived experiences. It is more effective to establish connections with Indigenous communities and educate students through a collaborative approach.

Zara shared a concern regarding teaching about Indigenous perspectives, unrelated to the use of mobile devices. She had worked closely with Indigenous children who harbored concerns about being denied access to education. The prospect of having children's education taken away is upsetting for them. Zara's stories provide proof that ECEs need to actively support Indigenous children in feeling a sense of safety during their early learning. By acknowledging and rectifying historical injustices, ECEs can contribute to decolonizing education and fostering reconciliation (MacEachren, 2018). Addressing concerns related to teaching Indigenous perspectives is significant as it enables ECEs to better assist Indigenous children and foster culturally inclusive classrooms.

The use of mobile devices can support ECEs to cultivate inclusive classrooms. However, additional PD is required specific to digital learning to improve ECEs' confidence for integrating mobile devices into their teaching (Fox-Turnbull, 2019). To begin with, it is important to highlight the advantages and foster a clear comprehension of the idea of digital learning when providing PD. Once ECEs develop this foundational knowledge, it is important to provide them with hands-on practical experiences to apply this knowledge. Vivian had experience using mobile devices for teaching, but she felt the need for more opportunities to explore the array of programs and applications. Based on the findings in this study, ECEs

should connect with fellow educators and professionals in the community to exchange ideas and insights on effective strategies for incorporating mobile devices into their teaching practices.

5.2.4 Supports for Facilitating Mobile Device Use

In this section, I outline the recommended supports for facilitating mobile device use that arose from my research. The first recommendation is PD opportunities. In early childhood education, the inclusion of mobile device use has progressed slowly. Therefore, PD could be useful in positively impacting ECEs' perceptions of digital learning. ECEs and professionals in the community who have experience using mobile devices could collaborate to create communities of practice (CoP). The CoPs would provide a collaborative space for ECEs to share experiences and strategies for using mobile devices. Childcare programs could incorporate training and development on mobile device use in annual training plans. Organization-wide training could provide support to improve ECEs' confidence in using mobile devices for early learning (Fox-Turnbull, 2019). Additionally, I suggest creating PD programs specifically tailored for supervisors, allowing them to better assist and guide ECEs. The effectiveness of any PD will be compromised if supervisors do not understand the value of incorporating mobile devices into teaching. Lucy discussed how supervisors need to provide ECEs with opportunities to explore different strategies for teaching with mobile devices and determine what works for their students. It takes time to understand which resources work for each individual learner or group of learners. Lastly, I recommend specific guidelines for implementing mobile devices. The curriculum policies and frameworks need to integrate technology into all areas of development to encourage child care providers to integrate mobile device use in early learning. Supervisors could enhance training and PD programs for digital learning if the early learning curriculum included specific guidelines for integrating mobile devices. For instance, the

curriculum should consider the integration of online and offline activities, ensuring a balance between traditional activities and those facilitated by mobile devices (Daugherty, 2014).

These suggested strategies for PD, active involvement from supervisors, and updated curriculum guidelines can support early childhood educators in utilizing mobile devices. For these recommendations to be successful, it is crucial for early learning policies and frameworks to actively support digital learning. In the next section, I explore the tools and resources that can empower ECEs to successfully teach about Indigenous perspectives.

5.2.5 Supports for Teaching About Indigenous Perspectives

Local communities can support ECEs in using mobile devices to help children learn about Indigenous perspectives through environmental inquiry. Learning from community members' knowledge and experiences creates credibility and reliability in ECE teaching practices. Chapter 2 offered insights on how Indigenous educators and Elders can share cultural traditions to make connections to the land and demonstrate care for nature (Stagg-Peterson et al., 2018). Children learn through imitation and hands-on learning experiences, as such allowing community members to support ECEs helps to ensure the activities are practiced in ways that are culturally appropriate (MacEachren, 2018). In Chapter 4, the participants' experiences demonstrated that support from the community offered valuable learning opportunities. For example, Lucy and Vivian felt comfortable learning the teachings from Elders and integrating them in their programs. Teaching Indigenous activities is acceptable with permission from Elders, but ECEs should be cautious in making these decisions. Non-Indigenous educators need to seek approval prior to sharing Indigenous teachings to ensure this choice is appropriate. There also might be differing opinions among Indigenous communities regarding the involvement of non-Indigenous educators in the instruction of Indigenous

perspectives. In order to provide culturally appropriate education, all ECEs need to continuously integrate Indigenous content in their curriculum – throughout the year – based on ongoing learning through professional development and collaboration with Indigenous community members. The transmission of generational knowledge has suffered greatly through ongoing processes of colonization, highlighting the importance of Indigenous peoples' active participation in its rejuvenation and appropriate teaching. ECEs gain valuable insights from the Indigenous community to enhance their understanding of Indigenous perspectives.

Teaching about Indigenous perspectives can be challenging in practice. Non-Indigenous ECEs need to continuously reflect on their positionality. One of my reasons for exploring this research topic was to address my fear of cultural appropriation. When I consider the findings, I relate to Zara's experience with trying to make dream catchers with the children. It is a perfect example because non-Indigenous educators need to understand that teaching Indigenous content may involve cultural appropriation. Educators need to know the Indigenous background and knowledge about these teachings, and they cannot teach about Indigenous content without having lived experiences. However, there are other ways supervisors can support ECEs to provide children with learning opportunities about Indigenous perspectives. For example, stakeholders can work together to ensure children are learning through Indigenous perspectives in a culturally appropriate way (Truth and Reconciliation Commission, 2015). Strategies for offering children cultural learning experiences can be planned through collaboration with Indigenous communities. However, it may not be possible to have an Indigenous representative available in person for daily teachings. For example, in this study, only Nayla was teaching in an Indigenous community with access to Indigenous families to bring their experiences into the classroom. When there is not an Indigenous representative available, ECEs can focus on

teaching about Indigenous perspectives through Indigenous histories and literature for different educational topics.

5.3 Implications for Early Learning

Decolonization is a continuous endeavor to transform the prevailing colonial ideologies and mindsets that perpetuate oppression (Held, 2019). With the goal of supporting Indigenous children in early learning, my hope is that this research will influence the early childhood education sector, resulting in transformation and social change. In order to teach Indigenous perspectives, it is necessary to collaborate with supervisors, colleagues, Elders, and community members. However, in order to provide culturally appropriate learning opportunities for all children, ECEs also need autonomy. ECEs will need to advocate for their independence and autonomy in teaching, as they are the experienced professionals who know the capabilities of the children in their programs. For instance, ECEs can provide young children with opportunities to connect to the land through environmental inquiry in their daily outdoor programming. While not the same, it is beneficial to teach environmental inquiry and Indigenous perspectives together because the teachings are both connected to the land. An Elder or Indigenous community member should teach Indigenous ceremonies and practices while ECEs can share songs, literature, histories, and other media to teach about Indigenous perspectives.

The findings indicate the participants can use mobile devices to help young children learn about Indigenous perspectives through environmental inquiry. The experiences and perceptions that participants shared helped create a narrative of what is happening in their early learning centres. As positive perspectives on mobile device use in early childhood education continue to gain strength, ECEs are increasingly embracing and promoting the use of mobile devices.

Participants found mobile devices valuable because they facilitate documentation for learning, communicating with families, researching information for planning curriculum, and sourcing information while teaching children. Even though ECEs had positive perceptions of mobile use, there were several barriers for using mobile devices.

Addressing and identifying the barriers that impact digital learning is necessary to create change and break down barriers. ECEs need to be supported by supervisors and community members to implement mobile devices for environmental inquiry (Lindeman et al., 2021). Participants identified challenges regarding children's screen time, despite the intended educational use of mobile devices. There is a fear that using a mobile device outdoors will create a problem, such as members of the community thinking ECEs are neglecting children if they are seen using a mobile device. Participants expressed fear and apprehension around mobile device use with young children, but, despite this, they could pivot and use mobile devices in a variety of ways to support their teaching. This research is important because children are growing up in a digital society, therefore providing opportunities to use mobile devices in the early years will set them up for success in their school years. As implementation of mobile devices advances, ECEs will need to be mindful that each childcare program will have its own organizational culture and climate. Negative opinions and perceptions about mobile device use from stakeholders impacts the progression of digital learning. ECEs who are not permitted to use mobile devices directly with the children will need to have conversations with their supervisors and colleagues to promote the benefits of mobile device use.

5.4 Limitations

This research, while based on evidence, is influenced by limitations or constraints that impact the entire study. I explore the potential effects of these limitations on my research results by examining the research design.

5.4.1 Research Design

There are different perceptions related to teaching about Indigenous perspectives in early learning. This includes those from the participants in this study. As Nikolopoulou (2021) argues, it is important to explore ECEs' perceptions because they greatly influence the practice of pedagogy. In this research study, the primary focus was on mobile device use, as well as the related barriers or supports that were associated with integrating mobile devices. Despite this, I was intrigued by the connection to Indigenous perspectives in early learning, introducing a second component to the research topic. Given the connection between Indigenous ways of knowing and being with environmental inquiry, I added a third component to the research topic. These three components could work well together, but the research showed that mobile devices are not being used by young children outdoors. Interviews revealed that teachers were leading outdoor mobile device use, or students were using mobile devices indoors to research ideas for environmental inquiry and then applying their learning outdoors. These ways of using mobile devices meet the criteria for this research study, but gathering more experiences of children using mobile devices for their environmental inquiry would make the data richer. The research did not uncover many experiences involving mobile devices, Indigenous perspectives, and environmental inquiry practised cohesively. Brining these topics together is beneficial because it uncovers a new area of development in early learning; however, it also creates a limitation because it is difficult to research a topic that is not commonly practised. As mobile devices gain momentum in early learning and are viewed as part of daily learning activities, ECEs may have the potential to

make more contributions to this research topic in the future (Nuttall et al., 2015). The research topic does not align well with the current culture of what is happening in early learning. This is a limitation because it does not recognize all the ways mobile devices may be supporting early childhood education.

5.4.2 Participants

There may have been more participants interested in this research study if the research topic had been more clearly publicized. Recruitment of participants was challenging because I did not have an extensive network of ECEs available to participate in this research before starting the study. I tried to advertise my research online, but there was little interest from social media efforts. I received a few inquiries about the research, but no participants were sourced as a result of social media postings. I had to send direct messages to request participation from ECEs who I knew. Direct messages made it easier to source participants, but there were still misconceptions about the research. For example, one potential participant with whom I studied in my Bachelors of Arts in Early Learning program declined participation because she felt that her knowledge of Indigenous perspectives was not strong enough. She felt she needed to have experience teaching Indigenous children. I explained Indigenous perspectives are part of all early childhood education, but she declined to take part. This conversation could have been more effective in person because it was challenging to articulate the meaning of teaching about Indigenous perspectives through environmental inquiry via Messenger.

5.4.3 Time

The recruitment process was time consuming, with an eight-week timeframe to complete the recruitment and interviews. This was not a lot of time to build relationships and make connections remotely with potential participants. I contacted several childcare programs

in the Ottawa and Toronto districts, but I did not have enough time to create connections. There were some potential participants, but they were not available within the given timeframe. Approving research with school boards is a lengthy process. I had to create a formal application to complete research with one of the school boards, and it took six weeks for approval. Only one participant was recruited after completing the approval process with the school board, as there was limited remaining interview time. If I had more time, I would have designed research that offered a combination of data collection methods, which may be more inviting for ECEs. For example, some ECEs may feel more comfortable answering an online questionnaire where they can answer at their own pace. I may have organized a focus group with experienced ECEs to collaborate and share stories together through conversations. There may have been more participation in my study if there was more time for the interview process and different engagement options for participants.

5.4.4 Future Research and Recommendations for Practice

Participants may be more interested in this research topic as mobile device use becomes more accepted in early learning. In this section, I explore future research endeavors and recommendations for integrating early learning strategies. Understanding how mobile devices can help teach young children about Indigenous perspectives through environmental inquiry is a contemporary approach for early childhood education. Future research should aim to collect more experiences and ideas from ECEs. The research showed that there was no cohesive discussion of experiences for digital learning, Indigenous perspectives, and environmental inquiry. For my future research, I would like to design a mixed methods research study to build on the important research I have initiated. I feel more investigation is needed; specifically, a combination of observations, interviews, and focus groups may provide more in-depth

information to further this research topic. I would like to observe early years programs that are experienced with teaching Indigenous perspectives and using mobile devices both in the classroom and outdoors. Alternatively, other researchers can use the research findings to investigate this topic further. I have included the recommended digital resources (Appendix K) that participants and I had found valuable for using mobile devices to support learning.

Additionally, I propose that early learning programs invest in additional PD initiatives to enhance the prospects of successful research outcomes and the creation of experiences tied to this specific research topic. ECEs need additional training and development that is supported by policy makers, such as practical training resources provided by the Ministry of Education and the College of Early Childhood Educators. This research illustrated that ECEs are fearful of cultural appropriation and uncertain of acceptable methods to use mobile devices with young children. Practical training with examples, such as the experiences shared by the seven participants, would be valuable to advance the use of mobile devices. While it is up to each ECE to engage in ongoing PD, there is a need for better guidance on culturally appropriate teaching practices.

PD could include the use of mobile devices for environmental inquiry as an effective teaching practice. As children explore the land, they could use mobile devices to enhance learning during environmental inquiry. In the future, resources can be made available for ECEs to understand environmental inquiry and how to create opportunities for outdoor learning experiences using mobile devices. ECEs are responsible for facilitating environmental inquiry, and it is not enough to bring young children outdoors with no instruction or prompts to build on their natural curiosity. Mobile devices can support ECEs by providing children with the opportunity to collaborate using mobile devices to research plants, insects, and animals in nature.

Children can document their outdoor experiences and create their own learning stories to share with families. Therefore, the documentation created by the children would replace the need for ECEs to document their learning and allow more time to work with the children. There will be a shift in early childhood education once ECEs have the autonomy to embrace mobile device use during environmental inquiry and permission to allow children to use mobile devices outdoors.

5.5 Conclusion

This research aims to outline inclusive practices and promote learning about Indigenous perspectives for Indigenous and non-Indigenous children in early childhood education. Critical theory acknowledges that societal change takes time. It has been a long journey for Indigenous peoples to begin to restore their communities and lands because of disruption caused by colonialism. As a result, the Government of Canada has been asked to commit to providing culturally appropriate early childhood education programs for all children (TRC, 2015). Considering different perspectives shared by ECEs, there were concerns voiced about teaching Indigenous perspectives without having their own lived experiences within these communities. Connections to the land and discussions about the histories of the land is a good space for ECEs who want to offer culturally appropriate learning opportunities. ECEs can use the land to teach about Indigenous perspectives, as the land provides children with a deeply rooted sense of place and recognition that everything is related (Anderson et al., 2017). Indigenous and non-Indigenous children can benefit from Indigenous perspectives and learning from the land by building reciprocal relationships with the land.

The portability and multimodal features of mobile devices allow ECEs to use them to support teaching young children about Indigenous perspectives through environmental inquiry.

Bringing digital learning into an early learning curriculum provides opportunities for children to learn how to use mobile devices and applications; however, several barriers for implementing mobile devices exist in early childhood education. Policy makers and supervisors need to support ECEs and encourage them to use mobile devices in their daily teachings. More training and development need to be created by policymakers to communicate the acceptance and importance of digital learning for young children. The different ways mobile devices can support ECEs in their planning, documentation, and teaching are helpful for reducing administrative tasks and creating opportunities to spend more time with the children. Thus, it is recommended to provide children opportunities to practice learning with mobile devices during environmental inquiry. ECEs need to continue advocating for digital learning in their programs and continue to document the learning that is happening when using mobile devices. The ECEs' experiences using mobile devices inform the early childhood education community through research efforts, such as this study.

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Appendix A: Research Ethics Board Approval

Date: *November 16, 2022*

To: *Ann LeSage*

From: *Ruth Milman, REB Chair*

File # & Title: *16970 - The use of mobile devices to help young children learn about Indigenous perspectives through environmental inquiry*

Status: ***APPROVED***

Review Type: ***Delegated Review***

REB Expiry Date: ***November 01, 2023***

Documents Approved:

Document Type	Document Name	Version Date
Supporting Documentation	Videoconferencing Guide	2022/07/05
Supporting Documentation	Verbal Thank you script	2022/07/05
Recruitment Materials	Recruitment Email	2022/07/05
Recruitment Materials	Recruitment - Social Media Post	2022/07/05
Consent Letter	Consent Form	2022/07/05
Supporting Documentation	Interview Guide	2022/07/05
Supporting Documentation	Reminder Email Script	2022/07/04
Confidentiality Agreements	Confidentiality Agreement	2022/07/04
Other (See Comments)	Purpose and Background – References	2022/07/03

Notwithstanding this approval, you are required to obtain/submit, to Ontario Tech Research Ethics Board, any relevant approvals/permissions required, prior to commencement of this project.

The Ontario Tech Research Ethics Board (REB) has reviewed and approved the research study named above to ensure compliance with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2 2018), the Ontario Tech Research Ethics Policy and Procedures and associated regulations. As the Principal Investigator (PI), you are required to adhere to the research protocol described in the REB application as last reviewed and approved by the REB. In addition, you are responsible for obtaining any further approvals that might be required to complete your project.

Under the TCPS2 2018, the PI is responsible for complying with the continuing research ethics reviews requirements listed below:

Renewal Request Form: All approved projects are subject to an annual renewal process. Projects must be renewed or closed by the expiry date indicated above ("Current Expiry"). Projects not renewed 30 days post expiry date will be automatically suspended by the REB; projects not renewed 60 days post expiry date will be automatically closed by the REB. Once your file has been formally closed, a new submission will be required to open a new file.

Change Request Form: If the research plan, methods, and/or recruitment methods should change, please submit a change request application to the REB for review and approval prior to implementing the changes.

Adverse or Unexpected Events Form: Events must be reported to the REB within 72 hours after the event occurred with an indication of how these events affect (in the view of the Principal Investigator) the safety of the participants and the continuation of the protocol (i.e. un-anticipated or un-mitigated physical, social or psychological harm to a participant).

Research Project Completion Form: This form must be completed when the research study is concluded.

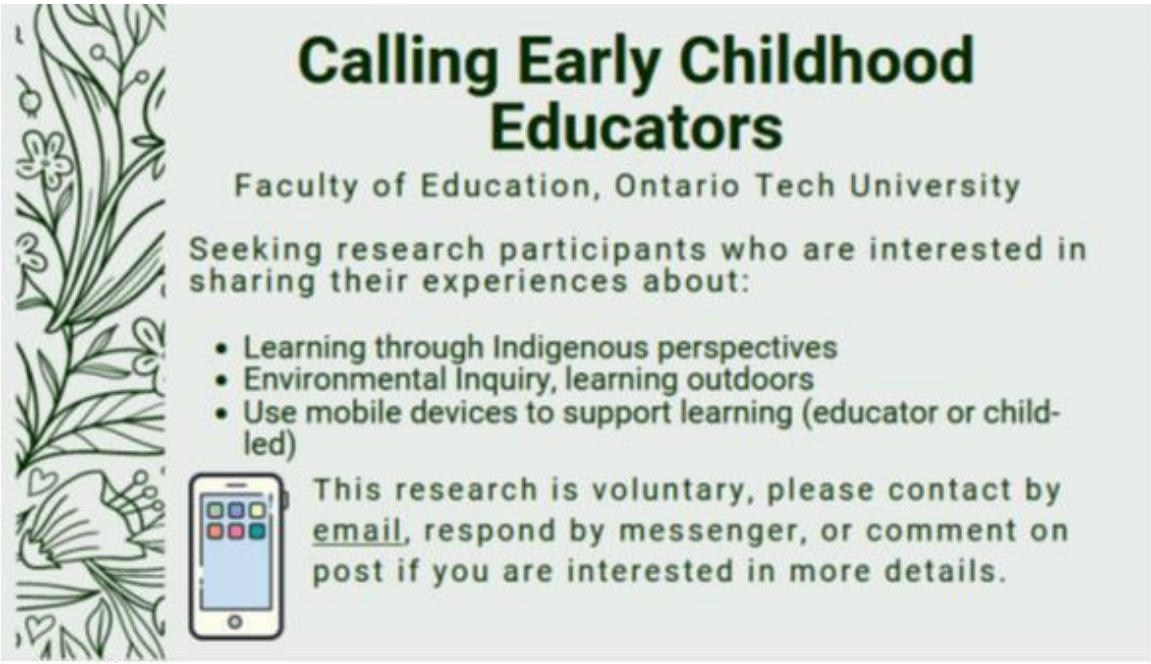
Always quote your REB file number (**16970**) on future correspondence. We wish you success with your study.

Sincerely,
Dr. Ruth Milman
REB Chair
Ruth.Milman@ontariotechu.ca

Appendix B: Social Media Posting

My name is Angela Walsh, I am a Master of Education student doing research for my thesis.
angela.walsh1@ontariotechu.net

Needing participants from Ontario, Canada



Appendix C: Social Media Platform

The following are the social media pages used to promote the study and all were accessed from Facebook platform:

Ottawa Teachers Professional Learning Community

Registered Ontario Early Childhood Educators

OTTAWA ECE CONNECTION

Canadian Child Care Federation

Early Childhood Educators of Ontario

Indigenous Early Years Educators

Early Years Ideas & Resources

Early Years Practitioners

Early Years Educator Support Group

Exploring Early Years

Twinkl Early Years Practitioners Group

Early Years Guidance and Support Network

Early Years Inquiry and Play

Early Years Practitioners with Growing Together

Appendix D: Professional Contacts

Professional Contacts Received from Thesis Committee

Indigenous Principal from Chalk River/Deep River area, this contact has many Indigenous students in their school district.

Contact from Durham College, Faculty of Research in Early Childhood Education.

Principal from a school up North.

Appendix E: School Board Application

Administrative Procedure 290

Access to RCDSB Operations by Research Personnel

Background

The Renfrew County District School Board supports excellence in teaching and learning and recognizes the value of research projects being carried out to further our collective understanding. This procedure outlines the application process, approval criteria and communication for a proposed study that has the potential to directly benefit the school system.

Procedure

The staged process:

Stage 1:

1. The applicant will submit F-290-1, Application to Conduct Research in the RCDSB, to the Director's Office (contact information available via RCDSB website). Email/electronic submissions are preferred.

2. The application will be evaluated by the Operations Steering Committee which meets at least three times in each year. The criteria used to evaluate the application is as follows:

    a) protection of student/staff rights when students/staff are subjects. When data are collected from students/staff, their rights and those of parents are not to be infringed upon. Conditions to be met include:
        - approval in writing from parents or the adult student or staff member;
        - assurance that information is given voluntarily without any special form of reward;
        - all rights are explained to participants in advance of data collection; and
        - there is no denial of learning opportunity.

    b) protection of the rights and well-being of the subjects in accordance with accepted research ethics;

    c) minimal or non-existent distress on students;

d) no use of violent materials for students;

e) consideration of political issues and consulting with the applicable Superintendent(s);

f) consideration of any researcher bias or conflict of interest situations that may arise;

g) a design that does not permit evaluation of an individual, and ensures that anonymity of participants and confidentiality of data are protected and consistent with the Municipal Freedom of Information and Protection of Privacy Act (MFIPPA);

h) clear procedures for obtaining informed consent (as required for application form completion);

i) appropriate protocol to deal with sensitive issues arising during the research (e.g., students who wish to withdraw from the study; disclosure of sensitive information by participants; debriefing participants);

j) well designed methodology presented with minimal use of technical jargon;

k) other venues considered for collecting the data, or other institutions to share existing data;

l) expenses for the research to be borne by the party conducting the research.

3. The research committee will communicate the outcome of the evaluation to Executive Council. Upon Executive Council approval, the applicant will be informed using F-290-2. This letter will, if necessary, be copied to the Principal(s) of the referenced school(s) or Manager(s) of referenced department(s).

4. The research committee will forward the application to the school(s)/department(s) for Stage 2 consideration.

Stage 2:

1. The Principal or Manager will evaluate the application upon receipt. The criteria used are:

a) minimal time for teachers, administrators and/or other Board staff to administer or be involved with the research, with the researcher taking responsibility for all aspects of the research;

b) protection of instructional time;

c) minimal disruption to the daily routine of the school;

d) a beneficial impact on both researcher(s), and RCDSB staff members and students;

e) alignment with the RCDSB Board Improvement Plan or specific School Improvement Plan as well as an alignment with Board policies and priorities.

2. The Principal or Manager will inform the research applicant of the outcome using F-290-3.

This procedure excludes professional development, additional qualification or accreditation-associated course work being completed by current employees of the RCDSB as well as course work by pre-service candidates working in one site. Also excluded are Ministry of Education data collection and surveys that gather feedback/data not used for a research project.

Depending on the timing of the applicant submission, a response can be expected within two weeks of receipt if aligned with research committee meetings (Stage 1). If necessary, the Principal/Manager will respond within an additional two weeks after which, with approval, access to participants and schools can be initiated. Approval will last as noted in the application form or as modified by the Principal/Manager in their communication. Requests for extensions must be received by the Principal/Manager prior to 75% of the requested timeline being completed.

Researchers will be required to provide a current Criminal Background Check to the Principal(s) of the school(s) or Manager(s) of the department(s) where the research is being conducted (should student interaction be a component of the research). Researchers are also required to provide linguistic translation of project information letters, consent forms, interview questions etc. if required. Full disclosure of research is required to be provided to the Director's Office at the conclusion of the research (this should include an Executive Summary). Researchers may undertake publication of their work in the press, academic publications, at conferences and through social media.

Legal References:

Education Act, section 265 Duties of Principal: Care of Pupil Municipal Freedom of Information and Protection of Privacy Act Ontario Regulation 474—Access to School Premises

F-290-1 Application To Conduct Research in the RCDSB*

**Consult the RCDSB administrative procedure 290, documentation and timelines when completing an application.*

A. APPLICANT INFORMATION

Date
January 25, 2023

Name	Angela Walsh		
Address	424C Moodie Dr.	Tel. *(Res.)*	819-700-3130
	Ottawa, ON K2H 8A6	Tel. *(Bus.)*	
Email	angela.walsh1@ontariotechu.net	Fax	

Institution / Agency Ontario Tech University

Position / Role Graduate Student

B. PROJECT DESCRIPTION AND TIMELINE

Title of research proposal: The use of mobile devices to help young children learn about Indigenous perspectives through environmental inquiry

Preferred start date: February 1, 2023

Expected end date: February 24, 2023

Expected date of report to board: *(research submitted to the board / participating schools)*: December 31, 2023

Please list all other school boards to whom you are submitting an application to conduct this research:

C. NATURE OF RESEARCH

q Undergraduate thesis **q** Master's thesis **q** Doctoral thesis **q** University research
q Principal's course **q** AQ course **q** Externally-sponsored project

q Other _____

Proof of permission and / or ethical review is required from your university / institution.

q the approval/ethics certificate from my university/institution is attached

q in progress (please provide details below, including expected date of approval/amendment)

Approval letter attached

D. RESEARCH OBJECTIVES

1. Provide a brief summary of your literature review and/or the theoretical foundations for your study.

The theoretical foundations for this literature are connected to play-based learning and what that encompasses; digital play in the classroom and outdoors. How mobile devices may have supported early learning in the current literature. Experiences and perceptions early childhood educators have regarding learning through the lens of Indigenous perspectives (IP) and environmental inquiry.

2. Explain the practical benefits and/or contribution of this research to the participants, to the district school board and/or to the education system in general.

This research seeks to create awareness of how mobile devices may support early learning programs. Understanding how 21st century learning can embrace digital devices and preserve Indigenous perspectives (IP) and environmental inquiry. Learning ways to embrace IP throughout daily activities is important in the ongoing work needed for truth and reconciliation.

E. DATA COLLECTION AND / OR DATA REQUESTS

1. Describe the proposed data collection. Include the number of sites/schools required and the name of any preferred schools or sites.

Semi-structured interviews with early childhood educators will be done online, all data will be analyzed through Nvivo software. Preferred school is Eganville and District Public School (EDPS).

2. How many students will directly participate?

Number of students	Grade/Program	Time required	Additional Details
0			

How many teachers will directly participate?

Number of teachers	Grade/Program	Time required	Additional Details
2-4	Kindergarten JK/SK	45-60 min each educator	Voluntary

How many other school personnel will directly participate?

Number of staff	Grade/Program	Time required	Additional Details
0			

3. Describe any other requests for data from the district school board.

No other requests. Educators can be kinder teachers or early childhood educators.

Meetings will be online through zoom or educator/board preferred platform.

F. METHOD OF INVESTIGATION/STUDY

1. Provide a brief summary of your planned method(s) of data collection. List all data collection instruments (e.g. tests, surveys, interview guides etc.) and attach copies to this application.

Interview guide attached.

2. Describe your plans for communicating to parents and participants about the research. Explain your plans for obtaining informed consent for participation. Attach copies of all information letters, consent letters and other communication materials to this application.

Informed consent form attached. Participant will be provided a copy of the research paper upon completion.

3. Briefly explain the data analysis procedures you will use for your research.

Data will be paired and analyzed through Nvivo software, keyword searches and trends/themes will be identified through the software.

4. List the security procedures in place for the protection of participant privacy and data storage.

All participants information will be anonymized, the information will be stored on one device with password protection.

G. ADDITIONAL REQUIREMENTS

1. Facilities required (e.g. quiet workspace; gymnasium; classroom)

Quiet space, Internet access, Device to login to virtual meeting.

2. Assistance required (e.g. early access to room for set up; assistance with students)

No

3. Other resources or special arrangements required

No

H. PROVISION FOR FEEDBACK

1. Please describe your plans to report results to participants, participating schools and/or the district school board office:

A copy of the final report will be shared with the participants and the school.

2. Describe any publication/speaking plans for this research (e.g. academic press; social media; online news; conference presentations):

Plans to publish with the University of Ontario Tech academic press.

SIGNATURES

Researcher:

I have received and read the Renfrew County DSB accompanying policy/guideline document about conducting research in the school board and agree to follow its requirements if my application is accepted.

Note that the final decision to participate in any research project always rests with the individual (e.g. principal, teachers, other staff; student through a parental consent form or a student assent form)

Signature of researcher

Professor / Sponsor / Affiliated organization:

This is to certify that the above described research proposal has been reviewed by myself/my organization and has been vetted for its academic soundness. Consideration has been given to ethical, legal and moral questions arising from the proposal.

Dr. Ann LeSage

Signature of Professor/Sponsor/Affiliated Organization

Print Name of Contact person (e.g. sponsoring professor, director of organization)

Name of organization

RETURN TO*: Renfrew County District School Board*

Date:

Dear _____:

Thank you for submitting your application to conduct research in the Renfrew County District School Board. This letter is to inform you that your application has / has not received approval from the research committee.

If approval granted:

Your application will be sent to the Principal/Manager of impacted schools/departments for Stage 2 of the approval process according to RCDSB Administrative Procedure 290. You should have a response from this stage in two weeks time.

If approval not granted:

Your application did not meet the criteria for approval for the following reasons:

Outline reasons here.

Should these items be modifiable to the point of acceptance, please consider re-submitting.

Sincerely

Chair
Research Committee
RCDSB

Date:

Dear _____:

Thank you for submitting your application to conduct research in the Renfrew County District School Board. This letter is to inform you that your application has/has not received approval from the Principal/Manager.

If approval granted:

I look forward to coordinating your research plan with you and invite you to contact me as per the information below.

School / Dept. contact information here:

If approval not granted:

Your application did not meet the criteria for approval for the following reasons:

Outline reasons here:

Should these items be modifiable to the point of acceptance, please consider re-submitting.

Sincerely

Principal/Manager

School / Department

RCDSB

Appendix F: Recruitment Email

September 6, 2022

Target audience: Early Childhood Educators

Subject line: The use of mobile devices to help young children learn about Indigenous perspectives through environmental inquiry

Optional Research Study:

This message is being sent on behalf of Angela Walsh, a graduate student at Ontario Tech University g. You are invited to participate in my Masters thesis research study titled: "The use of mobile devices to help young children learn about Indigenous perspectives through environmental inquiry." I would like to hear about your experiences. I am looking to speak with early childhood educators who are currently:

- Working with children ages 3-6 years old
- Foster learning about Indigenous perspectives through environmental inquiry
- Use mobile devices with children or allow the children to use mobile devices for learning
- Reside/teach within Ontario, Canada

Indigenous perspectives are dynamic knowledge systems that inform good teaching practices for all educators and students. Indigenous wisdoms and traditions can deepen principles and practices for environmental inquiry, supporting a child's natural curiosity to explore and discover in nature. Children are also curious about mobile devices and I am interested in learning how

mobile devices have been used to support your programming. A mobile device can be any digital device including an iPad, tablet, cellular, cameras, or any other mobile device that can support environmental inquiry. The use of mobile devices can be teacher guided, or the children can be using the mobile devices themselves / independently.

Participation in this research study is entirely voluntary, and will include an online interview for 45-60 minutes to share your experiences. If you are interested in participating or have any further questions, please contact Angela Walsh at angela.walsh1@ontariotechu.net. If you have any questions regarding your rights as a participant or have any concerns about this study, please contact the Research Ethics Office at researchethics@ontariotechu.ca or 905.721.8668 x3693. This study has been
reviewed by the Ontario Tech University Research Ethics Board [insert REB #] on
[insert date].

Sincerely,

Angela Walsh

Angela Walsh

Ontario Tech University Graduate Student

Appendix G: Consent Form to Participate in a Research Study

Title of Research Study: The use of mobile devices to help young children learn about Indigenous perspectives through environmental inquiry

Name of Principal Investigator (PI): Angela Walsh

PI's contact number(s)/email(s): angela.walsh1@ontariotechu.net

Names(s) of Co-Investigator(s), Faculty Supervisor, Student Lead(s), etc., and contact number(s)/email(s): Ann LeSage (Faculty Supervisor) ann.lesage@ontariotechu.ca

Departmental and institutional affiliation(s): Faculty of Education

You are invited to participate in a research study entitled " The use of mobile devices to help young children learn about Indigenous perspectives through environmental inquiry." Please read the information about the study presented in this form. The form includes details on study's procedures, risks and benefits that you should know before you decide if you would like to take part. You should take as much time as you need to make your decision. You should ask the Principal Investigator (PI), Angela Walsh to explain anything that you do not understand and make sure that all of your questions have been answered before signing this consent form.

Before you make your decision, feel free to talk about this study with anyone you wish including your friends and family. Participation in this study is voluntary. This study has been reviewed by the University of Ontario Institute of Technology (Ontario Tech University) Research Ethics Board file*#16970* on November 16, 2022.

Purpose and Procedure:

Purpose:

The purpose of this study is to gain insight into current teaching methods using mobile devices to help young children learn about Indigenous perspectives through environmental inquiry.

You have been invited to participate in this study and share your experience working in early childhood education. We seek to increase understandings of teaching methods you use, and any accomplishments or challenges you have experienced.

Procedures:

This is a qualitative research study using online interviews, where the interview will be recorded and transcribed for data analysis. The data will be analyzed using NVivo software to code information and find trends or themes within the data.

Interviews are semi-structured and offer open-ended questions for participants to provide their experiences and perspectives.

The interviews will be 45-60 minutes long. Reliable Internet access is required. The camera can be turned off if the participant is not comfortable having the camera turned on.

The research data being collected will include personal information to identify participant's demographics, early learning experiences with Indigenous education, experience using educational technology, and perspectives on how technology may or may not be integrated into Indigenous education. Experiences and opinions will greatly enhance the research the importance of Indigenous teaching methods in early learning.

Potential Benefits:

This research will show the importance of Indigenous teaching methods and practices. It may benefit participants to explore connections between Indigenous education and digital learning. Future research will seek to implement digital solutions and devices into curriculum to test how inquiry-based learning can be improved through technology.

Potential Risk or Discomforts:

There are no reasonably foreseeable risks (physical, psychological, or social) both for the participant and in general that are associated with the procedures described above.

Use and Storage of Data:

Researchers shall provide details to the REB regarding their proposed measures for safeguarding information, for the full life cycle of information: its collection, use, dissemination, retention and/ or disposal.

The data will be stored in password-protected digital files, on a password-protected computer in the researcher's home office.

Personal demographic information will include; name, email, city location, gender, and year(s) of experience. Workplace information will include age of children taught, type of child care centre, and percentage of Indigenous children are being taught in the classroom or centre.

The demographic information collected will only be used for research purposes related to this study, the information will be used during analysis of data to identify any patterns or trends based on demographics.

Only the student lead, Angela Walsh will have access to the data. If information is shared outside the institution for a publication, the data will be anonymized with pseudo names.

Audio and/or video data will be transcribed and data will be stored on a password protected computer, and original data will be destroyed after the research study. The original data will be stored until December 31, 2023 at end of research study period. All original data will be deleted from computer files, recycle bin files, and any encrypted hard drives used to back up the data for safe storage.

Research data will be stored for 10 years for potential future research. This time frame is adequate since the student researcher may use the data in future graduate studies.

All information collected during this study, including your personal information will be kept confidential and will not be shared with anyone outside the study unless required by law. You will not be named in any reports, publications, or presentations that may come from this study.

Confidentiality:

A secure Internet connection and reliable communication software will be used to record data, no public or open connection will be used to protect the confidentiality of information shared. Participants were all comfortable to use Zoom which was my preferred communication software platform, but they were offered Google meet as an alternative option. All reasonable steps to safeguard the confidentiality and anonymity of participants will be taken.

Your privacy shall be respected. No information about your identity will be shared or published without your permission, unless required by law. Confidentiality will be provided to the fullest extent possible by law, professional practice, and ethical codes of conduct. Please note that confidentiality cannot be guaranteed while data is in transit over the Internet.

This research study includes the collection of demographic data which will be aggregated (not individually presented) in an effort to protect your anonymity. Despite best efforts it is possible that your identity can be determined even when data is aggregated.

Participant identification in the data will be removed before linking data with the NVivo qualitative analysis software. This procedure is done to protect the aggregate demographic data when transferred.

Voluntary Participation:

Your participation in this study is voluntary and you may partake in only those aspects of the study in which you feel comfortable. You may also decide not to be in this study, or to be in the study now, and then change your mind later. You may leave

the study at any time without affecting your employment status. You will be given information that is relevant to your decision to continue or withdraw from participation. Such information will need to be subsequently provided.

You may refuse to answer any question you do not want to answer, or not answer an interview question by saying, ‘pass’.

Right to Withdraw:

If you withdraw from the research project before March 30, 2023, any data that you have contributed will be removed from the study and you do not need to offer any reason for making this request.

After March 30, 2023, the withdrawal of data will not be feasible after the personal information has been anonymized and added to a data pool.

Data will be removed if the participant stops answering questions or closes an online browser early.

It may be impracticable to withdraw results once they have been published or otherwise disseminated.

Conflict of Interest:

Researchers have an interest in completing this study. Their interests should not influence your decision to participate in this study.

Compensation, Reimbursement, Incentives:

Participants will not incur any expenses as a result of their participation in the study and there is no compensation for injury as there is no risk for participation.

There is no monetary incentive or compensation for participating in this research study. The participant should not suffer any disadvantage or reprisal for withdrawing.

Debriefing and Dissemination of Results:

If interested in results of the study, participants will be informed of the results by email and given a description of how the results will be published. If participants are interested in learning of the results, they may contact the student lead at angela.walsh1@ontariotechu.net

Participant Rights and Concerns:

Please read this consent form carefully and feel free to ask the researcher any questions that you might have about the study. If you have any questions about your rights as a participant in this study, complaints, or adverse events, please contact the Research Ethics Office at (905) 721-8668 ext. 3693 or at researchethics@ontariotechu.ca.

If you have any questions concerning the research study or experience any discomfort related to the study, please contact the researcher Angela Walsh at angela.walsh1@ontariotechu.net.

By signing this form you do not give up any of your legal rights against the investigators, sponsor or involved institutions for compensation, nor does this form relieve the investigators, sponsor or involved institutions of their legal and professional responsibilities.

Consent to Participate

Consent to study participation may be obtained in various ways such as: written, oral, use of a substitute decision maker, or online. For the section below, chose the wording that applies to the method in which consent was obtained.

a. Written Consent

    1) I have read the consent form and understand the study being described;

2) I have had an opportunity to ask questions and those questions have been answered. I am free to ask questions about the study in the future;
3) I freely consent to participate in the research study, understanding that I may discontinue participation at any time without penalty. A copy of this consent form has been made available to me.

Print Study Participant's Name Signature

Date

My signature means that I have explained the study to the participant named above. I have answered all questions.

Print Name of Person Obtaining Signature

Date

Relationship to Participant

My signature means that I have explained the study to the participant named above. I have answered all questions.

Print Name of Person Obtaining Signature

Date

b. Oral Consent
1) I have read the consent form to the participant and they have indicated that he/she understands the study being described.

2) The participant has had an opportunity to ask questions and these questions have been answered. The participant is free to ask questions about the study in the future.
3) The participant freely consents to participate in the research study, understanding that he/she may discontinue participation at any time without penalty. A physical/digital consent form has been made available to him/her.

Print Name of Witness Signature

Date

Relationship to Participant

c. Online Consent

1. I have read the consent form and understand the study being described.
2. I have had an opportunity to ask questions and my questions have been answered. I am free to ask questions about the study in the future.
3. I freely consent to participate in the research study, understanding that I may discontinue participation at any time without penalty. A copy of this Consent Form has been made available to me.

☐ I agree

Appendix H: Videoconferencing Guide

Video conferencing is the preferred solution for this face-to-face meeting, you are not required to have your video on during the interview. Here are some suggestions to prepare for the meeting:

- Choose a quiet room
- Ensure you have a stable high-speed internet connection
- Use a private, secure connection. Avoid using public hotspots and networks.
- Desktop computer or laptop preferred, cell phone, tablet, or other mobile devices can also be used
- Ensure webcams, microphones, headsets, and/or speakers are functioning
- Download Zoom or Google Meet software and have your account ready to use
- Test your software to avoid any technical issues
- Enable security settings on your videoconferencing software

Appendix I: Interview Guide (Semi Structured Interview)

Welcome (participant name), it's a pleasure to meet you. Thank you for taking the time from your busy schedule to meet with me.

Please, let me tell you a bit about myself. My name is Angela Walsh, and I am an early childhood educator who is working directly with a preschool age group in Ottawa, Ontario. I am passionate about early learning and currently doing the Masters of education program at Ontario Tech University. I have been working with young children for ten years now.

Can you please introduce yourself and let us know about your experience, where you are located, and why you have decided to participate in this project?

Excellent, I am going to begin our discussion by asking for your understanding of the research topic.If there are any questions that you do not choose to answer, please let me know by saying "pass."

1) What does learning through Indigenous perspectives in early childhood education mean to you?

2) What does environmental inquiry mean to you?

3) Can you talk about activities in your program that help children learn about Indigenous perspectives? Or activities that support learning through environmental inquiry?

4) Please tell the story of how your centre(s) became interested in using mobile devices and the role you played in that process?

5) Please talk about any challenges you have encountered integrating technology for Indigenous perspectives through environmental inquiry?

6) Please talk about some specific successes you have encountered integrating technology for Indigenous perspectives through environmental inquiry?

7) Can you please talk about how the children or educators use mobile devices outside? Have you noticed any unique projects or outcomes that were not planned?

8) What ways do you integrate indoor and outdoor learning experiences? For example, sometimes young children are very interested in taking photos outdoors and then educators help children to use the photos for a collage, or digital collage/journal.

9) Can you share some stories about children's questions or observations that are brought forth through environmental inquiry or through use of mobile devices?

10) How have mobile devices helped explain or support connections to land in your programming?

11) How do mobile devices help build knowledge as a community?

Appendix J: Categories Developed from Codes

Research Question 1: Mobile Device Use

Code	Categories	References	Code	Categories	References
Applications	Lower Order Thinking Skills	3	Documentation	Ease of Use	4
	Administrative Tasks	9		Efficiency	5
	Communication	12		Children's Interactions	3
	Educational Use	19		Photos	8
	Non-academic Use	1	Outdoor	Land	19
	Other	2		Mobile Device	9
Explore	Discovery	5		Perceptions	2
	Environmental Inquiry	12		Safety	1
	Safety	2		Other	3
	Mobile Device	10	Play	Play-based Learning	5
Photos	Documentation	6		Engagement	5
	Visual Aids	3		Digital Play	4
	Non-academic	3		Mobile Device supporting Play	12
	Safety	2		Environmental Inquiry	3
	Learning	7	Behaviour Change	Environmental Inquiry	1
	Identity/Belonging	2		Mobile Device Use	7
Skills	Lower order thinking	3	Online Safety	Cybersafety	4
	Research Using Mobile Devices	11		Social Media	3
	Digital Skills	7			
	Safety	2			
	Professional	5			

	Community Connections/Communication	15
	Social & Cultural	6
	Inquiry & Mobile Devices	5
	Developmental Skills	8

Research Question 2: Barriers

Code	Categories	References	Code	Categories	References
Cultural Appropriation	Taught by Indigenous people	2	Exposure	Indigenous ways of learning	10
	Respect	3		Environmental Inquiry	2
	Valid Information	3		Valid Information	4
	Cultural Knowledge	2	Lack of PD	How to teach using mobile devices	6
Fear	Natural Environment	1	Management-Barrier	Indigenous Connections	2
	Technophobia	6		Posting photos online	1
	Policy/Rules	6		Guest speaker	1
	Cultural Appropriation	1	Passive	Non-academic	3
	Children's Fear	1		Sedentary	2
	Social media/society	3	Resources	Knowledge/Training	2
Policy - barrier	Indigenous Perspectives	2		Adult Support	3
	Restrictions for mobile devices	8		Time	5
	Resources	1		Devices	1
	Community Connections	1		Proper Clothing	1

Time	Teach children to use mobile devices	1	Resistance	Screen Time	3
	Administration	1		No devices for young children	3
	Environmental Inquiry	4		Environmental Inquiry	1
	Professional Development/ Planning	2		Management Support	1
				Societal Norms	5
				Access to devices at home	2

Research Question 3: Supports

Code	Categories	References	Code	Categories	References
Activities	Environmental Inquiry	32	Community	Indigenous Perspectives	12
	Safety	1		Communicate via mobile devices	21
	Stewardship	5		Environmental Inquiry	6
	Culturally Responsive Education	8		Community Connections	6
	Mobile Device Use	13	Confidence	Teaching	2
Culturally Appropriate	Indigenous Perspectives	16		Professional Development	2
	Connections to the land	11	Culture	Elders/Community	6
	Environmental Inquiry	6		Mobile Device Support	7
	Mobile device support	3		Societal norms	7
	Validity	1		Land	5

				Connection	
Experience	Mobile device use - ECEs	4		Generational	3
	Time to offer experiences	1		Teaching – Identity/Ethnicity	5
	Digital skills for ECEs	2	Land	Environmental Inquiry	31
	Society – judgement for device use	1		Stewardship/ Respect for the Land	8
	Ethnicity	1		Safety	2
Knowledge	Lower order thinking	2		Societal Norms	1
	Generational	2		Community Connections	4
	Validity	3		Mobile Device Use	1
	Indigenous Perspectives	1		Cultural connections	2
	Inquiry	4	Management-Support	Autonomy in workplace	1
Professional Development	Mobile device use – teaching and learning	5		Support mobile device Use	3
	ECE digital skills/knowledge	4	Planning	Lower order thinking	2
	Indigenous Perspectives	4		Needs Assessment	3
Policy - Support	Ontario Curriculum – Indigenous Perspectives	1		Community Partners	2
	Mobile Devices	1			