

**Early Childhood Education for Sustainability: A Mixed Methods Approach to Generate
Professional Development for Educators**

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Abstract

Our world faces environmental and socio-cultural problems that will impact young children in the long term. Therefore it is important to advance research in the field of Early Childhood Education for Sustainability (ECEfS) to support educators in working alongside young children, families, and communities toward a more sustainable future. The purpose of my study was to create professional development to support educators in engaging in ECEfS with the children in their care. The participants were 14 early childhood educators who worked with young children between the ages of 1.5 and 5 years old. My study was grounded in social constructivist theory and systems theory, and was informed by the work of influential scholars in ECEfS. I adopted a complex mixed methods design that consisted of four research phases. In Phase 1, I collected qualitative and quantitative data about the educators' ECEfS previous knowledge and practices by means of the adapted Environmental Rating Scale for Sustainable Development in Early Childhood and interviews. In Phase 2, I merged the qualitative and quantitative data, created and implemented ECEfS professional development, and let 2 months pass for the educators to apply the strategies learned in the professional development. In Phase 3, I conducted a second implementation of the scale and a second round of interviews. In Phase 4, I performed a final merged interpretation of the data. Results of the study indicated that some of the educators' ECEfS reported practices improved slightly after the professional development while other ECEfS practices decreased due to strict COVID-19 restrictions. Although the modest improvements in the educators' ECEfS practices after the professional development point to the need for a deeper and broader engagement with ECEfS, the educators' reported engagement with ECEfS also provided evidence about the importance of professional dialogues, reflective practices, and loose parts as mediums to engage in ECEfS. A key implication is that some ECEs are engaging in ECEfS despite not labeling their practices as such.

Key words: early childhood, Early Childhood Education for Sustainability (ECEfS), education for sustainability, professional development, sustainability

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List of Acronyms

2030 ASD	The 2030 Agenda for Sustainable Development
BCME	British Columbia Ministry of Education
DESD	Decade of Education for Sustainable Development
ECE	Early Childhood Education, Early Childhood Educator
ECEfS	Early Childhood Education for Sustainability
ECERS	Early Childhood Environment Rating Scale
ECRDT-UNB	Early Childhood Research and Development Team at the University of New Brunswick
ERS-SDEC	Educational Rating Scale for Sustainable Development in Early Childhood
HDLD	How does Learning Happen? (Ontario Pedagogy for the Early Years)
NSDE&ECD	Nova Scotia Department of Education and Early Childhood Development
OME	Ontario Ministry of Education
OMEP	World Organization for Early Childhood Education
PD	Professional Development
RECE	Registered Early Childhood Educator
RUNHE	Report of the United Nations Conference on the Human Environment
SDG	Sustainable Development Goals
TD-ECEfS	Transnational Dialogues in Early Childhood Education for Sustainability
UNDRC	United Nations Declaration of the Rights of the Child
UNESCO	United Nations Educational, Scientific and Cultural Organization
WCED	World Commission on Environment and Development

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Chapter 1

Introduction

In this chapter, I begin with an overview of the dissertation in which I highlight key elements of the study. I continue by presenting the two theories upon which I base my study, namely social constructivist theory and systems theory. Next, I explain the conceptual framework to illustrate how the different elements of the study fit together. Then, I outline the goal of the study, the overarching research questions, and the sub-questions for each of four research phases. Thereafter, I provide a summary of the limitations of the study, which are explained with greater detail in Chapter 6. To conclude, I outline the structure of the dissertation by introducing the content included in each of the six chapters.

Overview

It is widely acknowledged that our world faces urgent problems that negatively impact natural environments and socio-cultural relationships (Siraj-Blatchford et al., 2010). We have clearly passed the point when we can dismiss such matters as ordinary citizens and much less as educators (Huggins & Evans, 2018). Although issues of sustainability concern everyone, children have greater stakes because they will stay longer on the planet (Elliot & Davis, 2009) and because they are typically hit the hardest by disasters and social injustices (Siraj-Blatchford & Pramling Samuelsson, 2016). Hence it is important to advance research in the field of Early Childhood Education for Sustainability (ECEfS) to support educators in working alongside young children, families, and communities to search for avenues toward a more sustainable future.

Building on my experience as an early childhood educator and on my current work as a college instructor in early childhood education (ECE) programs, I created professional development (PD) to support educators in engaging in ECEfS with children under their care. The participants of the mixed methods study were fourteen in-service early childhood educators who provided full-time care for children between the ages of 18 months and 5 years, and who

worked in a variety of early learning settings including kindergarten classrooms, childcare centres, and home care programs.

The research process was informed by the work of leading scholars in the field of ECEfS (e.g., Davis & Elliot, 2014; Pramling Samuelsson & Kaga, 2008), and by official Ontario early childhood education documents as well as international documents such as the *UN Declaration of the Rights of the Child* (UNCRC, United Nations, 1989) and the *Decade of Education for Sustainable Development* (DESD, UNESCO, 2005) that highlight the role of children as agents for social and environmental change. My study was grounded on social constructivist theory to honour the pedagogical practices in the early years and on systems theory to emphasize the interrelated nature of current socio-cultural, economic, and environmental issues.

As an experienced early childhood educator, I approached the research process from an insider perspective. Although a continuum is favoured over an insider-outsider researcher dichotomy (Mercer, 2007), I refer to myself as an insider or as fitting on the insider end of the continuum because I have been immersed in the ECE sector for the past 16 years in various capacities. My position as an insider allowed me easier access to participants, a better understanding of their practices and the possibility of establishing stronger relationships of trust (Kirpitchenko & Voloder, 2014). However, considering that outsider researchers can be better positioned than insider researchers to question taken-for-granted knowledge and practices during the research practices (Kirpitchenko & Voloder, 2014), I engaged in an ongoing reflexive process (Pillow, 2003), which involved being critically conscious of how my position and interests influenced every part of the research process.

The results of the study will contribute to the limited yet growing research in the field of ECEfS (Somerville & Williams, 2015b). The PD, which was shaped in collaboration with the participating educators, may ultimately be implemented with other educators to encourage the early childhood education community to engage in ECEfS perhaps in a more systematic and

purposeful manner. Lastly, the study provided evidence that challenges widespread views that children are not capable of participating in ECEfS (Elliot & Davis, 2009).

Influential Theories

The two theories that informed my research were social constructivist theory and systems theory. Although both theories concern the relationships among ECE stakeholders, the former was emphasized when considering the learning dynamics that took place during my study and the latter concerned more the systemic nature of issues related to sustainability. Both theories complemented each other throughout the study, as I explain in the following sections.

Social Constructivist Theory

Social constructivist theory, based on Vygotsky's (1978) ideas about the importance of play, active learning, socially-mediated knowledge, and the role of a more knowledgeable other, has been highly influential in the field of ECE (Dietze, 2006). Similarly, in ECEfS, social constructivist notions often play a key role throughout the research process. For instance, concerning the social aspect of the construction of knowledge, Ji and Stuhmcke (2014) indicated that in line with Vygotsky's (1978) social constructivist perspectives, "reflective thinking and interactions between the teacher and child, and child and child, are crucial factors in the success of a [n ECEfS] project" (p. 161). Ji and Stuhmcke also argued that engagement in issues of ECEfS is a socially constructed process that requires participation of as many stakeholders as possible such as parents and community members in addition to children and educators. Thus, in my study, sociocultural relationships among stakeholders in early childhood education were highlighted as a part of the ECEfS professional development.

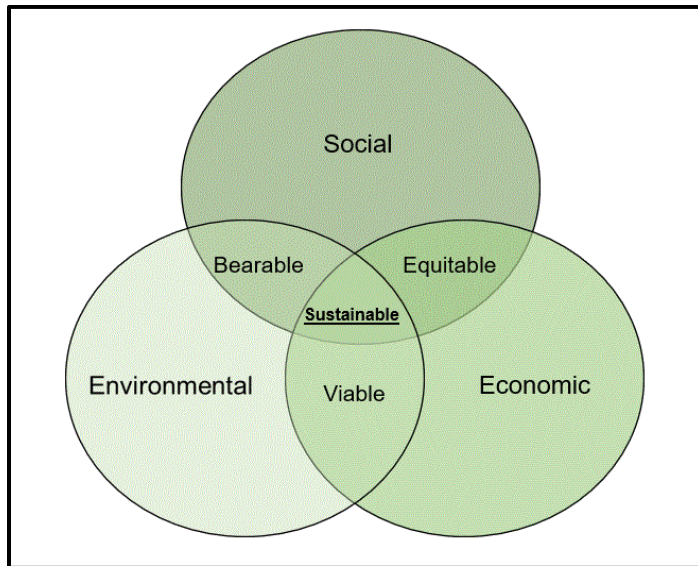
Another important idea from social constructivism that was part of the research process is the belief that learners take an active role in constructing their knowledge. On this subject, Driscoll (2005) indicated that from a constructivist perspective, learners are viewed as active organisms as opposed to "empty vessels waiting to be filled" (p. 387). In ECEfS, the active engagement of children and educators in taking action to create sustainable pathways is critical

(Huggins & Evans, 2018). Consequently, throughout the research process, I supported the participating educators in reflecting on and engaging with the principles of ECEfS with the children in their care. I supported the educators by building on initiatives they already had in place or by developing new ones relevant to their reality.

Social constructivism also supports “the idea that human beings learn through interactions with more competent others, who provide feedback to help new ways of thinking about the world” (Hesterman, 2018, p. 142). During my research, I acted as the more competent other for the early childhood educators on the topic of ECEfS by facilitating the PD and providing additional support when and as needed. The educators in turn took the role of the more competent others when implementing strategies to engage children in ECEfS and promoting the children’s sense of agency. I also highlighted the role of families and members of the community serving as more competent during the PD when, for instance, I presented a study conducted by Fuji and Izumi (2008) about a silkworm project in which a grandmother shared her expertise at embroidering kimono belts using the silk produced by the worms with children and educators.

Systems Theory

The notions proposed by systems theory complemented the ones from social constructivist theory in my study. To illustrate, the idea of prioritizing relationships over isolated entities as proposed by systems theory (Capra, 1997) is inherent to education for sustainability because the major problems faced by the world are interconnected and interdependent and cannot be understood in isolation. As a result, ECEfS is concerned with the mutual dependence of social, economic, and environmental systems (Siraj-Blatchford & Pramling Samuelsson, 2016) as illustrated in Figure 1.

Figure 1*The Three Pillars of Education for Sustainable Development*

Note: This diagram was adapted from Siraj-Blatchford, 2016b, p. 2.

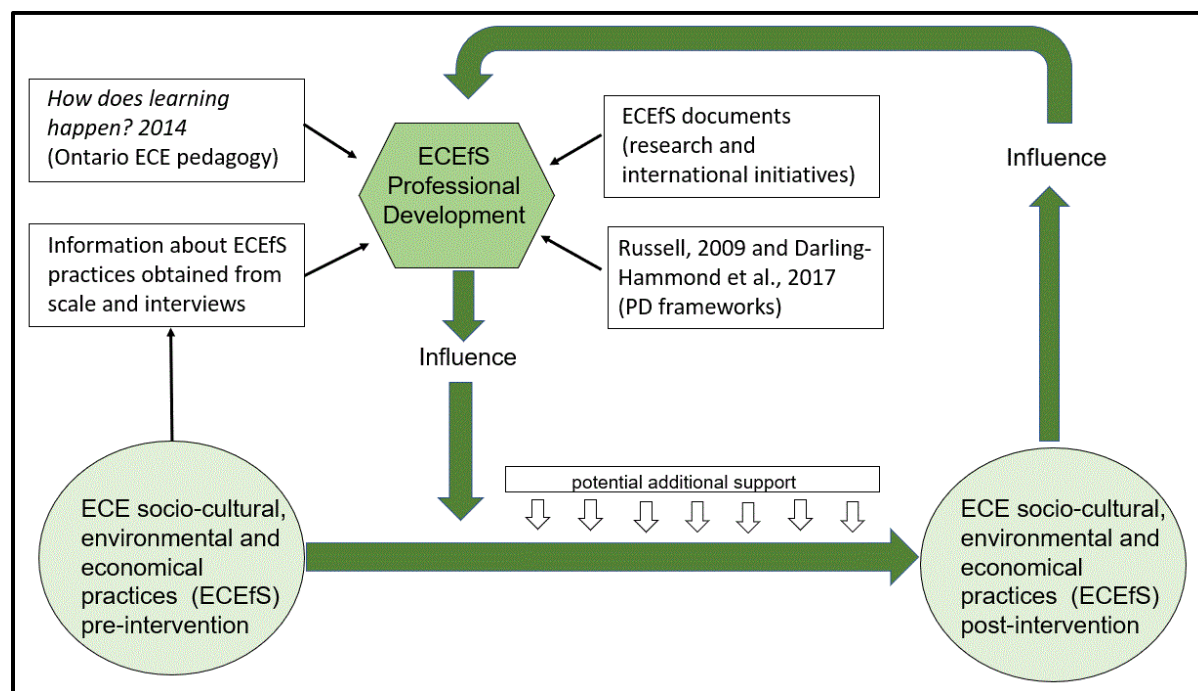
The emphasis on relationships that is highlighted by systems theory is also integral to research in ECEfS because despite a wide range of concepts and interpretations, ECEfS is primarily concerned with children working together with educators, families, and community members (Engdahl & Ärlemalm-Hagsér, 2014). On this topic, Mackey (2014) highlighted “the importance of building responsive and reciprocal relationships within early childhood learning communities” (p. 181). Mackey also pointed out children’s capacity and sense of agency to influence “others and the broader human and ecological systems they inhabit” (p. 192). Although my study focused on developing and providing PD for educators, the strategies emphasized in the PD and the additional support I provided highlighted both the importance of relationships among ECE stakeholders (children, educators, families, and members of the community) and children’s sense of agency to influence sociocultural and natural systems.

Concerning the impact of ECEfS initiatives, Ferreira and Davis (2014) argued that systemic thinking is required in ECEfS to generate change towards a more sustainable future. Efforts have traditionally focused on one part of the early childhood systems, such as individual

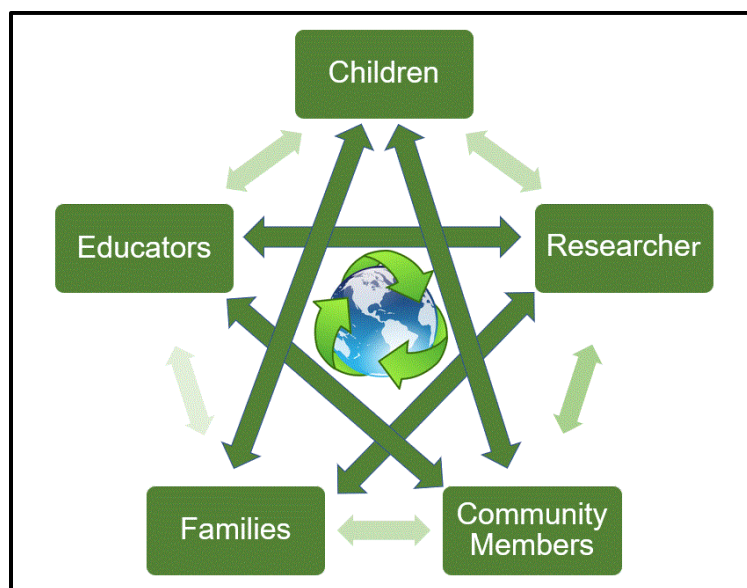
teachers or individual childcare centres. In reality, for large scale change to occur, all ECE stakeholders need to be involved. Ferreira and Davis state that despite the complexity of early childhood education systems (e.g., levels of governance, models of delivery, number of stakeholders), small-scale changes need to be linked to a large-scale movement for education for sustainability to have an effect. Although my study was a small-scale research project, it was still informed by a systems approach in regard to its expected impact because it was an initial effort to create PD that will serve as a base to generate a larger scale movement.

Conceptual Framework

Figure 3 shows how the main elements of the research process connected with each other. The blue circles illustrate the educators' practices before and after the implementation of the PD to support practices of ECEfS. The PD I created is represented by the gray hexagon, which is surrounded by four rectangles representing the following elements that informed the PD: (a) principles of *How Does Learning Happen? (HDLH)*, Ontario Ministry of Education, 2014), (b) ECEfS research and international initiatives, (c) strategies outlined in the PD frameworks by Russell (2009) and Darling-Hammond et al. (2017), and (d) information about the educators' ECEfS practices obtained from the implementation of the adapter ERS-SDEC scale and semi-structured interviews. As illustrated by the vertical arrow coming out of the hexagon, I examined how the PD influenced the educators' practices and then in turn, how the educators' practices influenced the PD. Figure 2 represents the abstract patterns of relationships that occurred during the research process among educators, families, community members and me.

Figure 2*Conceptual Framework for the Development of PD in ECEfS*

The interconnection and interdependence of stakeholders depicted on Figure 3 with blue arrows and rectangles align with both constructivist theory and systems theory. However, the world icon in the middle, which represents the engagement of stakeholders with the concept of sustainability, aligns better with systems theory because this theory transcends the realm of human relationships proposed by constructivist theory to incorporate the notion of interconnection with a larger universe of living things like plants and animals as well as non-living things such as water and rocks.

Figure 3*Relationships among Stakeholders***Goal and Research Questions**

The main goal of my mixed methods study was to develop meaningful PD to support early childhood educators in engaging in ECEfS with the children under their care. Plano Clark and Badiie (2010) noted that in mixed methods, research questions can be formulated in different manners, summoning qualitative methods, quantitative methods, or both. I selected the latter to formulate my central research question to emphasize the integrated mixed method approach I adopted. Consequently, the overarching questions guiding the study were:

How did ECEfS PD impact the practices of early childhood educators?

How did early childhood educators' practices impact ECEfS PD?

Creswell and Plano Clark (2018) recommended that in mixed methods research, researchers advance quantitative and qualitative research questions to highlight the results from quantitative and qualitative datasets. Consequently, for 2 phases during which I collected independent sets of qualitative and quantitative data, I created quantitative and qualitative sub-questions. For example, how did the scores in the scale change after the PD? (Quantitative

question) and how did the reported practices in ECEfS of the educators change after the PD? (Qualitative question). Conversely, for two during which the data sets were merged and interpreted jointly, I crafted mixed methods sub-questions. For instance, how did participating in the PD impact the educators' ECEfS practices short term? (Mixed question).

My research process was divided into the four phases that I will describe with greater detail in Chapter 3. Accordingly, each phase was guided by a set of sub-questions as follows:

- Phase 1 (Qualitative and quantitative data collection and analysis): What did the participating educators already know about ECEfS? What practices related to ECEfS, if any, did the educators already carry out? What sections and sub-sections in the adapted Educational Rating Scale for Sustainable Development in Early Childhood (ERS-SDEC) were scored the lowest? What sections and sub-sections were scored the highest?
- Phase 2 (Design and execution of PD with time to implement strategies): What knowledge and practices about ECEfS needed be emphasized in the PD? What additional support was required by the educators to engage in ECEfS?
- Phase 3 (Second qualitative and quantitative data collection and analysis): How did the scores in the adapted ERS-SDEC change after the PD? How did the reported views and practices of the educators change after the PD?
- Phase 4 (Final merged interpretation): How did participating in the PD impact the educators' ECEfS practices short term?

Limitations of the Study

In this section, I summarize four limitations of my study, which are discussed in greater detail in Chapter 6. The first limitation refers to the inability to generalize the results of the study to the wider ECE community. The second limitation is about the educators' workplaces, which are not fully representative of the collective of early learning settings. The third limitation concerns my biases as an experienced RECE, which I addressed with the ongoing support of

my supervisor and by engaging in a process of self-reflection (e.g., Rubin & Rubin, 2014). The fourth limitation pertains to the educational credentials of the educators, who were all fully qualified with extensive experience in ECE, which is not representative of the ECE workforce that includes new graduates and staff without ECE qualifications.

Structure of the Dissertation

This dissertation is composed of five chapters. In this introductory chapter, I started by providing an overview of my study. Then, I highlighted ideas from social constructivist theory and systems theory that informed my study. I continued by outlining the goal, the research questions, and the limitations of my study. I concluded by describing the structure of the dissertation.

In Chapter 2, I provide an overview of ECEfS globally and in Canada. Then, I outline four main reasons for young children to engage in ECEfS and describe international documents and initiatives that conceptualize ECEfS. Next, I propose a practical classification of empirical ECEfS research. Thereafter, I present connections between principles of ECEfS and the content of provincial early learning frameworks in Canada. I continue by outlining the pedagogical foundations and the principles of PD that informed the process of creating PD in ECEfS. Lastly, I summarize the characteristics of the ERS-SDEC, which I adapted to serve as a quantitative data collection instrument, and I review ten studies that were conducted to test the ERS-SDEC in different countries around the world.

In Chapter 3, I explain the pertinence of adopting a mixed methods approach to conduct my study and make connections between commonly identified benefits and challenges of mixed methods research and my study. Then, I outline the design of my study, which consisted of two basic convergent designs in succession. To follow, I explain the process by which I recruited the participants of the study. Next, I describe each of the four research phases of my study and the quantitative and qualitative data collection instruments that I used. To conclude, I present a

diagram featuring a synopsis of the study to illustrate how all the methodological elements, including procedures and expected products, fit together.

In Chapter 4, I start by presenting information related to the participants' professional qualifications and their workplaces. Then, I continue by presenting separately the quantitative and qualitative results obtained in Phase 1 of my study. To follow, I conduct a merged interpretation of the quantitative and qualitative data, which corresponds to Phase 2 of my study. Still in Phase 2, I justify how the merged interpretation of the data informed the development of ECEfS PD for my participants. Next, I present the quantitative and qualitative results from the second round of data collection conducted in Phase 3 of my study. Lastly, I conduct a final merged interpretation of the data, which corresponds to Phase 4.

In Chapter 5, I respond separately to the two overarching questions of the study: How did ECEfS PD impact the practices of early childhood educators? How did early childhood educators' practices impact ECEfS PD? To address the questions, I examine all the quantitative and qualitative datasets collected and analyzed in the four phases of the study, and I make connections between the results and relevant literature. I conclude the chapter making connections between the findings and the two theories that informed my study, namely social constructivist theory and systems theory.

In Chapter 6, I present an overview of the dissertation in which I highlight the main elements of my study. Then, I summarize the most important results for each of the four research phases. Thereafter, I outline the limitations of my study along with strategies to overcome some of the limitations. Next, I explain the implications of my study for early childhood education and the contributions for the field of ECEfS. To follow, I describe directions for future research in ECEfS that became evident in the context of my study. Lastly, I present my concluding remarks in which I express my thoughts about the importance and the future of ECEfS.

Chapter 2

Literature Review

In this chapter, I begin by providing an overview of ECEfS globally and in Canada. I continue by explaining the reasons for young children to engage in ECEfS and by describing the influence of international documents and initiatives on ECEfS. Then, I turn my attention to the empirical research and I propose a practical classification of ECEfS that fits the pragmatic nature of my study. Next, I discuss the reasons to advance ECEfS in Canada by establishing connections between the provincial early learning frameworks and ECEfS principles. Thereafter, I outline the pedagogical foundations and principles of professional development to highlight the theory that informed the process of creating professional development in ECEfS. I conclude by describing the features of the Environmental Rating Scale for Sustainable Development in Early Childhood (ERS-SDEC), which was the base for the development of my quantitative data collection tool, and by reviewing studies conducted to test the ERS-SDEC in 10 different countries.

Overview of ECEfS

ECEfS has its historical origins in the early 1990s when a small number of researchers, mostly in the United States and Australia, established a connection between environmental issues and early childhood education (Davis & Elliott, 2014). The term environmental education was progressively replaced by education for sustainability to integrate economic and socio-cultural dimensions (Ärlemalm-Hagsér & Pramling Samuelsson, 2018), expanding on the definition of sustainability first introduced by *Our Common Future* (also known as the *Brundtland Report*; World Commission on Environment and Development, WCED, 1987). The formation of the Brundtland Commission was an initiative created by the United Nations to combat the deterioration of natural resources and human relationships (Thomsen, 2013). Although the Brundtland Commission is credited for popularizing the concept of sustainable development as the “development that meets the needs of the present without compromising the ability of future

generations to meet their own needs” (WCED, 1987, p. 54), that definition was just the starting point of education for sustainability. As discussed by the delegates in an international workshop on ECEfS held in Gothenburg in 2007, sustainability in early childhood education is not limited to one definition because it is a developing concept that should be considered a learning process, rather than a product (Pramling Samuelsson & Kaga, 2008).

Despite a wide range of concepts and interpretations, ECEfS is concerned primarily with children internalizing values of sustainability in their formative years (Siraj-Blatchford et al., 2010) and with children working alongside educators, families, and community members to seek solutions to local issues (Engdahl & Årlemalm-Hagsér, 2014) and sometimes also larger scale issues (Engdahl & Rabušicová, 2011; Philips, 2014). With a documented modest number of publications in the first decade of the new millennium (Davis, 2009), Somerville and Williams (2015) identified a subsequent increase in the ECEfS literature in the following six years. No new review of the ECEfS literature has been published after 2015 but even with a rise in the number of international publications identified by Somerville and Williams, only one article and two chapters containing Canadian ECEfS content have been published to date. MacDonald (2015) wrote an article about a study on sustainable curriculum development conducted in a childcare center in Burnaby, British Columbia. Harwood et al. (2020) authored a chapter in which four early childhood academics, two of whom are Canadian, questioned post-colonial practices and shared personal stories with a land/place-based lens. In the chapter, the two Canadian authors reported on young children learning alongside Elders in childcare centres located in Beaubears Island, New Brunswick and in a nature kindergarten located in Sooke, British Columbia. Nelson and Hodgins (2020) published second chapter about a participatory research project in which they joined children and educators at exploring their relationships with trees in Victoria, British Columbia while advocating for a curriculum and pedagogy as a “lively, contingent, more-than-human entanglement” (p. 151).

The small number of published literature with Canadian content does not correspond to a lack of practices related to ECEfS. Davis and Elliott (2014) remarked that the field of ECEfS has been mostly advanced by practitioners. Accordingly, in a research project that I completed during the winter semester of 2019 in the context of a doctoral course, four experienced professors of early childhood education (ECE) reported on a wide range of ECEfS practices in Ontario and Quebec. Consequently, a general research-led reorientation of ECEfS as suggested by Huggins and Evans (2018) would be particularly relevant in Canada, building on educators' practices and developing a more cohesive academic approach to ECEfS.

Why Young Children Should Engage in ECEfS

Drawing on the developing ECEfS research mentioned in the previous section and from other related literature (e.g., Carson, 1965; Kellert, 2005; Naess, 1996), I identified four main reasons for which children should engage in and learn about ECEfS: sense of agency, innate curiosity, biophilia, and a disposition for spontaneous experiences. Agency is defined as “a person’s active initiative toward the achievement of a goal or actions undertaken in order to have an impact on someone or something” (von Braun, 2017, p.18). The significance of children’s agency is not a new topic; as early as the 18th century, Pestalozzi elaborated on young children’s abilities to become their own agents of change and their capacities to help themselves (von Braun, 2017). However, in ECEfS, despite a general intent to promote children’s agency, the concept of agency is often understood as merely taking part in an activity and consequently, children are not truly conceived as agents for change (Ärlemalm-Hagsér, 2014). Additionally, there is still a lack of consensus among researchers about what constitutes children’s agency as well as a deficit of empirically anchored studies (Caiman & Lundegard, 2014). Mackey (2012) and Caiman and Lundegard (2014) were among the few researchers who conducted empirically grounded studies to investigate young children’s agency while engaging in issues of sustainability. The results of these studies underscored the importance of recognizing young children as agents for change but highlighted the fact that children will only

develop their sense of agency through experiential learning, and by having opportunities to make decisions and take action in issues that concern them. Despite this identified deficit in studies about children's agency in ECEfS, Ärlemalm-Hagsér (2014) indicated that there is a growing number of international studies that consider children's perspectives, views, and actions (e.g., Duhn, 2012; Engdahl & Rabušicová, 2011). However, Ärlemalm-Hagsér (2014) also pointed out that it is necessary to keep in mind that young children are still dependent on the objectives and issues their educators consider important and on how the educators view children and childhood in general.

Another argument for promoting practices of sustainability in ECE is children's innate curiosity about their environment. As early as the publication of a *Sense of Wonder* (Carson, 1965), children's natural curiosity was acknowledged as a means to support their connection to the natural world and their appreciation for life on Earth. On this topic, Herbert (2008) warned that the sense of curiosity that children experience while interacting with the natural world (i.e., by observing and caring for plants and animals) is denied to children who spend their days in sterile buildings with structured schedules and artificial educational materials. Another important point about curiosity in the context of ECEfS is that it is directly connected to the children's sense of agency as it "can be a powerful motivator of behaviour that stimulates children to initiate actions, make social connections, or access resources to explore and make sense of their world" (Dietze & Kashin, 2015, p. 204). For instance, in a study conducted in a kindergarten setting in Greece, the children's curiosity was used as a catalyst to support their search for solutions to energy issues (Pliogou et al., 2017).

Two additional concepts associated with ECEfS that highlight early childhood as a critical period of time to establish connections to nature are *biophilia* (Kellert, 2005) and *spontaneous experiences* (Naess, 1996). *Biophilia* is defined as "humans' inherent affinity for the natural world" (Kellert, 2005, p. 13) although Chawla (2007) cautioned that for biophilia to develop and the associated desire to protect the environment, children must be given

appropriate opportunities to engage with the natural world. *Spontaneous experiences* refer to moments of deep connection with the natural world that allow for the realization that nature is more than the sum of its parts (*nature's gestalt*) (Naess, 1997). Naess argued that young children, to a much higher extent than adults, are prone to engage in spontaneous experiences with the world around them, and that it is not through reason that a person develops a deep regard for the natural world, but rather by being immersed in and connected with free nature. Unfortunately, despite children's innate dispositions to connect with nature highlighted by the concepts of biophilia and spontaneous experiences, in the context of industrialized societies, the opportunities for such experiences to take place are progressively decreasing. Hence one more reason to initiate and build on ECEfS projects, which could be conceptualized on the United Nations documents and initiatives that I discuss next.

United Nations Documents and Initiatives

As early as 1972, in the *Report of the United Nations Conference on the Human Environment* (RUNHE, United Nations, 1972), which was the product of the first world conference on the environment, the United Nations highlighted the importance of education in tackling environmental issues (e.g., Principle 19). Education is still considered essential by the United Nations at confronting environmental and sustainable issues (Grindheim et al., 2019). The following international documents and initiatives conceived by the United Nations relate to and impact ECEfS at a global level.

The United Nations Convention on the Rights of the Child

The *United Nations Convention on the Rights of the Child* (UNCRC, United Nations, 1989) is the most widely cited international document in ECEfS (e.g., Johansson, 2009; Mackey, 2012; Smith, 2007). The UNCRC acknowledges the importance of respecting others and the natural environment. To illustrate, Article 29 states that the education of children should be geared to “the development of respect for the natural environment” (p. 9). Pramling Samuelsson and Kaga (2008) went as far as to recommend the use of the UNCRC as a

common theoretical foundation to develop ECEfS worldwide. Considering that Canada is a signatory of the *UNCRC*, educators throughout the country are mandated to put into practice its directives and ECEfS appears to be an ideal avenue to do so. As observed by Warwick et al. (2018), promoting the children's engagement in issues of ECEfS and building on the stewardship endorsed by the *UNCRC* will help young children acquire the drive and knowledge to pursue more sustainable pathways.

The Decade of Education for Sustainable Development

The United Nations declared 2005 to 2014 the *Decade of Education for Sustainable Development (DESD)* (UNESCO, 2005) to build on the principles outlined in the Agenda 21 created in Rio de Janeiro as the product of the Earth Summit in 1992 (Engdahl, 2015). Even if the *DESD* was geared to all levels of education, it is noteworthy that the final document of the decade underlines the role of ECEfS by pointing out, among other statements, that “young children are both current and future citizens with already existing capabilities to shape sustainable societies” (UNESCO, 2014, p.78). Elliot and Davis (2009) indicated that it is unlikely that educators around the planet heard of the *DESD*. Elliot and Davis also argued that educators should have been among the first involved participants because young children are directly impacted by the state of the earth and by the sensible use of its resources. In spite of this generalized unawareness about the *DESD*, several important advancements did occur in ECEfS such as the development of four large scale projects sponsored by the World Organization for Early Childhood Education involving 44,330 young children from 28 different countries (Engdahl, 2015). Canada participated in the first of the four projects, which points to an interest of Canadian educators to engage in projects of ECEfS but unfortunately also to a lack of sustained commitment. Another initiative that took place as a result of the *DESD* was an international workshop on ECEfS in Gothenburg in 2007 that resulted in the creation of a document with practical recommendations for educators and samples of ECEfS projects (Pramling Samuelsson & Kaga, 2008). Despite the participation of a Canadian delegate in the

workshop, no Canadian contributions were included in the final document. Fortunately, there is currently another favourable international platform for future ECEfS Canadian contributions such as the initiative I discuss next.

The 2030 Agenda for Sustainable Development

The *2030 Agenda for Sustainable Development* (2030 ASD, United Nations, 2015) is an initiative currently in place to address the need to promote sustainable change in its three dimensions: social and cultural, economic, and environmental (Warwick et al., 2018). The *2030 ASD* is composed of 17 sustainable development goals (SDG) with 169 targets intended to be achieved by 2030. The goals and targets include specific mentions of the importance of early childhood education, child protection, and poverty reduction (United Nations, 2015). Although this initiative is still in its initial phase because the goals are set to be achieved by 2030, the SDG, along with the *UNCRC* are important documents to consider in conceptualizations of future research on ECEfS worldwide. Their potential contribution is particularly important in Canada where research in ECEfS is yet to be built upon. Children and families in Canada certainly have a key role to play in contributing to more sustainable societies (MacDonald, 2015) and the *2030 ASD* would constitute a plan of action for researchers and practitioners to collaboratively develop and enact ECEfS practices in early learning settings.

Empirical Research in ECEfS

While acknowledging that ECEfS is a field of study that has been mostly advanced by practising early childhood educators as opposed to researchers and theorists, Davis and Elliot (2014) argued that there is a need to further develop an academic stance to examine ECEfS practices and approaches more profoundly. In the following section, I discuss academic advancements in the field of ECEfS and more specifically empirical research to set the scene to suggest a classification of ECEfS approaches that suits the purpose and scope of my study.

Research Approaches to ECEfS

The research in ECEfS is complex, dynamic, and heterogeneous (Davis & Elliot, 2014). As a result, there are no clearly defined classifications or approaches to ECEfS. In the first book about international research on ECEfS, Davis and Elliot (2014) indicated that the authors of the empirical studies adopted a variety of theoretical frames such as social constructionism, conflict theory, systems theory, and critical theory with an equally wide range of methodological approaches including, among others, ethnography, action research, and case study. In a follow up book published six years later, Elliott et al. (2020) stated that this set of studies had a stronger post-colonial focus. Elliot et al. also indicated that approaches that were in their early days in the previous volume such as Deleuzian rhizomatic methodologies and post-humanistic perspectives are present in the second volume.

In a review of the literature of ECEfS, Somerville and Williams (2015) identified three major categories based on the theoretical orientation of the articles: connection to nature, children's rights, and post-human frameworks. In the same article, Somerville and Williams also proposed a categorization by methodology: positivist/quantitative, interpretive, critical, post-human and advocacy. Despite the academic merits of the aforementioned typologies, in the context of my study, I propose a pragmatic classification based on the main medium by which children are prompted to engage in issues of sustainability as follows: arts-based, Indigenous-based, nature-based, and project-based. I arrived at this classification by carefully examining the published literature of ECEfS while aiming at developing a meaningful and practical classification for practising educators. This classification of published ECEfS is not exhaustive and the boundaries among the proposed approaches are neither clear nor definite. It is possible that studies fall under more than one category or that studies not fit well under any of them. However, this suggested classification encompasses a large amount of empirical research involving young children actively engaged in ECEfS, which allowed practising educators to better understand the practical side of research in ECEfS and to familiarize themselves with

different types of manners to engage in ECEfS with young children. Furthermore, this classification revealed practical pedagogical patterns in the ECEfS empirical research, which became an important part of my study as I developed ECEfS professional development. In the following sections, I present a summary of my four proposed categories of approaches to ECEfS and elaborate on which approaches appear to be well suited for researchers to advance empirical research in ECEfS while joining forces with early childhood practitioners in Canada.

Arts-based Approaches

The first category of ECEfS approaches is arts-based and refers to studies in which creative arts such as storytelling, singing, painting, or sculpting are used as means to engage children in issues of sustainability (e.g., Luff, 2018; O’Gorman, 2014, 2020; Phillips, 2014). Luff (2018) argued that in ECEfS, the arts provide a meaningful context for children to express their thoughts and feeling beyond words as well as a medium to connect profoundly with aesthetic experiences. O’Gorman (2020) challenged a traditional and protective approach to teaching young children by proposing a risky, bold, transformative, and courageous approach to ECEfS through the arts to question anthropocentric worldviews and foster young children’s agentic responses. Additionally, O’Gorman (2014) asserted that art experiences create opportunities to develop critical thinking and problem solving skills, to raise awareness of social issues, and even to alter the way in which children and educators perceive the world. However, Ward (2013) highlighted that educators often lack confidence at teaching arts subjects and struggle converting factual information into creative experiences. The challenges underscored by Ward point to the complex pedagogical task of developing training in sustainability and art simultaneously. Therefore, it may be more convenient to include creative arts elements as optional when advancing research in ECEfS if researchers and educators consider them pertinent but not necessarily as the main focus of research studies in ECEfS.

Indigenous-based Approaches

The second category is Indigenous-based and refers to research studies with a strong emphasis on Indigenous knowledge systems (e.g., Green, 2017; Miller, 2014; Ritchie, 2012a, 2012b; Somerville, 2015). Indigenous-based approaches should have a center stage in ECEfS because they advance important dialogues about culture, diversity, and equity in early years settings beyond dialogues about the environmental, which are more commonly addressed (Miller, 2014). Indigenous worldviews also offer strong counter-narratives to the notion of humans being disconnected from nature and to colonial discourses that still impact the research and practices in ECEfS (Harwood et al., 2020). Additionally, Indigenous knowledge systems originated from the long-term mindful inhabitation of the land. Thus, Indigenous based approaches offer insights for everyone as we search for more sustainable ways of living (Kawagley & Barnhardt, 1999). However, despite the potential benefits of advancing Indigenous-based approaches, the lack of knowledge of non-Indigenous educators about Indigenous worldviews is an obstacle that impacts educators' sense of efficacy (Ritchie, 2012a). Keeping in mind the hardship Indigenous communities have been subject to, educators also need to develop skills to engage in intercultural dialogues such as a deep understanding of intercultural paradigms and a rights-based approach (UNESCO, 2006). Additionally, educators need to cultivate relationships of trust with members of their local Indigenous communities "to explore different worldviews and knowledge systems and negotiate pathways for productive futures" (Miller, 2014, p. 66). As a result, it might be advisable to foster Indigenous-based approaches once both researchers and practitioners have taken the necessary steps in terms of training and reflective practices both on the topics of ECEfS and Indigenous knowledge systems as well as developed relationships of trust with local Indigenous communities.

Nature-based Approaches.

The third category is nature-based approaches and consists of studies in which outdoor experiences and contact with nature are the foundation for ECEfS practices (e.g., Chawla &

Rivkin, 2014; Elliot, 2014; Grogan & Hughes, 2020; Knight & Luff, 2018). Nature experiences in the early years are considered essential for a long lasting sense of commitment to the environment (Ärlemalm-Hagsér, 2013). Moreover, Chawla and Rivkin (2014) argued that through free play in nature, children acquire a sense of competence to influence the environment that is essential for children to engage in issues of ECEfS. Along the same lines, Grogan and Hughes (2020) contended that nature is a compelling context that fosters young children's affective learning, discovery, as well as an understanding "in, about, for and with the environment" (p. 143). However, Dickinson (2013) cautioned adults from discourses and practices that view nature exposure as a solution to mend the damaged relationships between children and nature and denounces them as promoting weak sustainability because they fail to examine the socio-cultural and economic factors that cause and maintain environmental issues. Similarly, Elliot and Young (2016) questioned romanticized note of children in nature argued for a "fuller transformative engagement with sustainability" (p. 57) and for an agentic participation of children in ECEfS. Concerning the pedagogical practices of educators in nature-based programs, Grogan and Hughes (2020) argued that it is time to question the assumption that ECEfS is automatically being implemented in nature-based settings because educators in such settings may lack training and an understanding of sustainability. Despite the numerous documented benefits of nature experiences for young children (Louv, 2006; Moore & Cooper-Marcus, 2008) and the importance of forging early bonds with nature (Herbert, 2008), adopting nature-based approaches may not be the most suitable path to initiate research in ECEfS. Nature-based approaches may be particularly challenging in countries like Canada, where currently an estimate of 32 out of 38 millions of people live in urban centres (Statistics Canada, 2021). Many young children lack access to natural play spaces in urban areas (Dietze & Kashin, 2019) because an emphasis on risk reduction has led to outdoor environments with more prefabricated equipment and limited natural materials (Brussoni et al., 2017). While acknowledging the benefits of nature and natural materials (Gill, 2014) and hoping that children

will have more access to natural environments in the future, as I will discuss next, project-based approaches seem like a better suited ECEfS approach to support sustainable practices in the early years because it is not dependant on children and educators having access to natural areas or not.

Project-based Approaches

The fourth category correspond to project-based approaches, which includes studies that engage children in ECEfS learning experiences on a particular topic for a prolonged period of time (e.g., Elliot & Pugh, 2020; Lewis et al., 2010). The benefits of ECEfS projects include the possibility of young children developing both cooperative and autonomous inquiry and problem-solving skills (Huggins & Evans, 2018). Because projects in ECEfS extend in time, they also allow for in-depth explorations (Ji & Stuhmcke, 2014). The length and depth of explorations can facilitate the engagement of children and educators in the three dimensions of sustainability as evidenced in a long-term project about silk-worms conducted in Japan (Fujii & Izumi, 2008). In this project, the children learned alongside community members about mulberry trees and the lifecycle of silkworms (environmental dimension), about cultural practices such as the manufacturing of Kimonos (socio-cultural dimension) and about the silk industry (economic dimension). Furthermore, project-based approaches to ECEfS are versatile and adaptable to the realities of different countries around the world such as Brazil (Didonet, 2008), France (Pressoir, 2008) and Australia (Davis, 2008). Elliot and Pugh (2020) suggest that a project-based approach to ECEfS applied to local environments can offer opportunities for co-constructed and perhaps transformative learning in conjunction with community advocacy and young children's action taking. Project-based approaches also offer the possibility to incorporate elements of one or more of the three previously examined approaches as illustrated in a study about the conservation of bats conducted by Nikiforidou et al. (2015); in the study, the children engaged in art activities and participated in nature investigations about bats. As a result, while acknowledging the relevance of the three former approaches, project-based approaches seem

to be the most suitable to advance research in ECEfS because their length and depth of exploration enable children, educators, families, and community members to work collectively on projects that search for solutions to local problems while contributing to shape a more sustainable planet.

Reasons to Advance ECEfS in Canada

The approaches to ECEfS discussed in the previous section underscore different empirical contexts that researchers, in collaboration with ECE practitioners, may select to embrace and cultivate ECEfS. In the following section, I continue to argue for the advancement of ECEfS in Canada by highlighting the content of Canadian ECE frameworks.

The Presence of Sustainability in Several ECE Frameworks

There is no common Canadian ECE framework because each province and territory has its own government body responsible for the provision of early childhood education policies and programs (Employment and Social Development Canada, 2013). All the provinces except for Nova Scotia have an official ECE framework. Although not official, the Nova Scotia Department of Education and Early Childhood Development (NSDE&ECD) published an implementation draft of its ECE framework (NSDE&ECD, 2018) which is mandatory for provincially funded childcare centres (Friendly et al., 2020). The frameworks of the three territories are currently in development and are expected to be completed in the near future without a set predicted completion date (Friendly et al., 2020).

Half of the existing frameworks are not only compatible with ECEfS principles but also include the concept of sustainability as a key component of their contents. To illustrate, on Table 1, the first column shows that four provincial frameworks explicitly mention sustainability, the second column indicates that six frameworks have a section about sustainable practices and the third column shows that six frameworks include specific sustainable strategies. A case in point is the New Brunswick ECE framework, which contains a 28-page section on the topic of diversity and social responsibility with a sub-section entitled *Sustainable Futures* (Early

Childhood Research and Development Team at the University of New Brunswick, ECRDT-UNB, 2008). *Sustainable Futures* includes specific recommendations for educators to engage in sustainable practices accompanied by examples on how to implement the recommendations. For example, the recommendation of participating in local restoration initiatives is illustrated by “Angela (3 years) helps dig the centre’s garden ready for the ‘butterfly and bird plants’. Jan (9 months) watches from her stroller” (p. 180).

Table 1

How Provincial ECE Frameworks Include Sustainability

Province	Mentions of sustainability	Sustainable practice section	Sustainable strategies
Alberta	✓	✓	✓
British Columbia		✓	✓
Manitoba			
New Brunswick	✓	✓	✓
Newfoundland and Labrador	✓	✓	✓
Nova Scotia	✓	✓	✓
Ontario			
Prince Edward Island		✓	✓
Quebec			
Saskatchewan			

As indicated in Table 1, six Canadian provinces possess ECE frameworks with longer and more detailed sections on sustainability than the Australian ECE Framework (Australian Department of Education, Employment and Workplace Relations, 2009). The higher explicit ECEfS content in some of the Canadian ECE frameworks is surprising because Australia has one of the strongest traditions of ECEfS research worldwide (Siraj-Blatchford & Pramling Samuelsson, 2016). This unexpected discovery suggests that it is advisable to advance ECEfS research to enact the directives of the ECE frameworks on the topic of sustainability. After all, it is essential to “question where the gaps and silences in ECEfS research lie, to explore and add to” (Davis & Elliot, 2014, p. 10).

The Compatibility of Canadian ECE Pedagogies with ECEfS

Regardless of the heterogeneity of formats and of the existence or not of a section that contains references to sustainable practices, the content of all the provincial ECE frameworks aligns seamlessly with the core tenets of ECEfS: a view of the child as a capable and competent problem solver, a concern for positive connections with nature, an emphasis on socio-cultural relationships, a collaborative approach with families and community members, and a consideration for local contexts (Huggins & Evans, 2018).

The View of the Child

The first tenet of ECEfS consists of viewing young children as competent and empowered agents for change (Caiman & Lundegard, 2014; Mackey, 2012; Young & Cutter-Mackenzie, 2014). In fact, a review of the literature of ECEfS conducted by Hedefalk, Almqvist and Östman (2015) revealed that the research progressed over time from teaching children about sustainability and the environment to empowering children and promoting their stewardship. Accordingly, Davis and Elliott (2014) pointed out that in ECEfS, children are regarded as thinkers, problem solvers, and earth stewards but emphasize that this view of children is far from considering them as saviours or menders of the adults' wrong doings. In Canada, all existing ECE frameworks acknowledge children as capable and competent problem solvers. All ECE frameworks hint at children's capacity to influence their environment although the terminology varies slightly from province to province. For instance, capable and full of potential (British Columbia Ministry of Education, BCME, 2019); competent, curious, and motivated (Healthy Child Manitoba, 2011) or mighty learners and citizens (Makovichuk et al., 2014). With such an empowered view of the children present in all provincial frameworks, ECEfS can offer opportunities for children to take action in issues that concern them while actively allowing them to express their sense of agency.

Families and Communities

The second tenet of ECEfS refers to a collaborative approach with families and community members, which is an essential element in ECEfS (e.g., Ärlemalm-Hagsér & Pramling Samuelsson, 2018; Pressoir, 2008). Comparably, the contents of all ECE provincial frameworks emphasize the importance of relationships with families and community members. To illustrate, the Ontario ECE framework states that early years programs should focus on the well-being of children, families, and the community because they are all indistinguishably linked (Ontario Ministry of Education, OME, 2014). Similarly, the Alberta ECE framework introduces the term *places of vitality* as “strong, active, and energetic early childhood communities that welcome and invite participation of children, families, educators, and others” (Makovichuk et al., 2014, p. 17). In summary, the collaborative approach with families and communities is another point of convergence between the provincial ECE frameworks and ECEfS.

Relationships with Nature

The third tenet of ECEfS is about developing respect for and a connection to the natural world, which is a recurrent topic in the narrative of ECEfS (e.g., Chan et al., 2009; Gambino et al., 2009; Prince, 2010). Correspondingly, all Canadian ECE frameworks mention the relevance of nature in the lives of young children. For example, the Saskatchewan framework highlights the necessity of promoting children’s understanding of and appreciation for the natural world (Saskatchewan Ministry of Education, 2008). Likewise, the Prince Edward Island framework emphasizes the need to nurture children’s affection for nature (Flanagan, 2012) and the Newfoundland and Labrador framework highlights that social responsibility is nurtured when children have consistent opportunities to connect with nature and be involved in the care of plants and animals (Newfoundland and Labrador Department of Education and Early Childhood Development, 2019). Considering the increasing disconnection to land and place present in industrialised countries (Herbert, 2008) and the unquestionable benefits of nature encounters

for young children (Louv, 2005), ECEfS constitutes an avenue to strengthen the children's bonds with nature as advised by the provincial frameworks.

Social and Cultural Relationships

The fourth tenet of ECEfS consists of equitable social and cultural relationships, which are stressed by the ECEfS literature (e.g., Georgeson, 2018; Prince, 2010). With a similar social emphasis, the nine provincial frameworks include repeated allusions to the importance of nurturing social and cultural relationships. For instance, one of the focal theoretical foundations of the Quebec ECE framework is the ecological model inspired by Bronfenbrenner (1979) that underscores the relevance of social and cultural interactions (Quebec Ministry of Family and Senior Citizens, 2007). Similarly, the Nova Scotia implementation draft includes references on the significance of building on “socio-cultural perspectives” (NSDE&ECD, 2018, p. 11). This emphasis on social and cultural relationships is one more point of agreement between ECE frameworks and ECEfS that hints at the benefits of participating in ECEfS projects for children but also for their communities.

Local Contexts

Lastly, the fifth tenet of ECEfS refers to an emphasis on local contexts. Huggins and Evans (2018) contend that ECEfS “cannot be achieved by the delivery of a laid-down common curriculum but must be very largely constructed by practitioners in response to local contexts and needs” (p.1). Similarly, Canadian ECE frameworks explicitly state that they are broad in scope, meant to promote a shared understanding of ECE practices without prescribing a specific curriculum with mandated topics. For example, the Prince Edward Island framework includes guidelines that encourage educators to create learning environments relevant to their local communities while being respectful of local cultures and languages (Flanagan, 2012). Similarly, the British Columbia framework does not prescribe “how-tos” but is rather intended to “inspire pedagogical approaches that are relevant and respectful of local communities” (BCME, 2008, p. 6). In summary, it is evident that the main principles of the Canadian ECE provincial

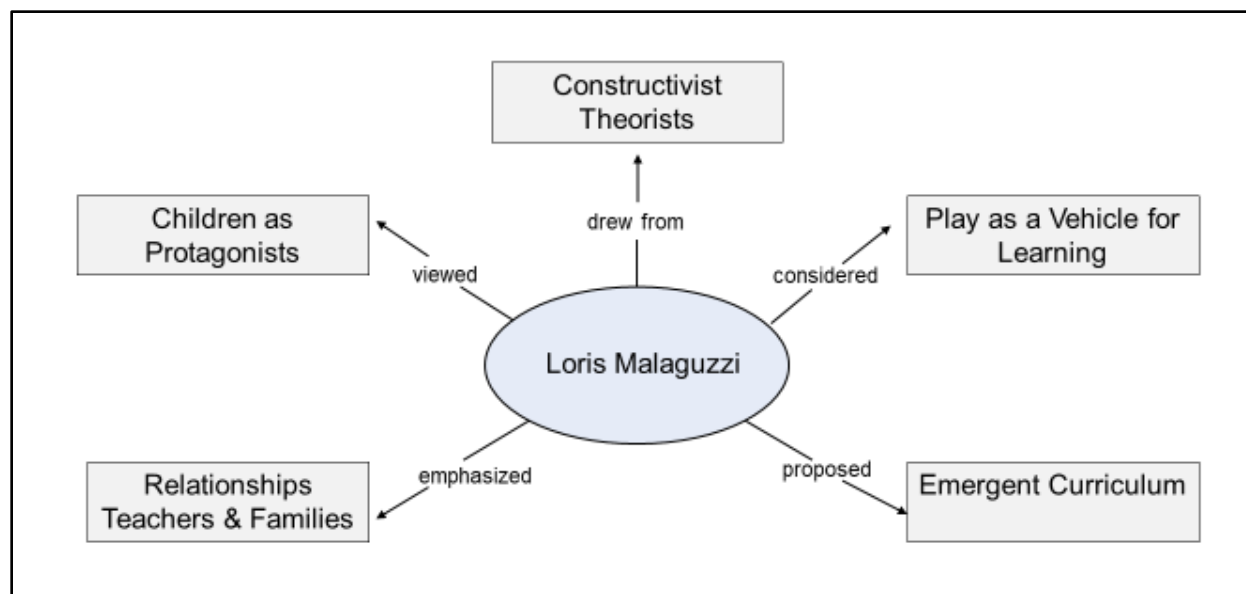
frameworks and ECEfS go hand in hand, with respect to key principles. This compatibility of principles signals that it is not only possible but also appropriate to initiate ECEfS in Canada utilizing ECE provincial frameworks as theoretical foundations. As noted by Pramling Samuelsson and Kaga (2008) “it is not necessary to invent new pedagogies to do education for sustainability in the early years, one can build on its pedagogical traditions to do so” (p. 13).

Pedagogical Foundations

The pedagogical foundations for the PD in my study were based on the work of Malaguzzi (Cagliari et al., 2016) because it aligns with intrinsic values of ECEfS (e.g., cooperation, solidarity), the pedagogical principles of *HDLH* (OME, 2014) the Ontario ECE framework, and the influential theories of my study (discussed in Chapter 1). *Figure 4* provides an overview of key points from Malaguzzi’s work that relate to my study.

Figure 4

Key Points from Malaguzzi’s Work Relevant to my Study in ECEfS



Malaguzzi was a constructivist and as such believed that learners construct their own knowledge as they attempt to make sense of their experiences (Cagliari et al., 2016).

Malaguzzi’s work was influenced by a number of educational theorists such as Vygotsky and

Dewey (Fraser & Gestwicki, 2002). To illustrate, Vygotsky's notions about how learning is shaped by socio-cultural contexts and his ideas about the critical role of language in building understanding were highlighted in Malaguzzi's theories and practices (Kim & Darling, 2009). Dewey's ideas about learning that requires personal involvement in active experiences were also present in Malaguzzi's work (Cagliari et al., 2016). Furthermore, Malaguzzi's work was heavily influenced by Dewey's ideas about democratic educational practices and, as a result, conceive children as empowered and as decision makers.

Concerning the development of curriculum, Malaguzzi opposed the prescription of topics and activities. On the contrary, he embraced the unexpected and the unpredicted, and valued wonder and surprise (Moss, 2016b). Thus, Malaguzzi proposed an emergent curriculum approach based on projects in which educators were tasked with observing children's interests, asking questions, and offering concrete learning experiences (Dietze & Kashin, 2019). Another fundamental facet of Malaguzzi's pedagogy and emergent curriculum was an emphasis on democracy and cooperation (Moss, 2016b) as opposed to predetermined programs dictated by adults or government documents.

Malaguzzi (1993) conceived of children as protagonists, who were active in constructing knowledge and who were also bearers of rights, values, and competencies (Moss, 2016b). For Malaguzzi, make-believe play was an essential vehicle for learning, as well as for the development of intelligence and social skills. Malaguzzi highlighted the importance of relationships in early childhood and noted that although the child is at the center of the educational process, omitting the teachers and families would constitute an incomplete view of the child. Consequently, Malaguzzi strived to intensify the relationships among children, teachers, and educators to create an amiable environment in which all the participants would experience a sense of well-being. In the next section, I turn my attention to the educators' professional development and more specifically to the principles I followed to ensure I created

not only meaningful professional development but also a collaborative atmosphere in which educators experienced a sense of well-being as advised by Malaguzzi.

Principles of Professional Development

In my study, PD refers to in-service training for early childhood educators who are already working in an early learning program with the objective of enhancing their knowledge and expertise in their practices although I acknowledge that learning activities that take place before ECEs enter the workforce may also be called PD (Gomez et al., 2014). In Ontario, ongoing PD is a requirement for professional practice in the early childhood sector and a requirement to maintain the professional designation Registered Early Childhood Educator (College of Early Childhood Educators, 2017). PD has also shown to be effective at supporting ECEs at acquiring skills in several content areas such as math and literacy and is deemed appropriate to extend educators' knowledge and skills with regard to ECEfS (Dyment et al., 2014). Hence the importance of developing meaningful PD in ECEfS grounded in evidenced based PD principles. In the remainder of this section, I outline recommended features of PD according to two well regarded PD frameworks: Darling-Hammond et al. (2017) and Russel (2009), and then, highlight additional PD considerations that informed the PD in this study.

After conducting a systematic review of 35 rigorous studies on the topic of teacher professional development Darling-Hammond et al. (2017) identified seven features of effective PD:

1. Firstly, effective PD should be content focused and include discipline specific and pedagogical strategies.
2. Another important feature of effective PD consists of built-in active learning that allows teachers to practice the strategies they learn.
3. PD also needs to promote collaboration by providing teachers with opportunities to share ideas and work together in job related contexts.

4. One more essential feature is the provision of models of effective practice such as student samples, videos, or peer observations.
5. Additionally, teachers should be offered ongoing and meaningful individualized coaching and expert support.
6. Furthermore, teachers need opportunities to engage in reflection and receive feedback to facilitate the process of developing teaching strategies.
7. Lastly, PD should extend in time to allow for educators to learn, implement and apply their newly acquired strategies.

Russell (2009) developed a PD framework specific for early childhood educators working in childcare programs. Although this framework was developed before Darling-Hammond et al. (2017) published their systematic review, it incorporates features nearly identical to those proposed in the review. Russell's framework was commissioned by the government of Australia with the goal of offering daycare staff and management an accessible resource to generate reflection on PD practices. The framework was developed as the result of a study that included 700 childcare centers. Among specific recommendations for PD in childcare contexts, Russell suggested engaging the parents at childcare centres in the PD process by, for example, sharing a PowerPoint presentation about the childcare staff's work or involving the parents in a new project. Another recommendation proposed by Russell was to embed principles of adult learning in the PD such as explaining why the learning is needed and how it will help educators in their role to sustain their motivation on ongoing learning. Russell also highlighted the role of centre director in supporting and encouraging educators through the PD process, which can in turn result in staff retention, commitment, and engagement.

In addition to the features of professional development recommended by the two aforementioned frameworks, the pedagogical practices I included in my PD followed a constructivist approach. As advised by Brooks and Brooks (1999), I designed the PD by building on the educators' previous knowledge as opposed to merely delivering generic information to

them. I made the learning was made as authentic as possible (Merriam & Bierema, 2014) by selecting examples of ECEfS cases based on educators' reported professional experiences. I acknowledged the educators' socio-cultural in the learning process as they constructed meaning from experience (Vygotsky, 1978) by facilitating dialogues in which the educators reflected on their own experiences about issues of sustainability and on how these experiences related to the topic of ECEfS. I supported educators' thinking processes (Merriam & Bierema, 2014) by encouraging them to make connections between the three dimensions of sustainability (environmental, socio-cultural, and economic) in commonly implemented ECE learning experiences such as the creation of crafts with a variety of recycled materials.

The ERS-SDEC Scale and Associated Research Studies

In this section, I focus on ECEfS studies that used the Environmental Rating Scale for Sustainable Development in Early Childhood (ERS-SDEC), which is the scale I redeveloped to use as a quantitative data collection instrument in my study and around which I framed and developed my qualitative data collection (semi-structured interviews). The original ERS-SDEC rating scale (see Appendix A) was developed by Siraj-Blatchford (2016b) with a format that resembles the Early Childhood Environment Rating Scale (ECERS; Siraj-Blatchford, 2016b). I selected this scale because the ECERS is the most widely used assessment tool for evaluating the quality of early childhood settings (Early et al., 2018) and its use is part of the ECE college diploma curriculum in the Ottawa area. Thus, it is likely that participating educators would be familiar with the rating scale completion procedures of the adapted ERS-SDEC.

The ERS-SDEC rating scale is comprised of three subsections: social and cultural sustainability, economic sustainability, and environmental sustainability (Siraj-Blatchford, 2016b). Each subsection contains a set of practices associated with ECEfS in a 7-point rating scale ranging from 1 (inadequate) to 7 (excellent). For example, under environmental sustainability, the practices related to the consumption of resources can be scored from 1, "There is very little or no reference made to paper, electricity and water consumption in the

setting” (Siraj-Blatchford, 2016b, p. 213) to a 7 “The children are encouraged and supported in questioning the hidden cost and benefits of a range of products” (p. 2013). The ERS-SDEC rating scale has a limited number of items to score, with the resulting ease of application a trade-off for the depth of analysis offered by the scale (Siraj-Blatchford, 2016b).

The ERS-SDEC was used in ECEfS studies in early learning settings in ten different countries are part of a coordinated program of research led by Siraj-Blatchford. These studies can be categorized according to how advanced ECEfS research is in each country, according to scores on the ERS-SDEC. I start by reviewing studies conducted in three countries in which the research of ECEfS is in a very early stage. In Chile, Simonstein (2016) implemented the ERS-SDEC in five urban childcare centres on the south of the capital and reported that all centres scored 1 (inadequate) in all the items of the scale. Simonstein concluded that sustainability was a new concept for the staff in the centres and that much work is needed to advance ECEfS practices. In Kenya, Macharia and Kimani (2016) trialled the ERS-SDEC in two preschools located in a slum five kilometers away from the capital. The preschools scored low in most items but the lack of clean water and resources stood out because it pointed to the hardship experienced by children in the preschools. Macharia and Kimani expressed their hopes that the ERS-SDEC research would contribute to raise awareness of the educational issues in Kenya. In China, Zhou et al. (2016) applied the ERS-SDEC to six early childhood centres, four in Shanghai and two in Beijing. Most centres scored low in socio-cultural and economic sustainability and average in environmental sustainability. Zhou et al. indicated that sustainability is a new concept for the teachers and that they still have much to learn.

Next, I highlight studies conducted in four countries in which ECEfS research has emerged and is in process but more concerted efforts are needed to bring ECEfS to the forefront. In Korea, Park et al. (2016) surveyed 37 kindergartens and daycare centres. In general, the early learning settings scored low in socio-cultural sustainability and average in economic and environmental sustainability. Park et al. stated that there is government and

public interest in ECEfS and that university and college-based centres are leading the way but effort is still needed to advance ECEfS at a larger scale. In Turkey, Haktanir et al. (2016) utilized the ERS-SDEC to conduct extended observation in conjunction with interviews in five different preschool classrooms. The score varied in the programs with the highest overall scores in environmental sustainability and the lowest in economic sustainability with some schools being above average in socio-cultural sustainability. Haktanir et al. concluded that despite progress in education and policies in sustainability, a more focused and intense approach is required to have an impact on the coming generations. In the United States, Mogharreban and Green (2016) employed the ERS-SDEC as an observational tool accompanied by interviews in five preschool classrooms in a rural midwestern area of the United States. The scores varied greatly among classrooms with score averages being the highest in environmental sustainability, followed by economical sustainability and socio-cultural sustainability. Mogharreban and Green concluded that in a country as diverse as the United States, it is not possible to draw any conclusions from the study and that until ECEfS principles are mandated by state and federal regulations, sustainability will just be an add on topic to the curriculum. In Portugal, Folque and Oliveira (2016) adopted an action research approach with educators and pre-service teachers to test the ERS-SDEC in five early learning programs. The scores varied in the programs but none of the centres was rated as inadequate in any of the sections of the scales. Folke and Oliveira reported on issues with the scoring system but stated that the study focused more on the formative process than on the scores and as a result, they indicated that the review of the ERS-SDEC was a rich process, which was highly valued by the participants.

To conclude, I present studies in 3 countries in which ECEfS research is relatively well established and continues to develop. In Norway, Heggen (2016) made use of the ERS-SDEC as an observation to tool complemented with interviews in five kindergartens. The programs scored high in socio-cultural and environmental sustainability and relatively low in economic sustainability. Heggen indicated that the overall high scores in the scale reflect Norway's focus

on sustainability in kindergarten. In Sweden, Kultti et al. (2016) conducted a multi-stage research program with five preschool programs that were at different stages of integrating ECEfS into their practices. As expected by the researchers due to the nature of the programs, the ERS-SDEC scores varied greatly among centres in socio-cultural and environmental sustainability while economic sustainability scored overall the lowest. Kultti et al. highlighted the insights gained by the teachers in the centres to take further steps in ECEfS while engaging with ERS-SDEC. In the United Kingdom, Siraj-Blatchford (2016a) tested the ERS-SDEC in eight preschool centre in the south of England. The centres scored fairly high in environmental and socio-cultural sustainability and fairly low in economic sustainability. Siraj-Blatchford indicated that three of the centres had access to natural environmental resources, that all the settings had developed social justice practices.

Chapter 3

Methodology

In this chapter, I begin with an overview of the four research phases that composed my study to set the context for the rest of the chapter. I continue by explaining the pertinence of a mixed methods approach to frame my study. Then, I highlight how three well-known benefits of conducting mixed methods research strengthened my study and how I overcame three commonly identified challenges. Next, I justify the complex convergent design of my study, which consisted of the succession of two basic convergent designs. Thereafter, I provide details of how I conducted each of the four research phases of my study including the features of the quantitative and qualitative data collection instruments I used, namely the adapted Educational Rating Scale for Sustainable Development in Early Childhood (ERS-SDEC) and semi-structured interviews. I conclude by presenting a detailed diagram highlighting a synopsis of the study to highlight how all the methodological elements of my study came together in each one of the four research phases.

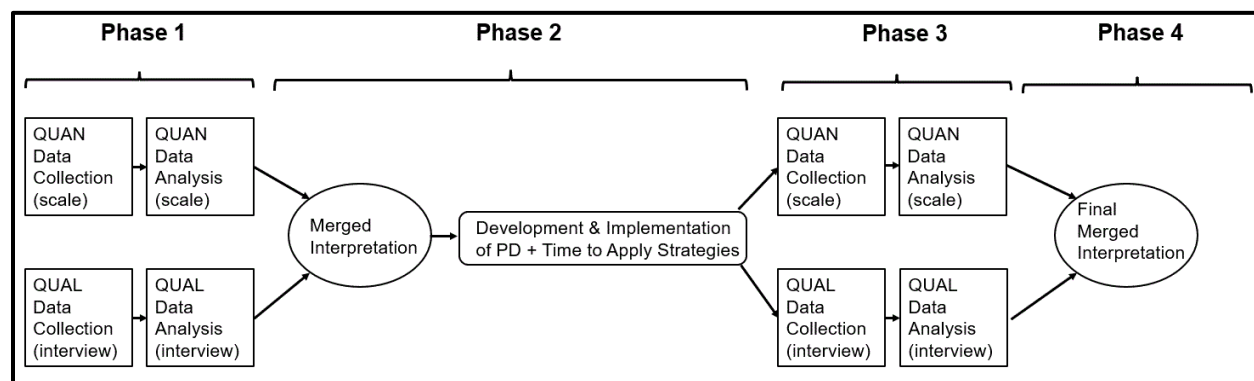
Overview of the Research Process

The objective of my research study was to create meaningful professional development (PD) to support early childhood educators at developing ECEfS practices with the children under their care. As illustrated in Figure 5, the research process developed as follows: Phase 1 consisted of a first round of data collection by means of semi-structured interviews and the application of the adapted ERS-SDEC (Siraj-Blatchford, 2016b) as well as a first round of data analysis. Phase 2 entailed merging the quantitative and qualitative data to design and implement PD for the participants, and a two-month period to apply the strategies learned during the PD. Phase 3 was composed of a second round of data collection with the use of semi-structured interviews and the adapted ERS-SDEC, and a second round of data analysis. To conclude, Phase 4 involved a final interpretation of merged quantitative and qualitative

results. The study included 14 participants who were in-service qualified and experienced early childhood educators working full time in a variety of early learning settings.

Figure 5

Procedural Diagram for the Development of Meaningful PD in ECEfS



Pertinence of a Mixed Methods Approach

In order to conduct these four phases, I took a mixed methods approach to my research. Educational researcher Berliner (2002) rejected the widespread distinction between soft and hard sciences and proposed a division that distinguished between easy and hard-to-do sciences instead. Berliner claimed that educational research fits in the latter category due to the complex conditions researchers face while conducting their studies. Following Berliner's line of thought, my study belongs into the 'hard-to-do' category and needs to be addressed with the best possible methodological tools available. As a result, I argue for the pertinence of a mixed methods approach to employ the joint strengths and possibilities of quantitative and qualitative methods to address the research questions meaningfully.

To address the research questions outlined in Chapter 1, I adopted a mixed methods approach defined as "the type of research in which a researcher or team of researchers combine elements of qualitative and quantitative research approaches for the purposes of breadth and depth of understanding and corroboration" (Johnson et al., 2007, p. 123). In my study, the breadth and depth of understanding referred to the examination of the impact of the

PD on the educators' practices and vice-versa by means of quantitative and qualitative research methods, and more specifically by utilizing the adapted ERS-SDEC scale and semi-structured interviews. As a result, I was able to better address the overarching research questions: How did ECEfS PD impact the practices of early childhood educators? How did early childhood educators' practices impact ECEfS PD?

Mixed methods constituted the most suitable approach to conduct my research in ECEfS because of the possibilities it offered for *complementarity* and *triangulation* (Greene et al., 1989). The concept of *complementarity* referred to the use of multiple research methods to deepen and broaden interpretations and inferences in the research process (Greene, 2007). In my study, during Phase 1, the results obtained by means of qualitative and quantitative methods allowed for a greater understanding of the educators' practices in ECEfS. This enhanced understanding led to a more meaningful design of PD in Phase 2. The results collected and analyzed in Phase 3 enabled a more comprehensive interpretation of the entire research process in Phase 4. The concept of *triangulation* concerned the corroboration of results from multiple methods (Greene, 2007). In my study, as I discuss in detail in Chapter 4, the qualitative results repeatedly confirmed or expanded on the quantitative results in Phase 2 and Phase 4.

Creswell and Plano Clark (2018) maintained that mixed methods research is helpful to address questions that cannot be answered singlehandedly by quantitative or qualitative methods. In my study, a mixed methods approach was not only helpful but indispensable to address comprehensively the overarching questions that guided my research study. An exclusively qualitative approach to these research questions would have yielded insights about how to develop PD for educators based on the participants' lived experiences and on the research context but would not have provided data on how the educators' practices progressed when compared to recommended practices of ECEfS as outlined in the adapted ERS-SDEC scale. On the other hand, an exclusively quantitative approach that noted the changes of the educators' practices in the ERS-SDEC scale would have missed out on the research context

and the lived experiences of the educators. As a result, a mixed methods approach offered the best possibility to address the overarching research questions because it allowed for an examination of the research context and at the same time an investigation of the changes in the educators' ECEfS practices.

Benefits and Challenges of Adopting a Mixed Methods Approach

In this section, I explain how three well-known benefits of adopting a mixed methods approach namely the compensation of methodological weaknesses, the acquisition of stronger insights and the practicality of using combined approaches strengthened my study. I also explain how I overcame three challenges I faced when I adopted a mixed methods approach such as the issue of the integration of the data, the lack of formal training in mixed methods and the absence of exemplary studies in my area of research.

Benefit 1: The Compensation of Methodological Weaknesses

According to Johnson and Onwuegbuzie (2004) researchers can “use the strengths of an additional method to overcome the weaknesses in another method by using both in a research study” (p. 21). Similarly, Creswell and Plano Clark (2018) contended that qualitative methods compensate for the lack of context in quantitative methods, and quantitative methods make up for the biases of the researchers in qualitative methods. In my study, the methodological weaknesses of quantitative methods were compensated by the strengths of qualitative methods and vice versa at several points of the research process. For instance, Johnson and Morgan (2016) remarked that a weakness of pre-designed scales (such as the ERS-SDEC) is the omission of the voices of the participants because the scales are written in the language of the designer. However, the voices of the educators in my study were heard abundantly during the semi-structured interviews.

Benefit 2: The Acquisition of Stronger Insights

Teddlie and Sammons (2010) posited that the combination of quantitative and qualitative methods generates more meaningful knowledge than the sum of its components. In my study,

by merging the results of the adapted ERS-SDEC with the semi-structured interviews, I acquired richer insights to develop meaningful PD and to examine the effect the PD than if I had just examined the results separately. To illustrate, in Phase 1, the results of the adapted ERS-SDEC revealed low scores in the dimension about involving children in responsible purchases under the economic aspect of sustainability. The data from the interviews about this particular dimension allowed me to better the context surrounding the low score (e.g., several educators just did not know about this strategy but were interested in implementing it) and address this particular dimension of sustainability during the PD.

Benefit 3: The Advantage of Practicality

Morgan (2007) reflected on the disastrous consequences of using an exclusively deductive (theory-driven) or inductive (data-driven) approach while operating a motorized vehicle to exemplify the practicality of adopting a mixed methods approach characterized by abductive reasoning. In line with Morgan's example about the use of a mixed methods approach in daily life, Onwuegbuzie (2012) contended that a mixed methods approach resembles the way toddlers learn to discover the world around them. Onwuegbuzie also pointed out that by the time the same little children become doctoral students, they were faced with a false and unnecessary dichotomy of qualitative and quantitative methods. In addition to the practicality of resembling the way in which humans naturally learn and problem-solve, mixed methods is also a pragmatic approach because it allows researchers to utilize all the spectrum of methodological tools available as opposed to being restricted to choose between either qualitative or quantitative research tools (Creswell & Plano Clark, 2018). In my study, mixed methods constituted a practical choice to simultaneously honour the pedagogical practices in early childhood education (ECE) that are heavily influenced by constructivist paradigms (Dietze, 2006) and the need to explore the effects of the PD. The possibility of utilizing both qualitative and quantitative research tools was also an advantage that generated richer data and allowed for a subsequent broader examination of the research questions.

Challenge 1: The Issue of Integration

The difficulty of integrating quantitative and qualitative methods was a frequently raised issue in the mixed methods literature (e.g., Bryman, 2006; Fetters et al., 2013; Morgan, 2014). One of the most serious concerns associated with the lack of integration referred to the potential fragmentation of the study into two or more parallel studies (Yin, 2006). As I elaborate with greater detail in a subsequent section of this chapter, I adopted a convergent design with two integration phases in the research process; in other words, the integration of methods became inherent to the design of my study. A case in point is the final interpretation (Phase 4) of the effects of the PD on the educators' ECEfS practices that was based on a merged analysis of the qualitative and quantitative data generated by semi-structured interviews and the implementation of the adapted ERS-SDEC respectively.

Challenge 2: The Lack of Training in Mixed Methods Procedures

Tashakkori and Teddlie (2001) condemned the polarization of quantitative and qualitative methods in research courses at the graduate level, and the lack of effort to prepare students for professional endeavors that progressively require more mixed methods research. My experience as a graduate student was consistent with the points discussed by Tashakkori and Teddlie. Therefore, I am conscious of the need to overcome my lack of experience in mixed methods research. Fortunately, over the past two decades, there has been an increase in the number of publications to guide researchers in the art of conducting mixed methods (e.g., Hesse-Biber & Burke, 2016; Teddlie & Tashakkori, 2009) as well as a rise in the number of articles with strategies to overcome the lack of training in mixed methods (e.g., Hesse-Biber, 2015). Additionally, as stated by Creswell and Plano Clark (2018), "apprenticing with someone familiar with mixed methods" (p. 15) is an effective way to cultivate the necessary skills to conduct mixed methods research. As a doctoral student, I counted on the direction of my advisor and committee members to guide me as I developed the required set of methodological skills to successfully conduct my first mixed methods study.

Challenge 3: The Lack of Exemplary Studies in ECEfS

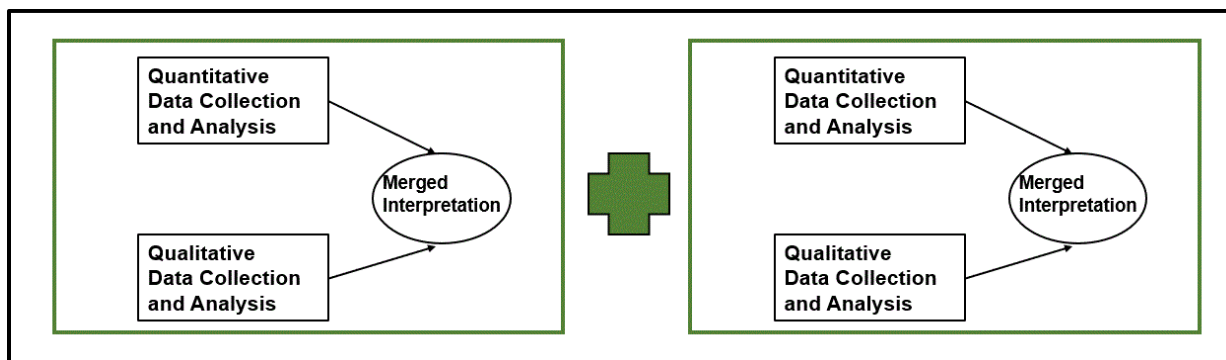
Somerville and Williams (2015) denounced a general lack of methodological rigor in ECEfS studies and state that the majority of them follow an interpretive paradigm. The points raised by Somerville and Williams hint to the difficulty of finding rigorous mixed methods ECEfS studies to inform my research because interpretive paradigms are associated with qualitative methodologies. Nonetheless, a resource that alleviated the lack of exemplary mixed methods studies is a book edited by Siraj-Blatchford et al. (2016) in which researchers from ten different countries reported on the implementation trials of the ERS-SDEC. None of the researchers explicitly referred to the use of a mixed methods approach but since the ERS-SDEC was implemented in conjunction with qualitative methods such as observations and interviews, it is evident that the researchers adopted a mixed methods approach. From the ten trials, one trial conducted in Portugal by Folque and Oliveira (2016) was particularly informative for my study because it focused on how the ERS-SDEC was used as a tool to generate PD for early childhood educators, which resembled the topic of my study.

Research Design

My study followed a complex convergent design that consisted of two successive, basic convergent mixed methods designs, as illustrated in Figure 6, Creswell (2015) stated that convergent designs allow the researcher to obtain more data, to perceive the issue being examined from multiple perspectives, and subsequently, to obtain a more thorough understanding of the research questions. The three points discussed by Creswell are pertinent to my study. Firstly, the data generated by the semi-structured interviews in addition to the data from the scale were more abundant than data generated by one method alone. Secondly, the combination of methods enabled me to examine the educators' practices about ECEfS from multiple perspectives, and lastly, the integration of the data resulted in a more thorough understanding of how to develop effective PD to promote practices in ECEfS.

Figure 6

Research Design as the Succession of Two Basic Mixed Methods Convergent Designs



Concerning the differentiation between fixed and emergent designs proposed by Creswell et al. (2010), my design fit the category of a fixed methods design better because, for the most part, I followed a predesigned plan of action. However, drawing from qualitative research practices and following Marshall and Rossman's (2011) recommendations, the design of the study was also partially emergent because I remained open to revisions during the research process to better address the research questions. As I will explain in an upcoming section of this chapter, in the final part of Phase 3, I followed an emergent approach because I could not plan ahead for the kind of support the educators would require in the two month period after the PD.

Recruitment of Participants

To recruit the participants of my study, I utilized a *purposive sampling technique* (Etikan et al., 2016), which consisted of an intentional choice of participants who possessed qualities such as experience, knowledge and communication skills relevant to my study in ECEfS. Drawing from my professional connections as an ECE college instructor and placement supervisor, I made use of a list of early learning settings with which I worked in the past and approach educators by email (see Appendix G for recruitment letter). The criteria to invite the educators was based on qualifications (early childhood education diploma) and a minimum of five years of experience working with young children between the ages of 0 and 6 years old.

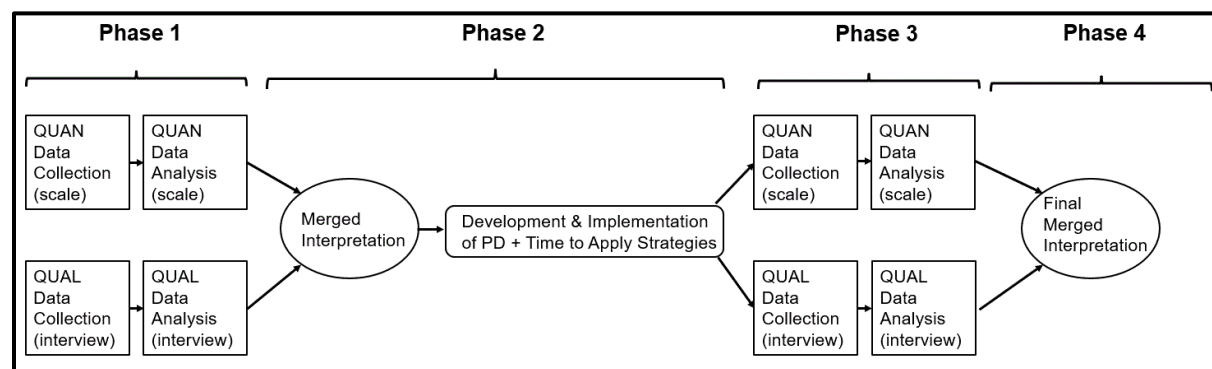
Although the recruitment process was challenging due to the COVID-19 pandemic, which added duties and responsibilities to the educators' work, I was able to recruit 14 in-service early childhood educators. Twelve participants took part in the entire research process. One participant left the research process due to personal reasons after Phase 1 but provided consent to utilize the data from the initial interview and rating scale. Another participant joined in Phase 2 after learning that her colleagues were taking part in the study. Even though Phase 1 had already been completed when this new participant joined, I welcomed her to the study not only because of her willingness to contribute but also because of her extensive knowledge of delivering PD for ECEs.

Research Phases

In this section, I describe the methodological procedures I followed in each one of the four research phases of my study. Considering the complex design of my study, I begin this section with the same diagram that I presented in the introductory section of the chapter in order to remind the reader about the research phases (Figure 7).

Figure 7

Procedural Diagram for the Development of Meaningful PD in ECEfS



Phase 1: Quantitative and Qualitative Data Collection and Analysis

To follow, I explain the procedures I followed during Phase 1 of my study. Although the quantitative and qualitative data were collected during the same period of time, I describe the quantitative and qualitative components separately for clarity purposes.

Quantitative Component

In this section, I begin by highlighting the features of the ERS-SDEC, which was the instrument I adapted to collect quantitative data. Then, I explain how I collected quantitative data in this phase of my study. To conclude, I outline how I analyzed the quantitative data collected by means of the adapted ERS-SDEC.

Instrument of Data Collection. As noted in Chapter 2, the ERS-SDEC was developed by Siraj-Blatchford (2016b) and contains three sections that corresponds to the three aspects of sustainability: social and cultural sustainability, economic sustainability, and environmental sustainability. The format of the scale resembles the Early Childhood Environment Rating Scale (ECERS; Siraj-Blatchford, 2016b), which is the most widely used assessment tool to evaluate the quality of early childhood settings (Early et al., 2018). As a result, most participating educators were already familiar with the completion procedures of the adapted ERS-SDEC scale.

To examine more closely the features of the original ERS-SDEC (see Appendix A) and to determine if the scale was indeed suitable to be used as an instrument of data collection in my study, I used the scale evaluation guide from Johnson and Morgan (2016) as a basis for a review and adaptation of the scale. The procedures listed in the scale evaluation guide are organized in five sections: (a) content evaluation, (b) usefulness of the results for professional practice, (c) technical evaluation, (d) practical evaluation, and (e) overall evaluation. Each section contains between three and five statements that need to be reviewed and be either adopted or adapted. By reviewing each of the statements in the guide that were pertinent to the ERS-SDEC scale in the context of my study, I obtained a better understanding of which features

of the scale to maintain and which to change (see Appendix B for a ten-page detailed description of how I adapted the scale following Johnson and Morgan's scale evaluation guide and Appendix C for the adapted ERS-SDEC).

Quantitative Data Collection. I collected quantitative data by having the participating educators complete the adapted ERS-SDEC scale. The educators were given the choice to complete the scale independently or with my assistance through a Zoom video conference. All the participants selected the second option. In the video conference, I read each of the 5 dimensions to be scored under the three aspects of sustainability one by one. Each time, the educators selected the option that best suited their ECEfS practices. During the process of completing the scale, I responded to the questions the educators posed and provided additional examples of the ERS-SDEC dimensions when needed.

Quantitative Data Analysis. To analyze the quantitative results of the ERS-SDEC, I created a frequency distribution table to summarize the scores of the scales completed by the participants. The frequency distribution table provided an overview of the scores and of the means for each section and sub-section of the scale and allowed me to address the quantitative research questions for Phase 1: What sections and sub-sections in the adapted ERS-SDEC were scored the lowest? What sections and sub-sections were scored the highest?

Qualitative Component

In this section, I start by explaining how I created the semi-structured interview protocol, which was the instrument I developed to collect qualitative data. Next, I outline how I collected qualitative data in this phase of my study. To conclude, I explain how I analyzed the qualitative data collected by means of semi-structured interviews.

Instrument of Data Collection. I developed the semi-structured interview protocol by formulating questions that aligned with the 3 aspects of sustainability and the 5 dimensions under each aspect outlined in the adapted ERS-SDEC scale (see Appendix D). Then, I added two background questions at the beginning of the interview to enquire about the educators

workplace and professional experience. After the background question, I added two introductory questions asking the educators about their previous knowledge about sustainability and ECEfS to gain insights on how to address these two concepts in the PD. At the end of the interview, I asked the educators if they had any concerns moving forward with the study and if they had any suggestions as I prepared the PD. All questions were reviewed by my advisor and committee members to ensure alignment and intentionality within the research process (e.g., alignment with the adapted ERS-SDEC, intentionality to address the research questions).

Qualitative Data Collection. I conducted the semi-structured interviews using the video conferencing software Zoom to obtain an extended understanding about the educators' background, previous knowledge about sustainability and practices of ECEfS (see Appendix D, Interview Guide for Phase 1). As noted by Glesne (2016), semi-structured interviews start with predetermined questions but "remain open to re-forming and adding to those questions throughout the research process" (p. 96). Glesne also highlighted the learning that occurs when questions lead in unexpected directions. The flexibility and the potential for unforeseen learning discussed by Glesne were both characteristics that made semi-structured interviews useful for my study to compensate for the rigidity of the adapted ERS-SDEC. The interviews were not fully open-ended because the results of quantitative and qualitative methods cannot be triangulated if the data collection instruments address different constructs (Greene, 2007). Accordingly, the quantitative and qualitative methods in my study both focused on the educators' practices concerning the three aspects of ECEfS: social and cultural, economic, and environmental.

Additionally, to strive for an in-depth understanding of the educators' practices, the interview process was informed by the responsive interview model proposed by Rubin and Rubin (2004). This model outlined the human relationships formed during the interview process and highlighted the importance of being attentive to the details of the participants' experiences and meaning. These two ideas informed the entire process of scheduling and conducting the interviews with my participants. For instance, before starting the recording of my interviews, I

spent a few minutes engaging in small talk and asking my participants about their day until I got the impression that they felt comfortable starting the interview. Another example was giving participants all the time they needed to share their experiences without interruptions, which resulted in several of the interviews continuing past the expected time but allowed the participants to develop their ideas about topics related to sustainability, pedagogy, and professional development.

Qualitative Data Analysis. To prepare the qualitative data and initiate the data analysis, I transcribed and labeled each interview. Then, I explored the semi-structured interview transcripts by reading through them and writing initial notes following Creswell and Plano Clark (2018) recommended procedures. Next, I conducted a thematic analysis following distinctive qualitative methodologies (Creswell, 2013; Rubin & Rubin, 2004). I made use of a combined deductive and inductive coding approach to ensure a more comprehensive analysis of the data. As noted by Linneberg and Korsgaard (2019) deductive (or predetermined) coding draws from the existing literature. In my study, the codes referred to the three aspects of sustainability and the dimensions under each aspect. The deductive coding allowed me to analyze the same constructs that were covered in the adapted ERS-SDEC scale in order to prepare the data for the merged interpretation in Phase 2. Then, I conducted the inductive (or emerging) coding, which allowed me to mirror the phrases and ideas that came directly from the participants rather than focusing on my own predetermined understandings (Linneberg & Korsgaard, 2019). For both the inductive and the deductive analysis, I created summaries of the findings in the form of short thematic paragraphs. The inductive and deductive analysis of the data allowed me to answer the qualitative research questions for this research phase: What did the participating educators already know about ECEfS? What practices related to ECEfS, if any, did the educators already carry out?

Phase 2: Merged Interpretation to Design and Implement PD with Time to Implement Strategies

I began Phase 2 by placing the analyzed quantitative and qualitative data from Phase 1 side by side to facilitate a merged analysis as suggested by Creswell and Plano Clark (2018). To create a joint display for the merged analysis, I adapted a template recommended by Guetterman (2019) for merging data in studies that follow convergent mixed methods designs such as mine (see original template in Appendix E). Guetterman's template includes three columns, one for the qualitative data, a second one the quantitative data and a third column for mixed methods interpretations or meta-inferences. In the third column, Guetterman posits that the researcher should indicate if the results of the quantitative and qualitative data confirm, disconfirm, or expand each other.

Additionally, to ensure a full integration of the quantitative and qualitative data as suggested by Creswell and Plan Clark, I transformed the quantitative results (mean scores) into qualitative by assigning the scores a qualitative label as follows: (a) inadequate for all scores in the 1 to 1.9 range, (b) minimal for all scores in the 2 to 2.9 range, (c) good for all scores in the 3 to 3.9 range, (c) excellent for scores of 4. These four labels were adopted from the original ERS-SDEC (Siraj-Blatchford, 2016b). In Figure 8, I present the template that I used for the merged interpretation of the data with an example of how the mixed methods meta-analysis was conducted. I created a hypothetical example using the construct of classroom materials (the first dimension under the social and cultural dimension of sustainability) as opposed to using actual data to better illustrate the differences between confirmation, expansion, and disconfirmation. As illustrated in the example, confirmation means that the results of quantitative and qualitative data analysis align, disconfirmation means that the results differ without an explicit reason or explanation for the difference in results, and expansion means that even though there is a visible difference in the results, there is a reason or an explanation that clarifies the difference.

Figure 8

Example of Joint Display and Meta Inferences in Phase 2

Dimension of ECEfS	QUAL Results Summary of Interview Responses	QUAN Results Means	Mixed Methods Interpretation Meta Inferences
Classroom materials	Participants reported on using a variety of materials that portray social and cultural diversity including books, pictures, dolls, and cultural fabrics.	3.5/4 Good	<i>Confirmation</i> The variety of materials reported by the participants aligns with the mean score in the scale.
Classroom materials	Participants reported on having a variety of materials that portray social and cultural diversity including books, pictures, dolls, and cultural fabrics.	1.5/4 Inadequate	<i>Disconfirmation</i> The variety of materials reported by the participants contradicts the mean score in the scale.
Classroom materials	Participants reported on having a variety of materials that portray socio cultural diversity including books, pictures, dolls, and cultural fabrics but indicated that most of the materials had to be put in storage due to the new COVID-19 cleaning and disinfection protocols.	1.5/4 Inadequate	<i>Expansion</i> The variety of materials reported by the participants contradicts the mean score in the scale but the discrepancy can be explained by the current COVID-19 measures that compelled participants to put away the materials they use.

This merged interpretation of the data analyses informed the content and the development of the PD, which will be explained in Chapter 4. After the PD, the educators were given a 2-month period to apply the strategies learned. As mentioned in the previous section of this chapter, I adopted an emergent approach to this part of the research process because I could not anticipate what kind of additional support the educators might require (e.g., ECEfS literature, pedagogical modeling). In my initial research proposal, which took place before the COVID-19 pandemic, I indicated that in this research phase, I intended to conduct field observations as an additional method of qualitative data collection. However, when I was about to start the process of data collection, the early learning settings in which I had planned to conduct observations were either closed or implemented restrictions to non essential visitors to comply with municipal and provincial COVID-19 protocols.

Phase 3: Second Data Collection and Data Analysis

To follow, I explain the procedures I followed during Phase 3 of my study. Although the quantitative and qualitative data were collected during the same period of time, I describe the quantitative and qualitative components separately for clarity purposes.

Quantitative Component

In this section, I begin by explaining that I used the same quantitative data collection instrument as in Phase 1 but for a different purpose. Then, I explain how I collected quantitative data in this phase of my study. To conclude, I outline how I analyzed the quantitative data and compared it to the results obtained in Phase 1.

Instrument of Data Collection. In the second round of data collection, which took place approximately two months after the delivery of the PD, I employed the same instrument of quantitative data collection, the adapted ERS-SDEC scale. I used the data collected with this instrument in two ways. In Phase 1, I used the adapted ERS-SDEC to provide a baseline for exploring the educators' pedagogical practices on the topic ECEfS whereas in Phase 3, my objective was to examine changes in the educators' practices brought about by the PD.

Quantitative Data Collection. In this phase, the participating educators completed the adapted ERS-SDEC scale once again through a Zoom video conference. In the videoconference, the educators revisited the scale they had completed in Phase 1 and noted the changes in score for each of the dimensions or indicated if the score had remained the same when compared to the first time they completed the adapted ERS-SDEC scale.

Quantitative Data Analysis. Similarly to Phase 1, in Phase 3, I created a frequency distribution table for the results of the adapted ERS-SDEC. The main difference was that in Phase 3, I proceeded to compare the results of this quantitative frequency distribution with its counterparts from Phase 1. In other words, I examined the differences between the scores of the adapted ERS-SDEC in Phase 1 and in Phase 3 by comparing the results from the two frequency distribution tables. This comparison provided me with insights on the effects of the

PD on the educators' practices, and allowed me to answer the quantitative research questions for Phase 3: How did the scores in the adapted ERS-SDEC changed after the PD?

Qualitative component

In this section, I begin by explaining how I modified the semi-structured interview protocol to follow up on the educators' ECEfS practices after the PD. Next, I outline how I collected qualitative data in this phase of my study. To conclude, I explain how I analyzed the qualitative data collected making use of an inductive and deductive approach.

Instrument of Data Collection. In the second round of data collection, I created a slightly modified interview guide to conduct the semi-structured interviews (see Appendix F). Similarly to the interview protocol for Phase 1, the questions aligned with the 3 aspects of sustainability and the 5 dimensions under each aspect outlined in the adapted ERS-SDEC scale. However, in this protocol, the questions were formulated to explore the changes in practices that occurred after the PD (e.g., were there any changes in the classroom materials that reflect children's social and cultural diversity?). At the beginning of the interview, I added three questions asking the educators to express their thoughts and impressions about the PD, to provide their opinion on aspects of the PD that could be expanded, and to share which elements of the PD were particularly useful. At the end of the interview, I added a closing question asking the educators if they had any suggestions for further PD in ECEfS. Following similar practices to Phase 1, the questions in the interview protocol were reviewed by my advisor and committee members to ensure alignment and intentionality within the research process (e.g., alignment with the adapted ERS-SDEC, intentionality to address the research questions).

Qualitative Data Collection. To conduct the semi-structured interviews, I used once again the video conferencing software Zoom (see Appendix F). during the semi-structured interviews, I continued to use the responsive interview model proposed by Rubin and Rubin (2004) to continue being attentive and mindful to the details of the participants' experiences and

meaning. Despite using a similar semi-structured interview protocol to collect data, the purpose of this instrument of data collection was different. In Phase 1, I designed the interview protocol to obtain an extended understanding about the educators' practices in ECEfS whereas in Phase 3, I designed the interview protocol to examine the impact of the PD on the educators' practices.

Qualitative Data Analysis. Similarly to Phase 1, to analyse the qualitative data in this phase of research, I conducted a deductive coding analysis following to the three aspects of sustainability and the five dimensions under each aspect. Then, I conducted a deductive coding analysis to obtain additional insights from the data. For both the inductive and deductive coding, I create summaries in the form of thematic paragraphs. The inductive and deductive analysis of the qualitative data allowed me to answer the research question for this phase, how did the reported views and practices of the educators change after the PD?

Phase 4: Final Merged Interpretation

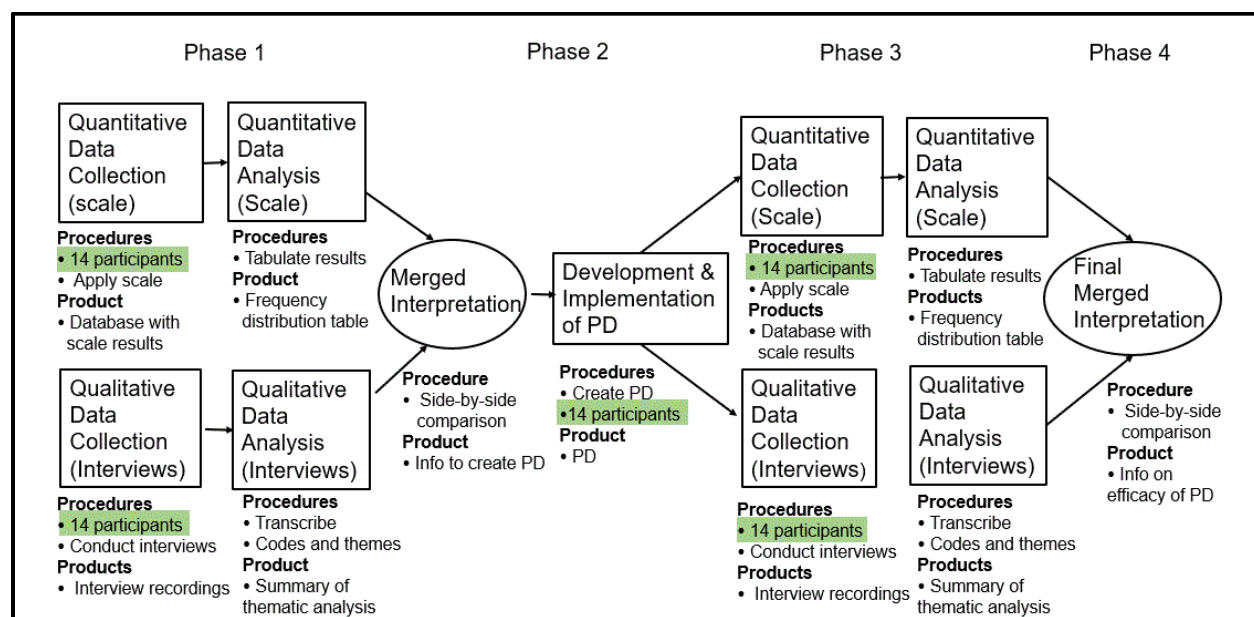
In Phase 4, I created joint display tables to merge the quantitative and qualitative data, and to develop mixed methods inferences or meta-interpretations following the same procedures outlined in Phase 2 as recommended by Guetterman (2019). Drawing from the data and inferences outlined in the joint display table, I proceeded to answer the research question for this research phase, that is: How did participating in the PD impact the educators' ECEfS practices short term? Lastly, I proceeded to review all the data collected and analyzed in the previous research phases (i.e., the joint display tables for Phase 2 and 4, the summarized findings of the deductive qualitative analysis in Phase 1 and 3, and the summary of the frequency distribution tables created in Phase 1) to answer the overarching questions of this dissertation: How did ECEfS PD impact the practices of early childhood educators? How did early childhood educators' practices impact ECEfS PD? These answers are presented in Chapter 5.

Synopsis of the Research Process

In Figure 9, I added the procedures and expected products to my initial procedural diagram in Figure 9 as recommended by Creswell (2015) to help readers navigate the complex structure of the design and to pull together all the elements of the study. The sections of the study in which the participants were actively engaged are highlighted in green to underscore the fact that although this research process was informed by theory, it was practitioner focused.

Figure 9

Alignment of the Research Phases with the Corresponding Procedures and Expected Products



Chapter 4

Results

In this chapter, I start by presenting the professional background and work-related information obtained about the participating educators during the semi-structured interviews. Then, I outline separately the quantitative and qualitative analysis of the data collected in Phase 1. Next, I introduce Phase 2 by presenting a merged interpretation of the data analyzed in Phase 1. Still as part of Phase 2, I explain how the data collected and analyzed in Phase 1 and how the merged interpretation informed the development of the PD. I also report on the additional support that was requested by the educators in the subsequent 2-month period. Thereafter, I present the quantitative and qualitative results of the data collected in Phase 3. To conclude, I conduct a final merged interpretation of the data.

Participants

In this section, I begin by outlining the participants' educational credentials and their years of experience working with young children. Then, I highlight the type of early learning settings in which the educators worked and the age groups of the children under their care. Lastly, I explain the process by which I assigned each of the participants pseudonyms related to ensure anonymity and at the same time humanize them while paying tribute to influential women in education.

Information about the Participants' Professional Background

As indicated in Table 2, all the participants held an ECE diploma and three participants had pursued further education. The majority of participants had more than 10 years of experience working as educators, including three participants who had over 20 years of experience and three who had over 30 years of experience.

Table 2*Participants' Professional Background*

	N	%
Educational Credentials		
ECCE diploma	11	79
ECE diploma and bachelor's degree	1	7
ECE diploma and master's degree	2	14
Years of Experience Working as Educators		
Under 10 years	4	29
Between 11 and 20 years	4	29
Between 21 and 30 years	3	21
30 years and up	3	21

Participant's Workplace and Age of the Children Under their Care

Considering that ECEs are qualified to work in a variety of early learning settings and with groups of children typically between 0 to 6 years of age, as illustrated in Table 3, I recruited participants who were employed in a variety of early learning settings and who worked with groups of children of different ages. The participation of five educators who worked with children under 2.5 years old was particularly insightful considering that the majority of studies on the topic of ECEfS refer to children over the age of 3.

Table 3*Participants' Type of Early Learning Setting and Age of Children under their Care*

	n	%
Type of early learning setting		
Childcare setting	7	50
Kindergarten in a public school	4	29
Home care	2	14
Forest school	1	7
Age of the children under the participants care		
Infants (0 to 18 months)	1	7
Toddlers (18 months to 2.5 years)	4	29
Preschool (2.5 to 5 years)	4	29
Kindergarten (4 to 5 years)	5	35

Participants' Pseudonyms

I assigned randomly each of the 14 fourteen participants in my study a pseudonym that corresponded to the first names of influential women in the field of education. The use of pseudonyms was meant to protect the anonymity of the participants, to pay tribute to thoughtful and full-hearted women who defied conventions and worked arduously for the rights of children and families, to highlight the role of the participants in my study as women who contributed to the advancement of knowledge in education by donating their time and sharing their experiences during uncertain times, and lastly, to humanize the process of reporting on the results by using names as opposed to labels such as 'participant 1' or 'P1'. Table 4 contains the participants' identifying number, the corresponding pseudonym, and the full name of the influential educator to which the pseudonym relates.

Table 4

Table of Pseudonyms for Participating Educators

Identifying Number	Pseudonym	Influential Educator
Participant 1 (P1)	Rosemary	Rosemary Brown
Participant 2 (P2)	Gillian	Gillian Doherty
Participant 3 (P3)	Martha	Martha Friendly
Participant 4 (P4)	Mary	Mary Gordon
Participant 5 (P5)	Donna	Donna Lero
Participant 6 (P6)	Margaret	Margaret Norrie McCain
Participant 7 (P7)	Maria	Maria Montessori
Participant 8 (P8)	Anne	Anne Sullivan
Participant 9 (P9)	Helen	Helen Keller
Participant 10 (P10)	Ruby	Ruby Bridges
Participant 11 (P11)	Temple	Temple Grandin
Participant 12 (P12)	Kira	Kira Orange Jones
Participant 13 (P13)	Julie	Julie Davis
Participant 14 (P14)	Gabriela	Gabriela Mistral

Phase 1: Results of Quantitative and Qualitative Data Analyses

In this section, I present separately the quantitative and qualitative results obtained by analysis of the first implementation of the ERS-SDEC scale and the first round of semi-structured interviews.

Quantitative Data Analysis for Phase 1

Next, after re-presenting the procedural diagram using colour to highlight where the quantitative data analysis occurred within the research process (see Figure 10), I outline the quantitative results obtained from the first implementation of the adapted ERS-SDEC scale (see Figure 11). Then, I respond to the quantitative research sub-questions for Phase 1: What sections and sub-sections of the ERS-SDEC scale were scored the lowest? What sections and sub-sections were scored the highest?

Figure 10

Procedural Diagram Highlighting the Quantitative Data Analysis in Phase 1

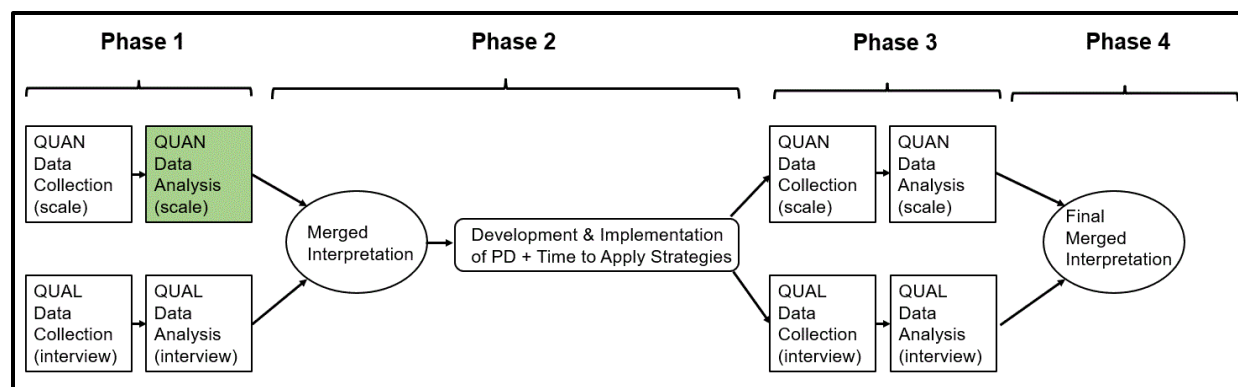


Figure 11*Results of the Phase 1 Quantitative Data Analysis*

Social and Cultural Aspect of Sustainability									
Dimension	Frequency of Scores								Mean
	N/A	1	1.5	2	2.5	3	3.5	4	
Classroom Materials				1		8	1	3	3.19
Discussions	3				1	4	1	4	2.62
Social and Cultural Activities				1		9		3	3.15
Social Justice Initiatives	3	2		2		4	1	1	1.96
Interactions with Community				1		5	1	6	3.42
Mean for the Social and Cultural Aspect of Sustainability									2.87

Economic Aspect Sustainability									
Dimension	Frequency of Scores								Mean
	N/A	1	1.5	2	2.5	3	3.5	4	
Classroom Materials		1		1		8		3	3.00
Discussions	3	1		1		3		5	2.46
Reusing/Recycling Activities						1		12	3.92
Conservation Initiatives	1					6		6	3.23
Responsible Purchases	4	4		1		2		2	1.54
Mean for the Economic Aspect of Sustainability									2.83

Environmental Aspect of Sustainability									
Dimension	Frequency of Scores								Mean
	N/A	1	1.5	2	2.5	3	3.5	4	
Classroom Materials				1		3		9	3.62
Discussions	4			1		3		5	2.32
Classroom Activities				3		4		6	3.23
Environmental Initiatives	2	2				4		5	2.62
Interactions with Nature				1		2	1	9	3.65
Mean for the Environmental Aspect of Sustainability									3.09

Responses to the Quantitative Sub-questions for Phase 1

I examined the mean scores of the three aspects of sustainability, as well as the mean scores of the dimensions under each aspect all of which were scored out of 4, in order to answer the quantitative research sub-questions regarding highest and lowest scoring sections. Concerning the first research sub-question, which was: what sections and sub-sections of the

ERS-SDEC scale were scored the lowest? The economic aspect of sustainability was the section of the ERS-SDEC scale that scored the lowest with 2.83. Regarding the sub-sections, in the social and cultural aspect of sustainability, the dimension of social justice initiatives scored the lowest with 1.96; in the economic aspect of sustainability, the dimension of responsible purchases scored the lowest with 1.54; and in the environmental aspect of sustainability, environmental discussions scored the lowest with 2.31.

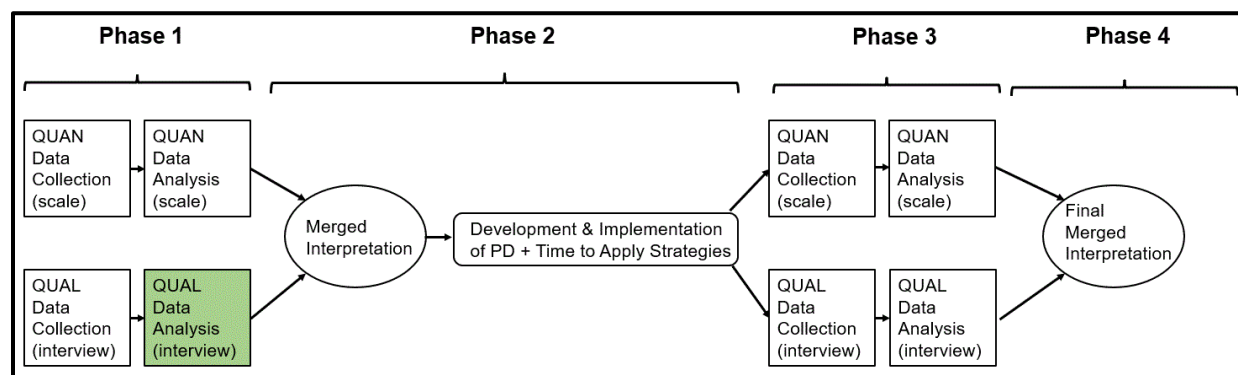
Apropos the second research sub-question, which was: what sections and sub-sections of the adapted ERS-SDEC were scored the highest? The environmental aspect of sustainability was the section of the ERS-SDEC scale that was scored the highest with 3.09. Concerning the sub-sections, in the social and cultural aspect of sustainability, the dimension of interactions with community members scored the highest with 3.42; in the economic aspect of sustainability, the dimension of reusing and recycling activities scored the highest with 3.92; and in the environmental aspect of sustainability, interactions with natural environments scored the highest with 3.65.

Qualitative Data Analysis for Phase 1

In this section, after re-presenting the procedural diagram highlighting where the first qualitative data analysis occurred within the research process (see Figure 12), I outline the results of the two types of qualitative data analysis conducted with the semi-structured interview transcripts in Phase 1: deductive coding conducted using predetermined codes based on the three aspects of sustainability and the five dimensions under each aspect, and deductive coding conducted using an emergent approach. Then, based on the aforementioned two types of data analysis, I proceed to answer the qualitative research sub-questions questions for Phase 1: What do the participating educators already know about ECEfS? What practices related to ECEfS, if any, do the educators already carry out?

Figure 12

Procedural Diagram Highlighting the Qualitative Data Analysis in Phase 1



Qualitative Results for Deductive Coding Using Predetermined Codes

In this section, I start by outlining the educators' answers to the introductory interview questions, which focused on their perspectives concerning the concept of sustainability and their knowledge, if any, about the field of study of ECEfS. Next, I summarize the educators' answers to the pointed questions about ECEfS, which included five questions for each of the three dimensions of sustainability: social and cultural, economic, and environmental. To conclude, I highlight the educators' responses to the two closing questions in which I asked them for suggestions to prepare meaningful PD and I enquired about their feelings or concerns with the possibility of engaging in topics of ECEfS with the children under their care.

Educators' Perceptions about Sustainability. When asked about the concept of sustainability in general, five educators referred to at least two of the 3Rs, which stand for reduce, reuse, recycle, and mentioned aspects such as avoiding consumerism and instant gratification, protecting Earth, and thinking about future generations. Four educators indicated the word sustainability made them think about the environment. Four educators referred to the sustainability of the early childhood profession and talked about topics like mental, physical, and emotional challenges and the importance of sustaining passion and commitment as well as the relevance of continuous professional development. To illustrate, Gillian said, "I just find

sustainability means how long you can last in the profession, like some days are harder to go back and it depends on who your teaching partners are.” Another educator referred to family influences such as passing down clothes and buying items in garage sales.

Educators’ Previous Knowledge about ECEfS. When asked if they had heard about the field of study of ECEfS, 10 educators indicated that they had not heard about it before. Out of these 10 educators, seven made no further comments, one mentioned being very interested in learning about ECEfS, another one referred to the book *Loose Parts 3* on the topic of cultural sustainability, and one indicated that her early childhood program had a strong emphasis on nature, recycling, and repurposing. Three educators responded that they had heard of ECEfS before; two of them had heard through my work. For example Ruby said, “I am only aware of it [ECEfS] through your work but I heard the words as separate entities so ECE or sustainability, and when you connect them together, it would be how to promote sustainability in the early years.” The third educator who reported having heard about ECEfS before made a connection to the sustainability of the early childhood profession highlighting the importance of reducing burnout and keeping up the enthusiasm of educators.

Social and Cultural Aspect of Sustainability. To follow, I highlight the qualitative results of each one of the five dimensions of the social and cultural aspect of sustainability: classroom materials, discussions, social and cultural activities, social justice initiatives, and interactions with community members. Some of the numbers reported in the dimensions under this as aspect and the following two aspects (economic and environmental) will add to more than 13, which is the number of educators who participated in this research phase, because some educators provided more than one response in each dimension.

Classroom Materials. All the participating educators indicated they had social and cultural classroom materials in their early learning settings. Books were the most frequently mentioned classroom materials to portray social and cultural diversity, and were brought up by eight educators. For example, Rosemary said, “We have some books that talk about diversity

and things like that and that is probably about it. I don't remember any other materials."

Photographs, depicting cultural diversity including the children and their families, were the second most mentioned materials highlighted by five educators followed by multicultural dolls, which were named by four educators. Two educators indicated they introduced cultural fabrics to their programs, another two educators mentioned cultural items in general, and two additional educators indicated they had social and cultural materials in their classroom but did not provide any specific example. Other social and cultural items of interest mentioned by single educators were cultural recipes, toys from around the world, a cultural calendar, a branch of hopes and dreams, signs for the classroom written in different languages, and crafts materials in shades of browns and creams for the children to use when representing themselves. Despite providing specific examples of materials, five educators explained that they could or should have more materials in their early learning settings.

Discussions. Eight of the thirteen participating educators stated that they engaged in discussions about social and cultural topics with the children under their care. Three educators mentioned that discussions about social and cultural topics usually took place during morning gathering time; the labels the educators used were different: circle time, group time, community time for sharing and caring. Three educators indicated that these conversations were mediated by items such as books or pictures. Three educators who worked with toddlers mentioned that it is a matter of timing and that as the children get ready to move to preschool, the conversations about social and cultural topics will start taking place. All five educators who worked with the youngest age groups (infants and toddlers) indicated that discussions about socio cultural topics occur with families, especially parents. For instance, Julie said, "In place of doing that [discussions] with the children, we do that with the families during the intake." Other ideas of interest related to social and cultural discussions shared by single educators were that often conversations take place among children from different cultural backgrounds, that educators

can have cultural discussions with children one on one, and that an absence of conversation may be positive as it is a sign of children's natural acceptance of each other.

Social and Cultural Activities. All educators stated that they engaged in social and cultural activities with the children under their care. Story telling and songs were the most mentioned activities and were noted by five educators. To illustrate, Maria said, "When it is the children's birthday, we sing happy birthday in their languages. We have educators who speak different languages so we encourage them to share that with us." However, two educators indicated that they tend to sing well-known songs that are familiar to them and that they could add more culturally diverse songs to their programming in the future. Three educators indicated that they take the opportunity to celebrate special occasions with children. Three additional educators mentioned taking part in Orange Shirt Day to pay tribute to Indigenous children. Two educators indicated taking part in occasional activities but did not provide any examples. Other ideas of interest related to social and cultural activities shared by single educators were celebrating Black History Month, making instruments from around the world, visiting a cultural event sponsored by a local community organization to raise awareness of how children live around the world, and engaging in cultural gardening, more specifically planting and growing the Three Sisters (squash, corn, and beans).

Social Justice Initiatives. Six out of the thirteen educators indicated that they engaged in social justice initiatives with the children under their care. Four educators mentioned taking part in food bank drives in their early learning settings. Two educators indicated they involved children in donating items such as toys or clothing to children from underprivileged economic backgrounds. Two educators stated that they followed the children's interests and that taking part in social justice initiatives may constitute an imposition of their own agendas on the children. Five educators working with the youngest age groups (infants and toddlers) indicated that social justice initiatives were beyond the children's developmental level but four of these educators mentioned they would be open to taking part in initiatives with families. For instance, Kira said,

“That again is way above the development of our toddlers but we would probably do this with families.” Other ideas of interest related to social justice initiatives shared by single educators were practising restorative justice (described by the educator as supporting children to find fair solutions to everyday conflicts), taking part in swap shops, and collecting money for specific organizations like the Humane Society, the Terry Fox foundation, and an organization that builds wells in Africa (the educator could not recall the exact name).

Interactions with Community Members. All educators reported on some type of interactions with community members. The most mentioned type of interaction, pointed out by five educators, referred to regular contact with local community members mostly during walks or outings. Four educators explained that they cultivated relationships with Indigenous community partners. Four educators talked about parent volunteers who come regularly to the early learning centres to support the daily activities. To illustrate, Anne said, “I believe that parents are partners in learning. They contribute different things to investigate, like we had a parent give us a bird’s nest”. Four educators mentioned inviting guest speakers such as artists, scientists, dental hygienists, and retired veterans. Three educators shared that first responders came to visit their programs including a police officer who brought his police dog named West. Three educators reported on either visiting a library or having a librarian visit their classrooms. Two educators did not mention any specific examples.

Economic Aspect of Sustainability. Below, I outline the qualitative results of each one of the five dimensions of the economic aspect of sustainability: classroom materials, discussions, reusing and recycling activities, conservation initiatives, and interactions with natural environments.

Classroom Materials. All educators stated that they possess either economic materials or open-ended materials (loose parts) that could be used as currency. Eight educators indicated they had cash registers and pretend money in their early learning settings. Five educators mentioned having toys to setup the dramatic area as stores or restaurants. To illustrate, Mary

said, “Our dramatic area is often a store. The children make up their menus or price lists for groceries, those kinds of things.” One educator indicated having many financial resources but did not provide any examples and another educator said the children were consistently offered open-ended materials but had not yet used the materials as financial resources. Other economic materials of interest mentioned by single educators were a piggy bank, a vintage adding machine, and a ten frame for counting, which was used to count money.

Discussions. Eight out of the thirteen educators stated that they engaged in economic discussion with the children under their care. Three educators indicated having conversations with children about the value of utilities such as running water and electricity. For example, Martha said, “We went over that with the children, that electricity costs and that it is expensive, and we want to do what we can to save the planet.” Two educators mentioned having discussions with the children about the cost of toys and materials in their programs and another two educators mentioned making use of play-based contexts such as setting up restaurants or construction sites in the dramatic areas to talk about the cost of things. The five educators of the younger children (infants and toddlers) indicated that they did not have discussions with the children about economic topics and three of them mentioned that children may hear the educators talking about economic matters but were not directly involved in the discussions. Other ideas of interest mentioned by single educators were talking about economic matters in the context of a food bank drive, during lunch time to avoid food waste and while discussing the use of paper.

Reusing and Recycling Activities. All participating educators mentioned they engage in some sort of activity that included reusing or recycling materials with the children under their care. Six educators indicated they engage the children in creative activities with recycled materials and two of these educators labeled the area in which these activities take place as ‘makers spaces’. For instance, Temple said, “We have a scrap paper bin in our art area and they [toddlers] use scrap paper whenever they want.” Five educators stated that the children

were actively engaged in recycling their own waste throughout the day. Three educators mentioned children play with recycled and donated items such as used toys, boxes, and paper towel rolls. Other activities of interest mentioned by single educators were fixing childcare items in front of the children, donating toys to charity, having children make their own paper, and organizing a recycled art exhibit.

Conservation Initiatives. Twelve out of thirteen educators indicated that they engaged in conservation initiatives with children under their care. Seven educators indicated that the children were regularly engaged in conservation initiatives to reduce the use of services such as running water and electricity. To illustrate, Gillian said, “In the first month, we have to give the children a reminder not to let the water running like: water costs money and everyone needs water as well but then, they learn to do this on their own.” Three educators mentioned that at the centres, children were involved in the conservation of physical resources such as toys and loose parts. Other conservation initiatives mentioned by single educators were cutting fabric scraps for art, participating in a litter-less lunch program, reducing the waste of food by monitoring amounts of leftover food, and participating in the creation of a toy lending library (the educator explained that by borrowing high quality toys, families and ECE students avoided buying low quality resources that were usually wasted later because they broke or wore out quickly).

Responsible Purchases. Five out of thirteen educators indicated that they engaged the children under their care in responsible purchases. Four educators stated that they involved children at making responsible purchases such as toys and materials for their early learning programs. Eight educators indicated that the children were not involved in any kind of responsible purchases; however, two of these educators mentioned it was an interesting idea they had not considered yet but were willing to try and referred to the age of the children as an obstacle to involve them in the purchases. For example, Helen said, “They are not involved and I would say it does not apply to their age.” Other ideas of interest related to responsible purchases mentioned by individual educators about involving children in responsible purchases

were talking with the children about the upcoming purchase of a climbing structure, taking the children to a local store such as Home Depot and including the children in future online purchases.

Environmental Aspect of Sustainability. Next, I highlight the qualitative results of each one of the five dimensions of the environmental aspect of sustainability: classroom materials, discussions, classroom activities, environmental initiatives, and interactions with natural environments.

Classroom Materials. All the participating educators mentioned having natural or eco friendly materials in their early learning program. Nine educators stated that they have second-hand materials, which were mostly donated to them by families or staff. For example, Ruby said, “We repurpose whatever someone has at home like if there is anything educators want to bring from home, we bring it to the classroom.” Eight educators indicated that they had natural materials in their classroom such as rocks, twigs, and wooden toys. Three educators mentioned visiting thrift stores or garage sales with the children. Two educators said their furniture was ecofriendly because it was either made out of wood or had been donated to them. Two additional ideas related to eco-friendly materials mentioned by single educators were making sure to have reusable water bottles to avoid purchasing disposable plastic bottles and being a member of ‘buy nothing’ social media groups to exchange used resources for children.

Discussions. Nine out of the thirteen participating educators indicated that they engaged in some sort of discussions about the environment with the children under their care. Seven educators mentioned that discussions about the environment took place in outdoor locations such as the yard or a nearby nature area and two educators specifically mentioned conversations about trees. For instance, Margaret said, “Discussions are related mostly to the trees in the yard; we ask them [children] not to pick the trees.” However, out of the seven educators, two specified that rather than two-way discussions with children, the verbal engagements consisted of educators modeling short conversations in front of the children. Four

educators mentioned not engaging in conversations about the environment with the children, and two of these educators indicated that the age of the children (infant/toddlers) was the reason. Additional ideas of interest related to discussions about the environment mentioned by single educators were having conversations in the context of fund raising initiatives, engaging in community time (morning group time), recycling and sitting at the nature table (table setup in the room with nature items that was changed depending on the interests of the children).

Classroom Activities. All the participating educators mentioned that they engaged the children under their care in environmental classroom activities. Nine educators indicated that they gardened with the children. Some examples of types of plants grown in the gardens were flowers (e.g., amaryllis), vegetables (e.g., tomatoes, carrots), and herbs (e.g., chives, mint). To illustrate, Maria said, “So they [children] choose the vegetables they want to plant and right now, we have a pumpkin growing, which is basically taking over the whole garden.” Five educators mentioned having class pets such as rabbits and guinea pigs prior to the pandemic, which were partially cared for by the children. Other environmental activities of interest mentioned by single educators were caring for butterflies, feeding a pet fish, caring for a senior Labrador dog, and creating art with fallen leaves collected by the children.

Environmental Initiatives. Nine of the thirteen participating educators stated that they engaged in environmental initiatives with the children under their care. Five educators indicated they collect rainwater with the children. Three educators mentioned not engaging with children in any kind of environmental initiatives mostly because of the age of the children (infants/toddlers). Two educators mentioned being mindful of and protecting insects. For example, Donna said, “Last year, we planted seeds to save the bees. We got the seeds from the Cheerios commercial, they sent us wildflower seeds and we planted them.” Two educators stated that they engaged children in fund-raising for causes related to the environment. Two educators mentioned involving the children in anti-littering activities. Other environmental initiatives of interest mentioned by single educators were donating items to thrift stores to

reduce the environmental impact of the things they do not need anymore and caring for flowers to encourage children to value plants.

Interactions with Nature. All the educators mentioned exploring natural areas with the children under their care. Five educators indicated that the children regularly visited a local wooded area in close proximity to their early learning programs. To illustrate, Rosemary said, “Do we go to nature areas? Yes! We do go to nature areas. There is one behind us and we actually went today to the ‘woody’ area”. Four educators stated that they went to local parks containing natural elements such as plants and trees but two of them reported on difficulties such as not being able to stay when older children are present or not being able to go as often as they would like to. Three educators shared that they walk with the children on nature paths and another three educators mentioned visits to local horticultural gardens. Two educators reported that they go for walks by the Ottawa river with the children. Additional interactions related to natural environments mentioned by single educators referred to the children having access to a newly built naturalized outdoor classroom and a yard that is in the process of having natural elements added to it.

Educators’ Feelings and Concerns about the Topic of ECEfS. In the final part of the interview, I asked participants about their feelings and concerns about the topic of ECEfS and if they had any suggestions or questions that might help me prepare the PD. None of the educators expressed any concerns about engaging with the topic of ECEfS; on the contrary, they all expressed positive feelings both about the prospect of learning more about ECEfS and about applying their knowledge in their early learning programs. Among the positive feelings reported, educators indicated feeling comfortable with the topic and being excited and happy about the PD. Four educators stated that they were looking forward to learning new strategies related to ECEfS. Two educators shared that they were very pleased to realize how much they already do on the topic of ECEfS after responding to the interview questions. To illustrate, Julie said, “I think it is wonderful to incorporate sustainability with young children! I didn’t realize how

much we already did within the program”. Other positive impressions of interest in connection with the upcoming PD shared by single educators referred to the importance of ECEfS in the lives of young children, the impression that sustainability is a topic that belongs in early learning, the need to be engaged in ECEfS to save the planet, and the hope of continuing to develop sustainable practices.

Educators’ Suggestions for the PD. Six educators mentioned they could not think of any recommendations to help me prepare the PD but indicated that if something came to their mind, they would send me an email. Three educators stated that they would like to have opportunities to share ideas with colleagues and to collaborate with them. Two educators mentioned that they were interested in learning about strategies that would not constitute an additional task but could be easily incorporated to their daily duties. For instance, Mary said, “I don’t know about other educators but we do not get planning time; so, any activities or initiatives we would implement would really have to be quick and easy.” Other suggestions mentioned by single educators were including examples from other countries, adding visuals to the PD like photographs of ECEfS examples, presenting theories behind ECEfS, making sure strategies were in line with regulations and early childhood documents, and sending a handout to the educators ahead of time.

Qualitative Results for Inductive Coding Using Emergent Codes

In this section, I present the results of the inductive coding analysis that I conducted to complement the deductive coding analysis that was outlined in the previous section. The six themes that I identified and describe in this section are: (a) the impact of COVID-19, (b) care for the planet, (c) a sense of belonging, (d) the use of loose parts, (e) Indigenous partnerships, and (f) the application of Catholic beliefs.

The Impact of COVID-19. The impact of COVID-19 was the most mentioned topic by the educators and was discussed across all three aspects of sustainability in a variety of dimensions. Of the 13 educators who participated in this research phase, 12 explained that the

pandemic had a negative impact on their ECEfS practices. For instance, with regards to the social and cultural aspect of sustainability (interactions with community members dimension), Anne said, “I was supposed to have [name redacted] who is a forest school practitioner come in and work with us on Fridays from nine to noon researching together, but with COVID-19, we have not been able to do that either.” Another example referred to the environmental aspect of sustainability (classroom activities dimension) in which Margaret said, “We used to have fish in the aquarium that the teachers and children cared for, you know, but the fish did not make it through COVID-19.” Gillian was the only educator who reported on a positive impact of COVID and referred to the economic aspect of sustainability (reusing/recycling activities dimension) by saying, “This year especially when we were teaching from home, we did a lot of recycled art because everything was closed, we had to use what we had in our house.”

Care for the Planet. Another theme that was broadly mentioned by the participants was care for the planet, which included ideas and stories shared by educators that went beyond the recommended sustainable practices in the adapted ERS-SDEC scale. The accounts shared by the participants included an affective component of caring for others and for the planet as driving forces for the actions taken by educators and children. For example, on the topic of caring for living beings, Temple said, “If we are outside and something is struggling, like a bug or an insect, we never kill them, we try to relocate them. We are very mindful of life.” Another example was Martha explaining how she shared her affection for nature, and in particular for plants, with the children, “I love bringing nature into the classroom. I do whatever I can to encourage a love of learning, a love for their planet. (...) We sing to plants and we tell them how wonderful they are.” A third example is Helen’s commitment for the environment which led her to go beyond the expected duties of an early childhood educator to engage very young children in recycling practices, “For some reason, our daycare did not have paper recycling, so this year, I brought my own bin from home for the children and now we all put our paper there.”

A Sense of Belonging. A third theme that was widely discussed by the participants was a sense of belonging, which included numerous ideas and anecdotes that went beyond suggested social and cultural practices like engaging in discussions about social topics or engaging with community members. The content shared by the educators depicted actions taken and intentions that aimed at creating a climate in which the children and families felt they belong. For example, Ruby said, “We always try to become very aware of what we display so that every child feels like they belong and feels welcomed. We try to shy away from any decor that is very western, very colonial, and very influential of such historical perspectives.” Another educator, Donna, even questioned the validity of the second dimension of the social and cultural aspect (engaging children in discussions about social and cultural topics) because she indicated that a lack of discussions in her class was an indicator of how accustomed the children are to social and cultural differences and how much they feel they belong. On this point Donna said, “children do not seem to notice differences (...) it is lovely, the children are very inclusive and accepting.”

The Use of Loose Parts. Although each of the three aspects of sustainability included a dimension about classroom materials, most of the educators mentioned the children’s engagement with loose parts at several points of the interviews beyond the questions that referred to classroom materials. For instance, while explaining that the staff at her centre had worked together to introduce loose parts for the children but also to model environmentally sound practices to the ECE students on placement, Maria said, “We introduced loose parts in the program and the reason was that we were really trying to be thoughtful about the types of materials that we shared with the children and that we introduced to them.” Another example about a team of educators offering loose parts to young children was shared by Julie, “Let’s say we have boxes in the storage room, we bring the boxes for the children to play with. We constantly think of ways we can use those types of things [loose parts].”

Indigenous Partnerships. Although the topic of Indigenous partnerships was less common than all the previous themes, several educators referred to the importance of developing partnerships with Indigenous community members. To illustrate, Kira said, “We are building our relationship with the Indigenous culture that is here at the [redacted] so we try and participate in their activities as well, and we are hoping for them to come down again to the centre and teach us different songs or stories.” Another educator, Martha, highlighted the importance of Orange Shirt Day to pay tribute to Indigenous communities and shared different ways in which she regularly introduced Indigenous knowledge to the children as well as worked on building relationships with local Elders, “We do a lot of Indigenous activities and songs, and that is a weekly thing. We also have guests who come in celebrating with us like Indigenous singers and dancers.”

The Application of Catholic Beliefs. Similarly to the previous theme, the application of Catholic beliefs was also a less frequently mentioned theme by the educators. However, several educators who worked in Catholic early learning settings shared ideas about sustainable practices that included references either to church activities or to Catholic beliefs. For example, Rosemary said, “Yes, at church we do [contribute to social justice initiatives], you know, we make the boxes, the Christmas boxes and we donate for underprivileged groups.” Another educator, Donna, made several connections between ECEfS recommended practices and Catholic teachings in her program. For instance, Donna said, “If you have a paper and drop it on the ground, because we are a Catholic school, we say, God would really like us to make His Earth beautiful. So, we need to put things in their proper place in the recycling bin or in the garbage.”

Responses to the Qualitative Sub-questions for Phase 1

I draw from the results of the inductive and deductive coding to answer the two qualitative research sub-questions for Phase 1. Concerning the first research sub-question which was: What do the participating educators already know about ECEfS?, the majority of

educators indicated they had not heard about the field of study of ECEfS before. Only three educators mentioned having heard about it in the past, two of whom said they had heard about it through me and my work and a third educator stated that the term referred to the sustainability of the early childhood education profession.

With regards to the second research sub-question which was: What practices related to ECEfS, if any, do the educators already carry out? From the deductive coding analysis, it was clear that all participating educators engaged in a variety of ECEfS practices with the children under their care. In general, practices related to the environmental aspect of ECEfS, and in particular in the dimension of interactions with natural environments, were the most frequently reported by educators. The social and cultural aspect of ECEfS followed the environmental aspect in the overall number of practices reported by the educators with a particularly high number in the dimension about interactions with community members. The economic aspect of sustainability was the one in which the least amount of practices were reported although all the educators indicated engaging in the dimension about reusing or recycling practices.

From the inductive coding analysis, despite the negative impact of the COVID-19 pandemic on ECEfS practices reported by the majority of the educators, it was evident that the educators demonstrated an affect-oriented engagement with matters of ECEfS that went beyond recommended practices outlined in the ERS-SDEC scale. To illustrate, several educators not only engaged children in caring for plants or animals but also modeled a profound affection for the planet and a genuine mindfulness of living beings. Another example is the educators' reported efforts to create an environment in which children and families experienced a sense of belonging while challenging traditional stereotypes. These reported efforts suggest an intangible positive atmosphere that goes beyond the inclusion of relevant social and cultural materials or the engagement with community members.

Considering both the inductive and deductive analysis, the educators carried out a number of ECEfS practices in their early learning settings. Although some of the educators

could further develop some recommended practices with the children under their care such as involving them in making responsible purchases or engaging the children more consistently in social justice initiatives; overall, the educators shared numerous ideas and stories that evidenced their engagement with sustainable principles even beyond recommended ECEfS strategies.

Phase 2: Merged Interpretation, Design and Execution of the PD, and Time to Implement Strategies

In this section, I present the merged interpretation of the quantitative and qualitative results in joint display tables. Next, I justify the design and execution of the PD. Lastly, I outline the support offered to the educators who requested additional information in the two-month period allotted to implement the ECEfS strategies learned in the PD.

Merged Interpretation

To follow, after re-presenting the procedural diagram using colour to highlight where the merged interpretation occurred within the research process (see Figure 13), I present Figures 14, 15, and 16, corresponding to the three aspects of sustainability: social and cultural, economic, and environmental. Each figure contains side-by-side comparisons of the analyzed quantitative and qualitative data for each of the five dimensions under the three aspects of sustainability. Additionally, each figure contains a column in which I included meta inferences indicating if the quantitative and qualitative data confirmed, disconfirmed, or expanded on one another. As indicated in Chapter 3, I assigned qualitative labels to the quantitative values (mean scores for each dimension) following the descriptors of the original ERS-SDEC scale as follows: inadequate for all the values within the 1 range, minimal for all the values within the 2 range, good for all the values within the 3 range.

Figure 13

Procedural Diagram Highlighting the Merged Interpretation in Phase 2

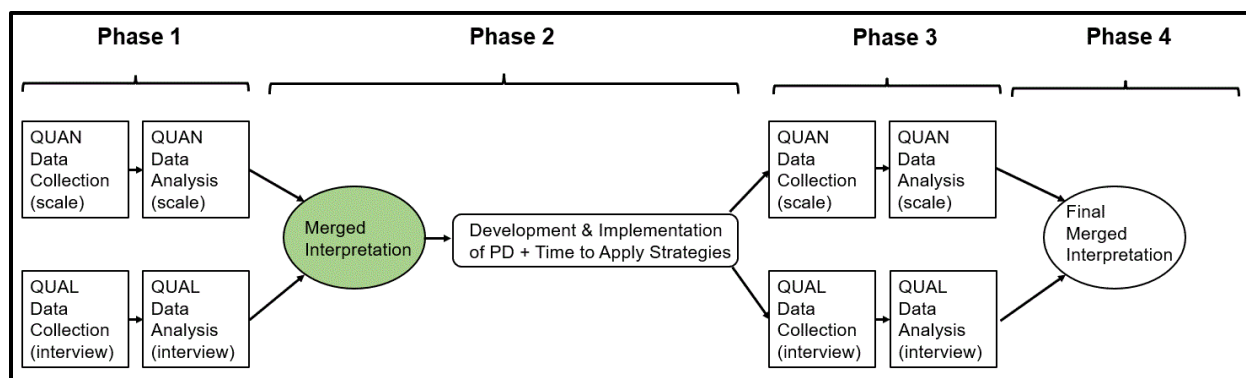


Figure 14*Merged Interpretation for the Social and Cultural Aspect of Sustainability*

Dimension	QUAL Results Summary of Interview Responses	QUAN Results Means	Mixed Methods Comparison Meta Inferences
Classroom Materials	Most of the educators reported having a variety of materials that portray socio cultural diversity including books, pictures, dolls, and cultural fabrics. Several educators indicated that they could have more materials.	3.19/4 Good	<i>Confirmation:</i> The variety of materials reported by the educators aligns with the mean score. Both the score and the comments of several educators indicate that although they possess a fair amount of materials there is still room for improvement.
Discussions	Some educators indicated discussions took place during morning gathering time and that discussions were often mediated through books or pictures. All the educators of younger children said discussion happen with families. Some of them also mentioned discussions start later in the year	2.62/4 Minimal	<i>Expansion:</i> The mean score could point to a general small number of discussions about social and cultural topics. However, the educators of younger children explained that despite low scores, discussions do take place with families and that once children grow older, conversations happen.
Social and Cultural Activities	Most of the educators reported on facilitating a variety of activities such as story telling, singing, and celebrating special occasions. Some educators indicated they could add more culturally diverse songs.	3.15/4 Good	<i>Confirmation:</i> Similar to the materials section, the variety of activities reported by the educators aligns with the mean score. Both the score and the educators' comments indicate that although a fair amount of activities were taking place, there is room for improvement.
Social Justice Initiatives	Several educators reported on different types of social justice initiatives such as taking part in food bank drives, donating items, and raising money for different organizations. The educators of younger age groups mentioned that initiatives are beyond the children's development level but most of them also stated that they would be open to take part in such initiatives with families.	1.96/4 Inadequate	<i>Expansion:</i> The low score (lowest of this aspect) could point to a lack of social justice initiatives but the responses of the educators indicate that initiatives are taking place and that the low score is linked to the fact that five educators work with toddlers and infants, and such initiatives are beyond the children's developmental level.
Interactions with Community Members	All educators shared that they interact often with community members. Some educators said the interactions took place during walks, other educators mentioned interactions with Indigenous partners, volunteers, and guest speakers.	3.42/4 Good	<i>Confirmation:</i> The variety of interactions with community members indicated by all the educators aligns with the mean score (highest of this aspect).

Figure 15*Merged Interpretation for the Economic Aspect of Sustainability*

Dimension	QUAL Results Summary of Interview Responses	QUAN Results Means	Mixed Methods Comparison Meta Inferences
Classroom Materials	Most educators indicated having cash registers and pretend money in their early learning settings. Some educators mentioned having toys to setup the dramatic area as stores or restaurants.	3.00/4 Good	<i>Confirmation:</i> The range of materials reported by most educators is in agreement with the mean score of the scale.
Discussions	Some educators indicated engaging in discussions about services, toys, and materials while some other educators indicated not having discussions with the children about economic matters.	2.46/4 Minimal	<i>Confirmation:</i> The engagement in discussions about economic issues by some educator and the lack of engagement in such conversations by other educators is reflected in the mean score.
Activities	All the educators mentioned they engaged in some sort of activity that included reusing or recycling materials with the children under their care such as creative projects, daily waste management and pretend play.	3.92/4 Good	<i>Confirmation:</i> The engagement in activities that involved reusing or recycling materials reported by all the educator aligns with the mean score (highest scoring dimension of this aspect).
Initiatives	Most of the educators indicated that children were regularly involved in initiatives to conserve services such as water and electricity and materials such as toys and loose parts.	3.23/4 Good	<i>Confirmation:</i> The involvement in initiatives reported by most of the educators is in agreement with the mean score.
Responsible Purchases	Most of the educators shared that they did not involve children in making responsible purchases and only a few of them said the children were involved in purchasing items such as toys and materials for their early learning programs.	1.54/4 Inadequate	<i>Confirmation:</i> The lack of involvement reported by the majority of educators aligns with the mean score (lowest scoring dimension of this aspect).

Figure 16*Merged Interpretation for the Environmental Aspect of Sustainability*

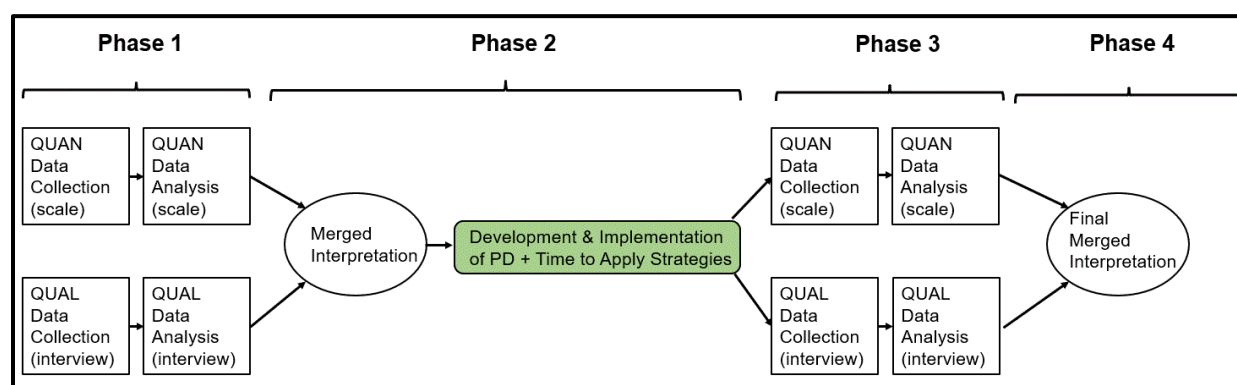
Dimension	QUAL Results Summary of Interview Responses	QUAN Results Means	Mixed Methods Comparison Meta Inferences
Classroom Materials	All educators indicated that they have natural or eco friendly materials in their classroom. Most educators reported having donated items. Many educators also mentioned natural materials such as rocks or branches.	3.62/4 Good	<i>Confirmation:</i> The use of natural or eco-friendly materials reported by all the educators in their early learning settings agrees with the mean score for this dimension.
Discussions	Slightly over half of the educators mentioned engaging in conversations with the children while spending time in outdoor environments but some mentioned it was more one- sided verbal modeling performed by the educators. Some educators mentioned not engaging at all in discussions, half of whom mentioned the age of the children as the reason (infants/toddlers).	2.31/4 Minimal	<i>Expansion:</i> The mean score for this dimension could point to an overall small engagement in discussions but the accounts from the educators reveal that many do engage in discussions with the children although some of the discussions are very simple. Also, the age of some children who are not yet able to engage in discussions (infants/toddlers) explains in part the low mean score.
Activities	Most of the educators indicated that they engaged in gardening activities with the children and grew plants like flowers, vegetables, and herbs.	3.19/4 Good	<i>Confirmation:</i> The mean score for this dimension is in agreement with the children's engagement in gardening activities reported by the majority of the educators.
Initiatives	Some educators mentioned collecting water. Some educators mentioned not engaging in any kind of environmental initiative mostly due to the age of the children. A few educators engaged children in fund-raising, anti-littering initiatives and insect protection activities.	2.62/4 Minimal	<i>Expansion:</i> Even though the mean score for this dimension could point to a general lack of interest environmental initiatives, the reports from the educators show that they do engage in different kinds of initiatives and that only some educators do not engage in environmental initiatives.
Interactions with Nature	All the educators reported that the children under their care interacted with natural environments such as local wooded areas, parks, nature paths, horticultural gardens, and the Ottawa river.	3.65/4 Good	<i>Confirmation:</i> The mean score for this dimension (highest of this aspect) is in agreement with the educators' reports that all the children under their care engage with natural environments.

Design and Execution of the PD

In this section, after re-presenting the procedural diagram using colour to highlight where the design and execution of the PD occurred within the research process, I provide an overview of the contents and activities that I created and implemented in the PD. Next, I explain how I followed the pedagogical practices outlined in two PD frameworks: Darling-Hammond et al. (2017) and Russel (2009). To conclude, I describe how the development of the PD was informed by the quantitative and qualitative data that were collected and analyzed in Phase 1 and by the meta-inferences that I conducted in the initial stage of Phase 2.

Figure 17

Sequencing the Development and Implementation of PD and Time to Implement Strategies



Even though my initial plan for the delivery of the PD was an in-person session that was going to last approximately 3 hours, due to the COVID-19 pandemic, I modified the format of the PD to best address the strict social distancing protocols and the government-mandated lockdowns that took place during the time I designed and implemented the PD (September to November 2020). As a result, I conducted the PD remotely over Zoom video conference and shortened the time to 1.5 hours to be mindful of the fact that all the participating educators were performing additional duties in their full-time educator jobs to comply with new COVID-19 protocols and to mitigate the negative effects of the pandemic on the young children and their families. To compensate for both the shorter PD from 3 to 1.5 hours and for the subsequent reduction of in-person interactions, I designed two identical PD sessions as opposed to one

single session and invited seven participants to join each session. By scheduling two sessions with a reduced number of participants in each session, I intended to offer the participating educators a higher level of engagement and more opportunities to contribute than in a session with double the amount of participants. One of the sessions was attended by seven educators and the other session by six educators (one of the educators excused herself from the study).

In Figure 18, I provide an outline of the activities I designed for and implemented in the PD. The elements outlined in Figure 18 will be discussed in greater detail in the following two sections of this chapter in which I justify how the activities were in line with the pedagogical principles of two PD frameworks (Darling-Hammond et al., 2017; Russell, 2009) and with the quantitative and qualitative analyzed data as well as with the meta inferences from the merged interpretation. Additionally, Appendix I contains a more detailed outline of the PD.

Figure 18

Outline of the PD in ECEfS Provided to Participating Educators

Element of the PD	Brief Description of the Element
Introduction	- The educators and I introduced ourselves - I shared the objectives of the workshop
Theory of ECEfS (Part A)	I provided an overview of the origins of ECEfS and of the three aspects of sustainability
First example of ECEfS project	I described an example of an ECEfS project about silkworms that took place in Japan, using images
The aspects of ECEfS in an example	Educators explored the aspects of ECEfS in recycled art exhibition
Theory of ECEfS (Part B)	- I highlighted the alignment of ECEfS with modern ECE practices and official pedagogical documents - I reviewed common approaches to ECEfS in the research literature
Second example of ECEfS project	I described an example of an ECEfS project that took place in Canada, using images
Possibilities and challenges of developing ECEfS	Educators engaged in small group conversations about the possibilities and challenges of ECEfS (break out sessions)
Highlights of small group discussions	Educators share the highlights of their small group conversation with the rest of the group
Concluding remarks and steps moving forward	I expressed my gratitude for the educators' contributions and outlined the next steps in the research project

Justification of how the PD Aligns with Principles of Professional Development

In this section, I start with a table outlining key principles of PD from the two frameworks that informed the PD: Darling-Hammond et al. (2017) and Russell (2009). The former is a research-based framework whose first author is a leading expert on the topic of PD for teachers in the United States. The latter is a framework that was already used effectively in PD for educators in the field of ECEfS by Dymont et al. (2014). As evident in Figure 19, the principles of the two frameworks are similar but by combining the frameworks, I aimed at maintaining the high standards of PD as proposed by Darling-Hammond et al. while at the same time addressing the singularities of PD in ECEfS as demonstrated by Dymont et al. Then, I explain how I addressed each one of the key principles outlined in Figure 19 as I developed and implemented the PD.

Figure 19

Principles for the Delivery of PD in ECEfS

Framework by Darling Hammond et al.	Framework by Russell
Focuses on the content considering local classroom	Provides practical and theoretical information and knowledge
Incorporates active learning that engage teachers directly in the practices learned	Creates opportunities to apply new knowledge and skills
Provides a clear vision of what best practices look like	Consists of investigating real life examples in the educators' own settings
Provides scaffolding by coaches and experts who are educators themselves	Provides opportunities for educators to have a trusted 'other'
Offers built-in time for feedback and reflection in which teachers, receive input on and make changes to their practices	Involves educators assessing their own learning, thinking critically, considering different perspectives
Is of sustained duration	Extends over a period of time

Concerning the first pair of principles on Figure 19 which refer to focusing on content considering local classrooms (Darling Hammond et al., 2017) and providing practical and theoretical information and knowledge (Russel, 2009), I designed the PD as a sequence of small blocks of times in which I delivered theory about ECEfS alternating with larger blocks in which I presented two examples of practical ECEfS projects executed by early childhood

practitioners: Silkworm is a fascinating insect for children and Unruly voices: Growing climate action pedagogies with trees and children (see Appendix J). Additionally, I engaged the educators in the examination of a third example, a recycled art exhibition, which is closely related to the reality of the educators' early learning settings because in the first interview, they all indicated engaging in reusing and recycling practices with the children under their care.

To address the second pair of principles about incorporating active learning that engaged teachers directly in the practices learned (Darling-Hammond et al., 2017) and creating opportunities to apply new knowledge and skills (Russell, 2009), from the beginning of the PD, I encouraged the educators to take an active role in the PD. For example, to introduce themselves at the beginning of the PD, I invited the educators to share an item with the group that meant something special for them. This activity is commonly known in early learning settings as 'show and tell' and supports the development of social and cultural relationships for both children and adults because it encourages them to get to know each other more. Throughout the PD, there were several other opportunities for the educators to engage in active learning (see Appendix I). After the PD, the educators were also given a 2-month period to apply the knowledge and skills acquired in the PD.

With respect to the third pair of principles in Figure 19 on the topic of providing a clear vision of what best practices look like (Darling-Hammond et al., 2017) and investigating real life examples in the educators' own settings (Russell, 2009), I used the same strategy mentioned in the first set of principles. I presented three practical examples of ECEfS projects, one of which was directly related to the reusing and recycling practices mentioned by all the educators in the first interview. Additionally, in the small group conversations, the educators were tasked with discussing the challenges and possibilities of ECEfS projects in their own early learning settings. Lastly, I offered the educators any additional support they needed to apply the content of the PD in their own setting for the two months following the PD and before the second interview.

Regarding the fourth pair of principles on Figure 19 on the subject of providing scaffolding by coaches who are educators themselves (Darling Hammond et al., 2017) and providing opportunities for educators to have a trusted 'other' (Russel, 2009), as an experienced Registered Early Childhood Educator (RECE) with an expertise in ECEfS, I was well positioned to create and implement the PD with a solid understanding of ECEfS content and practices that were meaningful and useful in their work as educators of young children. Additionally, for over 15 years, I had cultivated professional relationships of trust with the majority of educators by collaborating with them either in an academic or a practitioner capacity. The only three educators who joined the study without having known me for an extended period of time were recommended by a mutually trusted professional acquaintance. Consequently, I am confident that all participating educators perceived me as a trusted 'other'.

About the fifth pair of principles on Figure 19 concerning offering built-in time for feedback and reflection (Darling-Hammond et al., 2017) and involving educators assessing their own learning, thinking critically, considering different perspectives (Russel, 2009), I allotted the longest block of time in the PD for the educators to engage in small group conversations and to collaborate with each other. To support the educators in thinking critically about ECEfS during these small group conversations, I provided them with sample questions to discuss on the topic of challenges and opportunities of implementing ECEfS in their own early learning settings (see Appendix I). To further support the educators in considering different perspectives beyond the ones of the educators had within their small group composed of three to four educators, I facilitated a conversation for the two small groups to share their ideas with the larger group (six to seven educators) once the break out sessions were over.

With regards to the sixth pair of principles on Figure 19 about the PD being of sustained duration (Darling Hammond et al., 2017) or extending over a period of time (Russell, 2009), I designed the research project with a 2-month period for the educators to implement the strategies discussed during the PD before I checked in with them in the follow up interview and

in the second implementation of the ERS-SDEC scale. Although I acknowledge that changes in ECEfS practices are likely to happen over a more extended period of time, this PD was meant to be a pilot project to inform future PD at a larger scale and over a longer period of time.

Justification of how the PD was Informed by the Data Collected in Phase 1

From my analysis of the quantitative data, the score that stood out was the mean score for reusing and recycling under the economic aspect of sustainability because it was highest reported score with a mean average of 3.92/4. Drawing from this score, which reflected the fact that all the educators engaged in some sort of activity that included reusing or recycling materials with the children under their care, I created an example of an ECEfS project on a recycled art exhibition for the educators to discuss. The educators' familiarity with reusing and recycling practices constituted a useful platform to examine the connections among the three aspects of sustainability: social and cultural, economic, and environmental in an ECEfS example.

From the analysis of the qualitative data and in particular, from the inductive coding analysis (emergent themes), the most valuable insight I applied as I designed the PD was the realization that the educators were already fully invested in the topic of ECEfS. The educators reported on an engagement in practices that were affectively loaded with sentiments of deep care for others and the planet, which went beyond the practical and more objective strategies outlined in the interview questions and the corresponding dimensions of the ERS-SDEC scale. The positive feelings of encouragement and inspiration I experienced when hearing about and recording these types of practices led me to the certainty of allotting the two largest blocks of time during the PD for the educators to engage in guided small and large group conversations. Although this scheduling decision was already made before examining the qualitative data to frame the PD in alignment with the principles of collaboration included in the frameworks mentioned in the previous section (Darling-Hammond et al.,2017; Russell, 2009), the prospect

of an inspiring working climate constituted an additional benefit to the expected collaboration among educators.

Concerning the merged interpretation of the quantitative and qualitative data, for the most part, the meta-interpretations evidenced an alignment (confirmation) between the scores the educators assigned in the adapted ERS-SDEC scale (quantitative data) and the corresponding practices of the educators reported in the interview (qualitative data). As a result, the majority of meta-interpretations aligned with the aforementioned decisions I took as I designed the PD, which were based on the analysis of the quantitative and qualitative data. However, the few meta-interpretations of the dimensions in which the qualitative data expanded on the quantitative data (expansion) proved to be the most informative in the design of the PD. These meta-interpretations evidenced a pattern concerning the lower scores in the dimensions of ECEfS initiatives under the social and cultural aspect and responsible purchases under the economic aspect. These lower scores were mostly caused because the engagement with the dimensions were developmentally out of the reach of the younger children (infants and toddlers). This pattern provided evidenced that practices outlined in the scale need to be revised for educators of younger age groups, which will be discussed in the final chapter of the dissertation. Additionally, this identified pattern led me to the idea of grouping together educators from the younger age groups (infants and toddlers) during the two breakout sessions of the PD so they could discuss the opportunities and challenges of incorporating of ECEfS while also benefiting from the subsequent conversations of the larger group, which included educators who worked with older children.

Concerning the specific suggestions for the design of the PD requested from the educators in the closing part of the first interview (when asked if there was anything they considered helpful for me to know as I prepared the PD), half of the educators offered a variety of suggestions that I considered and implemented in the PD. In the remainder of this paragraph and in the following six paragraphs, I address individually the thoughtful suggestions made by

the educators for the PD to honour their willingness to contribute to the PD and their expertise in matters of PD in ECE. The first suggestion was to include opportunities for them to share ideas and collaborate with colleagues. This suggestion coincided with the seventh principle by Darling-Hammond discussed in the previous section and was addressed by offering the educators the longest possible block of time to engage in guided small group discussions with peers and later sharing their conversations with the larger group.

A second suggestion made by educators consisted of including strategies that could easily be incorporated to their daily educator duties without constituting an additional task. Drawing from the fact that all the educators mentioned in the first interview that they already engaged in reusing and recycling activities with the children, I introduced the example of a recycled arts and crafts exhibition (see Appendix J, Slide 8) to illustrate how seamlessly ECEfS practices can be incorporated to ECE practices. I also facilitated a conversation about how the three aspects of sustainability were represented in this activity. This example highlighted the educators' engagement in ECEfS without having the need of taking over additional responsibilities.

A third suggestion made by one of the educators was to include an ECEfS example from another country. To select a suitable example, I examined a variety of ECEfS exemplars included in a UNESCO sponsored publication in which researchers from around the world presented their work on ECEfS. I selected an ECEfS project by Fuji and Izumi (2008) about silkworms that took place in Japan. This example illustrated how an ECEfS project can touch on three aspects of sustainability because the children cared for the silkworms (environmental aspect), engaged with elders in the community to learn how to weave the silk into kimono belts (social and cultural aspect), and learned about the silk industry (economic aspect).

A fourth suggestion proposed by one of the educators was to include visuals such as photographs in the PD for the educators to have a better idea of what ECEfS practices look like. To address this suggestion, I presented the two examples of ECEfS projects by means of

images in my PowerPoint slides without including any text on the slides to be better highlight the visuals. In the silkworm example from Japan by Fuji and Izumi (2008), I included six images in which young children can be seen caring for silkworms and collaborating with community members. Additionally, one image showed finger puppets made by the children with the cocoons of the silkworm and in another image, a child can be seen holding a pictograph of the silkworms (see Appendix J, Slides 5, 6, and 7). In the second ECEfS example by Nelson and Hodgins (2020) about trees, which took place in Canada, I included six images that included the social media post that originated the project, a child holding a camera used to photograph trees, a child sitting under a tree branch and three images showing a series of drawings about trees created by the children who engaged in the project (see Appendix J, Slides 14, 15, and 16).

A fifth suggestion made by an educator was to make sure that the content of the PD was in line with local ECE documents. Although neither ECEfS nor sustainability are explicitly mentioned in the content of Ontario's early learning framework *How does learning happen?* (OME, 2016), practices of ECEfS are fully in line with the content of the document. As a result, I included two slides that highlighted the connections between ECEfS and modern early childhood education pedagogies (see Appendix J, Slides 9 and 10). The slides referred to four points, which are common principles of both ECEfS and early childhood pedagogies: the empowered view of the child, the engagement of families and communities, the importance of forging relationships with nature, and the need to develop equitable social and cultural relationships. Although I was certain that these points made the connections between ECEfS and the Ontario early childhood framework evident because *How does learning happen?* (OME, 2014) is in line with current ECE pedagogical practices, I underlined the connections verbally by inviting the educators to further reflect on how ECEfS is indeed aligned with the provincial framework. As a result, several educators identified additional points of intersection between ECEfS and the framework beyond the information on the slides such as: the relevance of active learning, an emphasis on local contexts and a focus on relationships.

A sixth suggestion made by one of the educators was to add some of the theory behind the field of study of ECEfS. In order to address this suggestion without overwhelming the educators with an excessive amount of academic information, I included two short sections of academic content about ECEfS. In the first section, I provided the educators with an overview of the origins of ECEfS and explained the three aspects that compose the field of study of ECEfS: social and cultural, economic, and environmental (see Appendix J, Slides 2 and 3). In the second section, I outlined the connections between ECEfS and modern early childhood education pedagogies and described common approaches to research in ECEfS (see Appendix J, Slides 9, 10, 11, and 12).

A seventh and final suggestion was to provide the educators with a handout about the PD ahead of time for them to know what to expect prior to attending the PD. I addressed this suggestion by sending the educators a detailed agenda of the PD with the topics and activities (see Appendix I). Additionally, on the second page of the handout, I included a table highlighting suggested topics of discussion for the small group conversations, which were one of the most important parts of the PD. To guide the conversations, I included recommended questions to discuss on the possibilities and challenges of implementing practices of ECEfS in the educators' early learning programs. Lastly, I included a list of general topics to consider in the conversations such as materials, initiatives, and community involvement.

Responses to the Qualitative Sub-questions for Phase 2

In this section, I answer the two research sub-questions for Phase 2. To begin, I address the first sub-question which was: What knowledge and practices about ECEfS should be emphasized in the PD? As mentioned in the previous section, by examining the analyzed data collected in Phase 1 as well as the merged interpretation conducted in the initial section of Phase 2, it was clear that although the majority of educators were not familiar the field of study of ECEfS, they already performed a variety of ECEfS practices as outlined in the ERS-SDEC scale. It also became evident that the educators demonstrated an affective and practical

engagement with matters of ECEfS that went beyond recommended practices outlined in the ERS-SDEC scale. As a result, concerning the knowledge about ECEfS, during the PD, I presented two small blocks of theory about ECEfS outlining the origins of ECEfS and the three aspects of sustainability in the first block and highlighting common approaches to research in ECEfS as well the alignment of ECEfS with modern ECE practices during the second block of theory. With regards to the practices, considering the already broad engagement of the educators with ECEfS practices, the most suitable way I found to capitalize on their experiences and engagement with ECEfS was to allot the largest blocks of time for the educators to collaborate and share with each other their real-life experience with regards ECEfS practices. Additionally, I presented two formal ECEfS projects, one conducted in Japan and another one in Canada, and discussed with the educators an example directly related to their recycling practices to illustrate how the aspects of sustainability can be incorporated into ECEfS projects.

To address the second research sub-question for this phase which was, what additional support was required by the educators to engage in ECEfS after the PD?, I had to wait to be contacted by the educators in the two-month period following the PD to find out what kind of additional support they needed. Shortly after the PD, I was contacted by three educators who asked me for additional resources to continue learning about the topic of ECEfS alongside their colleagues in their early learning centres. After carefully examining all the resources I had collected over the years, I selected two publicly available and practitioner friendly resources that were suitable for educators to expand their knowledge about ECEfS. The first resource was an electronic book *Education for Sustainable Development in the Early Years* (Siraj-Blatchford et al., 2010). In this resource, the educators had access to more information about the three aspects of sustainability, about further strategies to develop their ECEfS practices and about organizations and associations that support sustainability in the early years.

The second resource I recommended to the educators was the electronic book *The Contribution of Early Childhood Education to a Sustainable Society* (Pramling Samuelsson &

Kaga, 2008). Although the entire book contains interesting information about ECEfS and chapters written by researchers from all around the world, I suggested paying particular attention to the introductory section because of its general information on the topic of ECEfS. I also suggested three chapters of the book that I considered to be particularly practical and insightful: What might education for sustainability look like in early childhood?, A silkworm is a fascinating insect for children, and Swedish preschool children show interest and are involved in the future of the world.

Phase 3: Second Quantitative and Qualitative Data Analyses

In this section, I present separately the quantitative and qualitative results obtained by means of the second implementation of the adapted ERS-SDEC scale and the second round of semi-structured interviews, which took place 2 months after the PD.

Quantitative Data Analysis for Phase 3

To follow, after re-presenting the procedural diagram using colour to highlight where the second quantitative data analysis occurred within the research process, I outline the quantitative results obtained from the implementation of the adapted ERS-SDEC in Phase 3 of the research process in the form of a frequency distribution table (see Figure 21). Then, I respond the two quantitative research sub-questions for Phase 1.

Figure 20

Procedural Diagram Highlighting the Quantitative Data Analysis in Phase 3

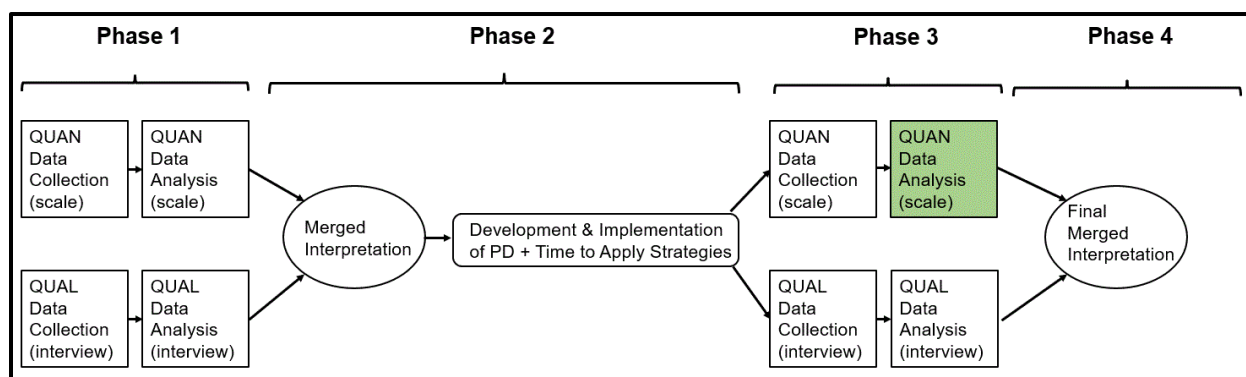


Figure 21*Frequency Distribution Table with Quantitative Results for Phase 3*

Social and Cultural Aspect of Sustainability									
Dimension	Frequency of Scores								Mean
	N/A	1	1.5	2	2.5	3	3.5	4	
Classroom Materials				2		2	2	6	3.42
Discussions	3				1	4	1	3	2.50
Social and Cultural Activities				1		7		4	3.25
Social Justice Initiatives	2	2		1		6		1	2.16
Interactions with Community		1		2		5	1	3	2.96
Mean for the Social and Cultural Aspect of Sustainability									2.86

Economic Aspect of Sustainability									
Dimension	Frequency of Scores								Mean
	N/A	1	1.5	2	2.5	3	3.5	4	
Classroom Materials		1		2		5		4	3.00
Discussions	3			1		4		4	2.50
Reusing/Recycling Activities						2		10	3.83
Conservation Initiatives	1					5		6	3.25
Responsible Purchases	4	3				4		1	1.58
Mean for the Economic Aspect of Sustainability									2.83

Environmental Aspect of Sustainability									
Dimension	Frequency of Scores								Mean
	N/A	1	1.5	2	2.5	3	3.5	4	
Classroom Materials						7		5	3.42
Discussions	4			1		3		4	2.25
Environmental Activities				1		4		7	3.50
Environmental Initiatives	2	1				5		4	2.67
Interactions with Nature				1		2	1	8	3.63
Mean for the Environmental Aspect of Sustainability									3.09

Response to the Quantitative Sub-question for Phase 3

To follow, I answer the quantitative research sub-question for Phase 3, which was: How have the scores in the adapted ERS-SDEC changed after the PD? To address the question, I examined the changes that occurred in the mean scores of the three aspects of sustainability from Phase 1 to Phase 3. I also noted the changes that took place in the mean scores of the dimensions under each of the three aspects of sustainability (see Figure 22).

With regards to the social and cultural aspect of sustainability, the total mean score of the aspect decreased by 0.01. However, despite this very minimal decrease, there were changes in the five dimensions of the aspect. Three dimensions increased as follows: the means for the dimensions of classroom materials, social and cultural activities, and social justice initiatives increased 0.23, 0.10, and 0.20 respectively. Two dimensions decreased as follows: the mean for the dimension of discussion and interactions with community members decreased 0.12 and 0.46 correspondingly.

Concerning the economic aspect of sustainability, even though the total mean score of the aspect remained the same at 2.83, there were several changes in the dimensions with only one dimension, classroom materials, remaining the same at 3.00. Three dimensions increased slightly after the PD as follows: the mean score for discussions, conservation initiatives and responsible purchases increased 0.04, 0.02 and 0.04 correspondingly. On the contrary, the mean score for the dimension of reusing/recycling activities decreased by 0.09.

With respect to the environmental aspect of sustainability, although the total mean of the aspect remained the same, there were changes in all five dimensions. The mean scores for the dimensions of classroom activities and environmental initiatives increased by 0.07 and 0.05 respectively. The mean scores for classroom materials, discussions, and interactions with natural environments decreased 0.20, 0.06 and 0.02 correspondingly.

Considering the average score for the combined three aspects of the ERS-SDEC scale, there was a very small decrease of 0.004 (from 2.93 before the PD to 2.926 after the PD) that disappeared when I rounded the average score after the PD (2.926 to 2.93). Within the three aspects, the mean score for the dimension of environmental classroom activities increased the most by 0.37 followed by the mean score for the dimension of social and cultural classroom materials by 0.23. In contrast, the mean score for the dimension of interactions with community members decreased the most by 0.46 followed by the mean score for the dimension of environmental classroom materials by 0.20.

Figure 22*Mean Scores of Quantitative Data Analyzed in Phase 1 and Phase 3*

Social and Cultural Aspect of Sustainability			
Dimension	Mean Phase 1	Mean Phase 3	Change
Classroom Materials	3.19	3.42	+0.23
Discussions	2.62	2.50	-0.12
Social and Cultural Activities	3.15	3.25	+0.10
Social Justice Initiatives	1.96	2.16	+0.20
Interactions with Community Members	3.42	2.96	-0.46
Total	2.87	2.86	-0.01

Economic Aspect of Sustainability			
Dimension	Mean Phase 1	Mean Phase 3	Change
Classroom Materials	3.00	3.00	0
Discussions	2.46	2.50	+0.05
Reusing/Recycling Activities	3.92	3.83	-0.09
Conservation Initiatives	3.23	3.25	+0.02
Responsible Purchases	1.54	1.58	+0.04
Total	2.83	2.83	0

Environmental Aspect of Sustainability			
Dimension	Mean Phase 1	Mean Phase 3	Change
Classroom Materials	3.62	3.42	-0.20
Discussions	2.31	2.25	-0.06
Classroom Activities	3.23	3.50	+0.27
Environmental Initiatives	2.62	2.67	+0.05
Interactions with Nature	3.65	3.63	-0.02
Total	3.09	3.09	0

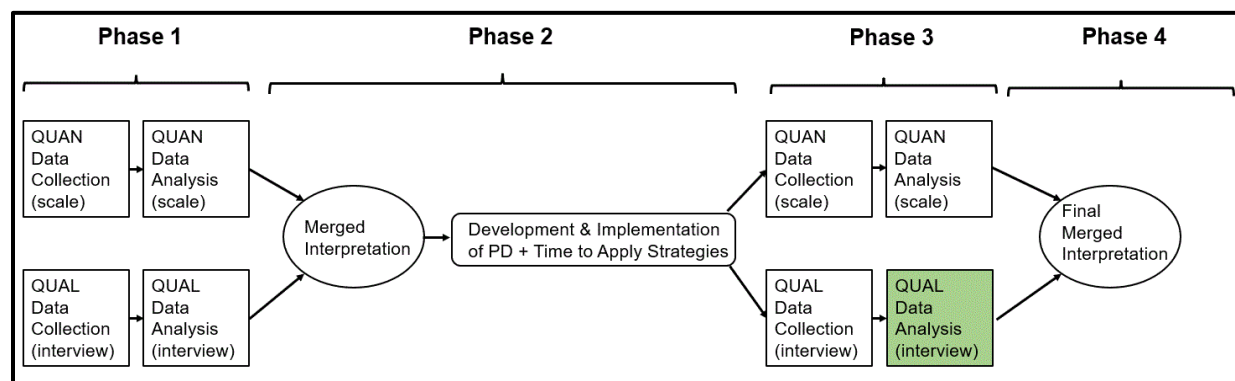
Qualitative Data Analysis for Phase 3

In this section, after re-presenting the procedural diagram using colour to highlight where the second qualitative data analysis occurred within the research process, I present the result of the two types of qualitative data analysis conducted in Phase 3. I conducted the first analysis using deductive coding based on the three aspects of sustainability and the five dimensions under each aspect. I conducted the second analysis using inducting coding using an emergent

approach to the data. After presenting the two types of data analyses, I answer the qualitative research sub-questions for Phase 3.

Figure 23

Procedural Diagram Highlighting the Qualitative Data Analysis in Phase 3



Qualitative Results for Deductive Coding Using Predetermined Codes

In this section, I start by outlining the educators' answers to the introductory questions to the follow up interview, which consisted of asking them about their thoughts and impressions about the PD, as well as the aspects of the PD they thought should be expanded on or considered particularly useful. Next, I summarize the educators' answers to the pointed questions about ECEfS, which included five questions for each of the three dimensions of sustainability: social and cultural, economic, and environmental. To conclude, I highlight the educators' responses to the closing question of the follow up interview in which I asked them if they had any suggestions for future PD on the topic of ECEfS.

Educators' Thoughts and Impressions about the PD. When asked to share their thoughts or impressions about the PD, eight educators mentioned they liked the PD and experienced positive feelings such as excitement and happiness while participating in it due to the conversations and exchange of ideas with other educators. To illustrate, Ruby said, "I liked connecting on Zoom with different early childhood educators from the field because it really gave us a platform to share our ideas and give each other suggestions." Four educators

indicated they felt reassured because they confirmed that they were already engaging in sustainable practices after having conversations with fellow educators. Three educators stated that conversations about gardening with young children were particularly inspiring for them. Two educators shared that they considered more closely the use of their materials and resources after the PD. Other ideas of interest shared by single educators regarding their participation in the PD were: experiencing a feeling of growth while learning more about ECEfS, reflecting on the use of documentation app such as StoryPark to engage families more in the centre's daily life and incorporating recycled items to science projects after being inspired by ideas shared during the PD.

Educators' Suggestions on Aspects to Be Expanded in Future PD. When asked which aspects need to be expanded in future PD about ECEfS, five educators mentioned that the same type of PD should be delivered to a larger number of people including other educators, teachers, and the community. For instance, Anne said, "I think that more people need exposure to these ideas because it is not that they are not interested in them. Maybe some people have just not thought deeply about them so just getting people together to discuss sustainability is important." Two educators stated that they would like to see more examples of ECEfS projects and another two educators said the PD should extend over more time to generate a more visible change in practices and to support educators moving forward in what they already know. Additional ideas of interest mentioned by single educators were creating professional connections about ECEfS through social media, making use of an action research approach in future PDs, developing strategies on how to reconcile COVID-19 protocols and sustainable practices, and creating examples in the form of pedagogical documentation samples like learning stories.

Educators' Responses about Aspects of the PD that were Particularly Useful. When asked what aspects of the PD were particularly useful and should remain the same in future PD, eight educators referred to the break-out sessions in which the educators had an

opportunity to connect, collaborate, and converse with each other. For example, Gabriela said, “I really liked the way you allowed the educators to have dialogues.” Three educators indicated that they liked the structure and organization of the PD and mentioned the timing, the flow, and the activities. Two educators stated that the examples of ECEfS projects that were presented in the PD were particularly useful. Additional ideas of interest mentioned by single educators were the use of the adapted ERS-SDEC scale because it constituted a guide in terms of ECEfS practices and the number of educators (seven per session) because it allowed them to work well together both in the break out sessions (three or four educators) as well as in the larger group.

Social and Cultural Aspect of Sustainability. After the three introductory questions of the follow up interview (the results of which I outlined above), the educators were asked if there were any changes in their practices in the five dimensions under each aspect of sustainability. To follow, I summarize the educators’ responses to each one of the five dimensions of the social and cultural aspect of sustainability: classroom materials, discussions, social and cultural activities, social justice initiatives and interactions with community members.

Classroom materials. Seven educators responded that the amount of classroom materials that portrayed social and cultural diversity in their early learning settings had remained the same since the first interview. None of these seven educators made any additional comments. Four educators mentioned that they had added classroom materials such as books, artwork, and images of cultural food. Two of the educators who reported an increase in classroom materials indicated that Black History month had been an occasion that led them to think about classroom materials. For example, Rosemary said, “For the cultural diversity materials, because it was Black History Month, we found and added some books that portrayed different cultures.” Only one educator shared that she had to put away several social and cultural materials such as books and cultural fabrics because they could not be sanitized following the stricter COVID-19 disinfection protocols.

Discussions. All of the educators responded that the discussions about social and cultural topics remained the same after the first interview. None of the educators made any additional comments about the dimension of discussions during the follow up interview.

Social and Cultural Activities. Eleven educators responded that the social and cultural activities remained the same after the first interview. None of these eleven educators made any additional comments about the dimension of social and cultural activities during the second interview. Conversely, one educator stated that there was a significant increase in the social and cultural activities in her early learning program after the first interview because the staff had decided to add more virtual interactions with children and families to mitigate the effects of the pandemic. To illustrate, Margaret said, “We have included families. They do show and tell and they put videos and pictures of things they want to share and that has been a big hit.”

Social Justice Initiatives. Nine educators responded that social justice initiatives remained the same after the first interview. From these nine educators, one indicated that new church related initiatives had come up to replace the ones she had mentioned in the previous interview, another educator shared that her plans to visit a senior home with the children had to be postponed due to COVID-19 and seven educators did not make any additional comments. Three educators stated that there had been an increase in social justice initiatives. One educator mentioned the children were involved in a drive to collect and donate socks. A second educator, Maria, said, “Okay this [referring to social justice initiatives] could be changed because we are now partnering with the [name of institution redacted] hospital so the children are going to be creating some art pieces for the seniors.” A third educator mentioned a fundraiser for Indigenous communities in Nunavut as well as a prom dress initiative in which the children took over the advertisement of the event.

Interactions with Community Members. Seven educators responded that their interactions with community members remained the same since the first interview. None of these seven educators made any additional comments on this dimension. Three other

educators mentioned that even though they had maintained the same scores for this dimension in the scale because they felt they were still a good fit, they did think the interactions had changed and become more at a distance. To illustrate, Helen said, “When the caterer brings our food, they come by and the kids say ‘hi’ and when the garbage trucks come, that is a big hit with the kids and they honk the horn for them and wave so there are still those tiny interactions.” Two educators said the interactions had decreased dramatically from frequent to minimal or almost non-existing due to COVID-19.

Economic Aspect of Sustainability. Below, I summarize the educators’ responses to each one of the pointed questions about their practices on the five dimensions of the economic aspect of sustainability: classroom materials, discussions, social and reusing and recycling activities, conservation initiatives and interactions with natural environments.

Classroom Materials. Ten educators responded that there were no changes in the classroom materials since the first interview. None of these ten educators made any comments about the classroom materials. Another educator mentioned the materials had increased in her classroom. To illustrate Martha said, “There are many financial materials. We started opening up a store after this [the PD] and learning about money as part of the curriculum about math and our dramatic play has been a shop. Every week the shop has changed, it has been a bakery, a pet store and now, it is a rain forest internet café shop.” One additional educator shared that there was a decrease in the number of materials in her classroom because it was very difficult for her to put out some of her financial resources out due to the stricter COVID-19 cleaning protocols and procedures.

Discussions. Eleven educators responded that the discussions on economic topics remained the same after the first interview. Ten of the eleven educators did not make any additional comments and one shared that she did reflect about introducing discussions with the children under her care but felt that because of their age, the verbal interactions were still too one sided to be considered discussions. One educator, Temple, stated that there was an

increase in discussions and said, “I would say discussions have gone up and that was one of the easy ones, once we realized that we were not doing it, were okay, that is something that costs nothing, maybe just a little bit of extra time.”

Reusing/recycling Activities. Eleven educators responded that reusing and recycling activities remained the same after the first interview. Nine of these eleven educators made no additional comments on the activities and two educators shared that they were still working on these activities despite the very young age of the children (toddlers). To illustrate, Kira said, “I know we still try to get them to understand that instead of throwing a piece of paper in the garbage, they throw it in the recycling bin. We are also using a lot of loose parts sort of think like toilet paper rolls and things like that.” One educator reported that there had been a decrease in the activities because the children could not have free access to recycled materials for their arts and crafts due to the schools’ stricter COVID-19 protocols.

Conservation Initiatives. Eleven educators responded that the conservation initiatives remained the same after the first interview. Nine of these eleven educators made no additional comments about the conservation initiatives. One of the educators shared that her program, in conjunction with the school where the centre is located, was still working on moving from ‘silver status’ to ‘gold status’ as part of an environmental program they were following. Another one of the educators from the younger age groups (toddlers) said the children were still participating in conservation initiatives through the activities that took place in her program. On this point, Ruby said, “The children are able to go to the gym and look at the tables full of winter boots and snowsuits for the moms to take home for their children. So, just being exposed to a swap shop like that is a very good conservation initiative for sure.” Another educator reported that the initiatives had increased and indicated that the conversations with the children to plan new initiatives had also increased.

Responsible Purchases. Ten educators responded that the children’s involvement in responsible purchases remained the same after the first interview. Nine of these ten educators

did not make any additional comments and one shared that she had not figured out how to involve her children who were from a younger age group (toddlers) in responsible purchases because her curriculum was based on the children's interests. Two educators reported an increase in the children's involvement in responsible purchases. To illustrate, Mary said, "We have moved up in responsible purchases because we have talked more about them [children] helping make decisions in things that we have purchased for the classroom." Another educator stated that the children in her program were actively involved in the purchase of climbing equipment for the outdoor yard.

Environmental Aspect of Sustainability. To follow, I summarize the educators' responses to each one of the pointed questions about their practices on of the five dimensions of the environmental aspect of sustainability: classroom materials, discussions, classroom activities, environmental initiatives, and interactions with natural environments.

Classroom Materials. Eight educators responded that the natural or eco-friendly materials remained the same since the first interview. Seven of these eight educators made no additional comments about the materials and one of the educators indicated that even though the materials remained the same in the classroom, the children were spending more time outside engaging with natural materials. Three other educators reported that they had to put away natural and eco-friendly materials due to COVID-19 procedures and cleaning protocols. To illustrate, Julie said, "I don't know if you have heard this from other educators but the natural eco-friendly materials in the classroom, unfortunately, we had a ton of wood type of toys and we had to put them away because they won't do well with cleaning so we don't want to ruin them and we just had to use more plastic toys." One educator stated that she felt she had made a mistake in the amount of materials mentioned in the first interview and said her score for materials in the scale should have been higher (despite the fact that many plants had died due to COVID-19) because she had reconsidered what eco-friendly means and noticed that they did have many donated materials.

Discussions. All the educators responded that the classroom discussions about environmental aspects remained the same after the first interview. Nine educators made no additional comments about the discussions. One of the educators mentioned that the children were still too young (toddlers) and that the educators were still mostly redirecting the children by asking them to put the garbage in the right place but that real discussions were not yet happening. Another educator, Donna, explained that even though the discussions had not changed and remained relatively low, “There will always be an opportunity to talk when topics come up in the future.” A third educator shared that even if discussions were not yet happening, the young children (toddlers) did have an opportunity to see the educators engaging in tasks that involved caring for the environment.

Classroom Activities. Nine educators responded that the classroom activities had remained the same after the first interview. Seven of these nine educators did not make any additional comments about the classroom activities. One of these educators stated that even though they were fortunate to have exposure to many plants and animals beside the Ottawa river, the children did not have the opportunity to care for them. The other one of these educators, Helen, who reported no changes said, “I am excited that spring is coming because then, I can start that, you know, plant something and get our little garden going again”. Three educators reported an increase in classroom activities after the first interview. One of them shared that the care for plants had increased and that there was a new pet in the program. Another one stated that the educators in her classroom gave the children exclusively the responsibility of caring for plants and animals. A third educator asserted that the children and staff in her centre had started planning and organizing a garden for the upcoming spring season.

Environmental Initiatives. Eleven educators responded that there were no changes in environmental initiatives since the first interview. Nine of these eleven educators made no additional comments on the initiatives. One of these educators shared that the children under

her care were still too young to engage in environmental initiatives, which were still modeled and initiated by the educators. Another one of these educators stated that she and the children were going to take part in a water related initiative but it had not happened yet. One of the educators, Mary, reported on an increase in environmental initiatives and said, “I would say it is appropriate for this [environmental initiatives] to say that they have increased. We have been talking about cleaning up when we see stuff outside.”

Interactions with Nature. Ten educators responded that there were no changes in the interactions with natural environments. Eight of the ten educators made no additional comments on the interactions with natural environments. One of the educators shared that even though there were fewer outings in her program due to COVID-19, she introduced more natural materials into the playground such as rocks and sticks to make up for the situation. Another one of the educators, Kira, stated that the children still took part regularly on nature outings called ‘woody Wednesdays’ and said, “So we still take the children to a forested area where it is a bit more open for them to explore and create, and learn things.” One educator reported an increase in outings to parks and nature paths due to a new pet in the program. Another educator shared that there was a decrease in the number of interactions with natural environments due to COVID-19 and stated that they used to be out much more often with the children before the pandemic.

Educators’ Suggestions for Future PD in ECEfS. After the pointed questions on the three aspects of sustainability, the educators were asked if they had any suggestions for future PD on the topic of ECEfS. Six educators suggested providing participants with more information about ECEfS such as academic articles, chapters, resource sheets and infographics. Two of these educators suggested having the educators read the material ahead of time to discuss in the PD session. To illustrate, Temple said. “Like an article study, having or providing some kind of chapter or something related to sustainability to spark some kind of specific conversation. I find that would be a nice way to get everyone’s mind around an idea.” Four educators

suggested continuing to create spaces for ECEs to come together either virtually or in person to continue engaging in dialogues and to exchange resources. For example, Gabriela said, “If you want to create a more ripple effect, you want to create spaces for people to dialogue within programs and also bring other people from outside groups. We need an inner and an outer dialogue.” Three educators stated that they felt the needed to receive more guidance on the topic of social and cultural diversity because it was often overlooked or implemented with a seasonal approach only. For instance, Rosemary said, “We tend to think about cultural diversity when the seasons change, like when it is Christmas but we do not think about it at different times of the year so I think more of that would be good.” Two educators stated that it would be beneficial to connect with other educators engaging in ECEfS practices within Canada and internationally. Additional ideas of interest suggested by single educators were extending the PD to certified teachers who work with educators in kindergarten programs, using an action research approach to engage educators on the topic of ECEfS, creating PD at different levels to serve educators who are new to the early childhood sector or who have not yet developed reflective practices, extending the PD over a longer period of time, and providing additional support to educators at interpreting the connections between ECEfS and official provincial early learning documents.

Qualitative Results for Inductive Coding Using Emergent Codes

In this section, I present the results of the inductive coding analysis that I conducted to complement the deductive coding analysis. The five emergent themes that I identified in the inductive analysis and describe in this section are: (a) the impact of COVID-19, (b) the use of loose parts, (c) reflective practices, (d) virtual interactions, (e) documentation of practices.

The Impact of COVID-19. Similar to the first interview, the impact of COVID-19 on the educators’ ECEfS practices remained the most mentioned topic during the follow up interviews. The educators reported on how COVID-19 protocols and restrictions continued to negatively impact their ECEfS practices in all the three aspects of sustainability. For instance, concerning

the social and cultural aspect, Julie said, “We are not able to interact with community members at this point. I would say due to COVID-19 but that is very unusual. It is not typical but in childcare, we are not allowed to have extra people.” With regards to the economic aspect, Martha shared that even though the children had been very interested in setting up different types of stores in the classroom, providing suitable materials for the children in collaboration with the parents had been difficult. On this point, Martha said, “We have a lot of restrictions so if something comes from home, we have to have it in our storage for at least one week untouched and in a sealed container before we open it up because of COVID-19.” Regarding the environmental aspect, Ruby indicated that COVID-19 had negatively impacted the natural materials in her program. On this point, Ruby said, “We do have repurposed furniture with the donations we receive but I will have to say not plants right now because of COVID and no animals either.”

The Use of Loose Parts. The use of loose parts was also a theme that continued to be mentioned by the educators in the follow up interview. The educators repeatedly mentioned loose parts as appropriate means to engage their children in sustainable activities. To illustrate, Donna said, “You know, as they say, the simpler the better. Now children really do enjoy just simple, everyday things to explore. We do not have to buy all these fancy gadgets.” Even educators who worked with the younger age groups such as infants and toddler referred to the use of loose parts in daily sustainable practices. For example, Kira said, “We are using a lot of loose parts sort of things. So, toilet paper rolls and things like that. We are using them to create art and that sort of thing.” Another educator, Margaret, mentioned that she recalled an interesting conversation about loose parts with colleagues during the breakout session in the PD and shared that staff in her program regularly makes use of loose parts with children, sometimes over extended periods of times. On this point, Margaret said, “You know kids! So, they learn to play with just an old blanket type of thing, we use them and we keep them for years.”

Reflective Practices. The theme of reflective practices was not present in Phase 1 but was also widespread in the answers provided by the educators during the follow up interview. This theme refers to instances in which the educators made comments or shared anecdotes about how they reflected on their ECEfS teaching practices since the PD. For example, Maria mentioned that the PD had helped her and her colleagues consolidate their reflective practices. To illustrate, Maria said, “We are really trying to be reflective educators and really thinking about what the program needed. This [the PD] just kind of solidified that and gave us a little bit of a push in the right direction, it was wonderful, it was great!” Another educator indicated that since the PD, she and the children reflected more frequently about the materials they used. For instance, Anne said, “So one of the things we have been really trying to think about is using the resources that we have available to us and not going out and buying resources, focusing on the paper, focusing on the water.” A third educator, Donna, mentioned she remembered a conversation she had during the PD’s breakout room sessions about the creation of a toy lending library that prompted her to reflect on the use of materials. Donna said, “I think that anything that we provide for children really needs to be thought out, talked about, reflected on, you know? So, these sorts of things maybe we could teach or help early childhood educators understand the importance of a little more.”

Virtual Interactions. The theme of virtual interactions, which was also new to the follow up interview, was less prevalent than the previous three but also appeared frequently in the responses of the educators. Virtual Interactions refers to instances in which the educators mentioned how technological platforms were either used or could be used to replace in-person interactions among different members of the early childhood community to promote ECEfS practices. For instance, Mary suggested the creation of a virtual forum for educators to connect about ECEfS topics and said, “Even if it is just a forum for ECEs to get together or even if it is something online that you may just type in if you cannot join to actually talk.” Another educator, Helen, mentioned one of her social media accounts as a medium to promote ECEfS practices, “I

have an Instagram account in which I like to share stuff I do related to early childhood care and education so I do have fun sharing pictures of some of the projects I do.” Margaret shared that her program had created a virtual show and tell every Tuesday for families and children to share their preferred videos with each other, “One child did sprinkled cookies in front of us, some kids read a story with their parents, one parent showed us her house with Valentine’s day decorations and told the teachers how much she missed them.”

Documentation of Practices. Similarly to virtual interaction, this new theme about documentation practices was also less prevalent than the first three themes but was mentioned and discussed by several participating educators. Documentation of practices refers to instances in which the educators highlighted the importance of documentation when learning about or engaging in ECEfS practices. One educator, Maria, explained that it she would like to see how other programs document their ECEfS practices. “I would like to see more of what other centres are doing (...) Do they have documentation samples? For example, a learning story of some sort that shows how they are addressing sustainability?” Another educator, Gabriela, indicated that it would better if I would show samples of my own documentation about ECEfS in my PD as opposed to present examples from other educators and researchers, to illustrate, Gabriela said, “Maybe more immediate feedback then is that stories that are used to share your point of view are very impactful but I can offer the idea that people would love to hear your story; so, some of your own documentation is part of that.”

Responses to the Qualitative Sub-question for Phase 3

In this section, I answer the qualitative research sub-question for Phase 3, which was: How have the reported practices of the educators changed after the PD? First, I address the question by referring to the data analyzed through deductive coding, which included three main themes that correspond to the three aspects of sustainability: social and cultural, economic, and environmental. Then, I address the question by referring to the data analyzed by means of inductive coding, which I conducted using an emergent approach.

Concerning the data I analyzed using deductive coding, in the social and cultural aspect of sustainability, several educators reported an increase in practices in the dimensions over which they were able to act upon. For example, four educators indicated they had added materials such as books, artwork, and cultural food display. Conversely, several educators reported a decrease in practices in the dimensions over which they had no control due to stricter COVID-19 protocols such as interactions with community members. In the economic aspect of sustainability, the majority of the educators reported no changes in the different dimensions. In each dimension under the economic aspect, changes in practices were mostly reported by single educators. In the environmental aspect of sustainability, several educators reported an increase in practices in the dimension over which they had the capacity to act upon. For instance, three educators reported an increase in environmental classroom activities. On the other hand, several educators reported on a decrease in practices in the dimension over which they did not have control due to COVID-19 such as the incorporation of natural and ecofriendly materials, which are typically harder to clean and sanitize when compared to materials made out of plastic.

Concerning the data I analyzed using inductive coding, although the negative impact of COVID-19 on the educators' ECEfS practices was, in general, the single most talked about theme, the educators continued to report on the use of loose parts as suitable materials to engage children in sustainable practices, even for the youngest ones who are still infants or toddlers. Additionally, following the PD, the majority of educators also shared ideas and anecdotes that suggested they were engaging in reflective practices about the topic of ECEfS in a variety of ways as illustrated in the previous section. Some of the educators also highlighted the role of different virtual means of communications to either engage in ECEfS practices with early childhood stakeholders such as children and families or to continue learning about ECEfS in the future alongside colleagues. Lastly, several educators reflected on the importance of documentation as part of the process of continuing to learn about ECEfS.

Phase 4: Final Merged Interpretation

To follow, after re-presenting the procedural diagram using colour to highlight where the final interpretation occurred within the research process, I present three more figures corresponding to the three aspects of sustainability (see Figure 25, 26, and 27). Each figure contains a side-by-side comparison of the quantitative and qualitative data obtained for each of the five dimensions of each aspect. In the column for the quantitative data, in addition to the scores of the aspects, I indicate if there was an increase or decrease of the score when compared to the scores obtained in Phase 1, prior to the PD. Additionally, each figure contains a column in which I included meta inferences indicating if the quantitative and qualitative data confirmed, disconfirmed, or expanded on one another.

Figure 24

Procedural Diagram Highlighting the Final Merged Interpretation in Phase 4

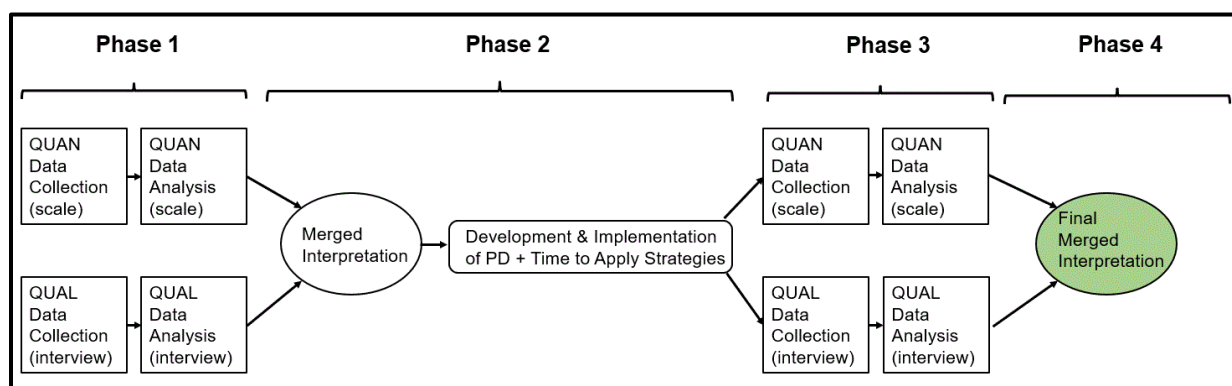


Figure 25*Merged Interpretation for the Social and Cultural Aspect of Sustainability*

Dimension	QUAL Results Summary of Interview Responses	QUAN Results Means & Variation	Mixed Methods Comparison Meta Inferences
Classroom materials	Over half of the educators reported no changes in the amount of classroom materials since the first interview. Some educators indicated they had added materials such as books, artwork, and cultural food displays. Only one educator reported a decrease in materials.	3.42/4 Good Increase of 0.23	<i>Confirmation:</i> The increase in the number of materials reported by some of the educators corresponds to the increase in the mean score for this dimension.
Discussions	All the educators indicated that the number of discussions about social and cultural topics remained the same since the first interview.	2.50/4 Minimal Decrease of 0.12	<i>Expansion:</i> Even though all the educators reported a lack of change in the number of discussions, the decrease relates to the fact that one the educators who scored this dimension very high in the first interview did not take part in this phase of the study.
Social and Cultural Activities	Although most of the educators reported that there were no changes in the social and cultural activities after the first interview, one educator mentioned there was a substantial increase in virtual social and cultural activities.	3.25/4 Good Increase of 0.10	<i>Confirmation:</i> The increase in social cultural activities reported by one of the educators is in line with the increase of the mean score for this dimension.
Social Justice Initiatives	Although most educators indicated that social justice initiatives remained the same since the first interview, a few educators stated that there was an increase in the initiatives.	2.16/4 Minimal Increase of 0.20	<i>Confirmation:</i> The increase in social justice initiatives reported by a few of the educators aligns with the increase of the mean score for this dimension.
Interactions with community members	Most of the educators shared that there were no major changes in the interactions with community members although a few of them felt the interactions were more at a distance. A few educators reported on a major decrease of interactions from frequent to almost non-existing	2.96/4 Minimal Decrease of 0.46	<i>Confirmation:</i> The significant decrease in interactions reported by a few educators is consistent with the decrease in the mean score for this dimension.

Figure 26*Merged Interpretation for the Economic Aspect of Sustainability*

Dimension	QUAL Results Summary of Interview Responses	QUAN Results Means & Variation	Mixed Methods Comparison Meta Inferences
Classroom materials	Most of the educators indicated there were no changes in the classroom materials since the first interview. However, one educator reported an increase in materials and, on the other hand, another educator reported on a decrease in the classroom materials.	3/4 Good No variance	<i>Expansion:</i> The lack of variance in the mean score for this dimension could be interpreted as a lack of change in classroom materials. However, the qualitative data from the interview shows that there were actually a couple of changes and that the lack of variance in the mean score can be explained because the increase in materials in one case made up for the decrease in another case.
Discussions	The majority of educators indicated that discussions on economic topics remained the same after the first interview. Only one educator reported an increase in discussions.	2.50/4 Minimal Increase of 0.05	<i>Confirmation:</i> The increase in discussions on economic topics reported by one of the educators is consistent with the increase in the mean score for this dimension.
Reusing/ Recycling Activities	Most of the educators indicated that reusing/recycling activities remained the same after the first interview. Only one educator reported a decrease in the activities in her program.	3.92/4 Good Decrease of 0.09	<i>Confirmation:</i> The decrease in reusing/recycling activities reported by one of the educators is in line with the decrease in the mean score for this dimension. Another factor that accounts for the decrease relates to the fact that the educator who left the study after Phase 1 had scored this dimension with a 4/4
Conservation Initiatives	Most of the educators indicated that there were no changes in the conservation initiatives since the first interview. Only one educator reported an increase in conservation initiatives in her early learning setting.	3.25/4 Good Increase of 0.02	<i>Confirmation:</i> The slight increase in the mean score for this dimension is consistent with the increase in conservation initiatives reported by one of the educators.
Responsible Purchases	The majority of the educators shared that the children's involvement in making responsible purchases remained the same after the first interview. Two educators reported an increase in the children's engagement in making responsible purchases.	1.54/4 Inadequate Increase of 0.04	<i>Confirmation:</i> The increase in the mean score for this dimension aligns with the increase in the children's involvement in responsible purchases reported by two of the educators.

Figure 27*Merged Interpretation for the Environmental Aspect of Sustainability*

Dimension	QUAL Results Summary of Interview Responses	QUAN Results Means & Variation	Mixed Methods Comparison Meta Inferences
Classroom Materials	Even though most of the educators indicated that the classroom materials remained the same after the first interview, several of the educators reported on a decrease in materials due to stricter COVID-19 procedures and cleaning protocols.	3.42/4 Good Decrease of 0.20	<i>Confirmation:</i> The decrease in materials reported by some of the educators is consistent with the decrease in the mean score for this dimension.
Discussions	All the educators indicated that the classroom discussions about environmental aspects remained the same after the first interview.	2.31/4 Minimal Decrease of 0.06	<i>Expansion:</i> Even though all the educators reported a lack of change in the number of discussions, the decrease relates to the fact that one the educators who assigned a high score to this dimension in the first interview did not participate in this phase of research.
Classroom Activities	Most of the educators indicated the classroom activities remained the same after the first interview. Some of the educators reported an increase in classroom activities.	3.23/4 Good Increase of 0.27	<i>Confirmation:</i> The increase in classroom activities reported by some educators is consistent with the increase in the mean score for this dimension.
Environmental Initiatives	All but one of the educators stated that environmental initiatives remained the same after the first interview. One educator reported an increase in environmental initiatives.	2.67/4 Good Increase of 0.05	<i>Confirmation:</i> The increase reported by one of the educators is in line with the increase in the mean score for this dimension.
Interactions with Nature	The majority of the educators indicated there were no changes in the interactions with nature after the first interview. One of the educators reported an increase and another educator reported a decrease in the interactions due to COVID-19.	3.63/4 Good Decrease of 0.02	<i>Expansion:</i> The minor decrease in the mean score for this dimension could be interpreted as a minimal decrease in one of the educators' scores. However, the qualitative data from the follow up interview shows that there were actually a couple of changes and the minor decrease in the mean score can be explained because the increase in interactions with nature in one case partially compensate for the decrease in another case.

Response to the Sub-question for Phase 4

In this section, I answer the qualitative research sub-question for Phase 4, which was: How did participating in the PD impact the educators' ECEfS practices short term? To address the question refer to the meta-inferences from the merged interpretation and I also make connections to the data analyzed by means of inductive coding (emergent themes) to provide a more complete response to this final sub-question.

The meta-inferences arising from the merged interpretations of the three aspects of sustainability showed that for the most part, the scores on the scale (quantitative data) and the reported practices of the educators (qualitative data analyzed with predetermined codes) confirmed one another. Consequently, as previously noted in the answers to the research sub-questions for Phase 3, there were multiple changes in the ECEfS practices after the PD. Overall, there was an increase in practices associated with some of the dimensions among which the dimensions of social and cultural classroom materials, social justice initiatives and environmental classroom activities increased the most. Conversely, there was a decrease in practices associated to some of the dimensions among which the dimensions of interactions with community members, environmental classroom materials and social and cultural activities decreased the most.

Although the merged interpretation proved useful because, for the most part, it illustrated the consistency between the quantitative and qualitative data, and because it yielded additional insights (e.g., a lack of variation in the mean score of a dimension did not mean a lack of changes in the educators' practices), the inductive data analysis allowed me to address the sub-question in a more comprehensive manner. In other words, the inductive analysis revealed the educators' engagement with matters of ECEfS that went beyond the objective and practical strategies outlined in the scale. Notwithstanding the utility of these strategies, it is perhaps more important to note that the PD impacted the educators' ECEfS practices in unforeseen yet meaningful ways. For instance, by generating reflection about the impact of COVID-19 in ECEfS

practices, the role of loose parts, virtual interactions and documentation practices while engaging in matters of ECEfS, and reflective practices to further develop ECEfS practices.

Chapter 5

Discussion

In this chapter, I address separately the two overarching questions of the study: *How did ECEfS PD impact the practices of early childhood educators?* and *How did early childhood educators' practices impact ECEfS PD?* To address these questions, I examine the entire quantitative and qualitative dataset collected and analyzed in the four phases of the study, and I describe the most relevant findings. Then, I revisit the findings discussed in light of the two influential theories upon which my study is based.

How did ECEfS PD Impact the Practices of Early Childhood Educators?

In this section I explain the impact of the ECEfS PD on the participating educators' practices. To begin, I address the considerable influence of COVID-19 restrictions and regulations on the educators' ECEfS practices. Next, I highlight the small but encouraging improvements in the educators' ECEfS practices and the need for more time and opportunities for the educators to further develop their practices. Then, I discuss the educators' engagement in reflective practices about ECEfS and the similarities between the educators' reflective practices and the concept of recognition as conceived in Reggio Emilia schools. Lastly, I describe the educators' widespread mentions to loose parts as a medium to engage in ECEfS.

The Impact of COVID-19 on the Educators' ECEfS Practices

In discussing the impact of the PD on the educators' practices, I need to address the substantial impact of the COVID-19 pandemic on the educators' practices. The pandemic not only impeded the educators from further developing some of their ECEfS practices but even forced them to reduce some of their well developed ECEfS practices to a minimal level (e.g., interactions with community members). Although the COVID-19 pandemic intensified general structural difficulties experienced by the ECE sector such as inadequate funding and insufficient support for staff (Tekin et al., 2022), the impact of the pandemic on the educators' sustainable

practices was also evident in the context of government mandated regulations and restrictions (e.g., social distancing, disinfection protocols) put into place in early childhood settings during the data collection and the implementation of the PD.

As part of the mandated COVID-19 regulations, early learning settings in Ontario were required to provide mask and eye protection for children, follow strict cleaning and disinfection procedures of the environment, toys, and equipment and limit contact to essential personnel only (Government of Ontario, 2021). As a result of these regulations and restrictions, educators reported having to substantially decrease their usual contact with community members such as volunteers and guest speakers. Additionally, several educators indicated that they had to put away environmentally friendly materials, which were not suitable to resist the more rigorous and repeated disinfection processes (e.g., wooden toys, cultural fabrics). While these adverse effects of the COVID-19 on the educators' ECEfS practices were not related to or caused by the PD, the adverse effects do put in evidence the fragility of the early childhood sector. These negative effects also call for a discussion on how to mitigate such negative effects in future PD both concerning ECEfS practices and the ECE sector in general.

Modest Improvements in ECEfS Practices

Despite the negative impact of COVID-19 on several dimensions of the educators' ECEfS practices and in particular over the dimension related to interactions with community members, there were numerous dimensions on which participating educators reported an increase in score and a corresponding development of sustainable practices. Considering that the educators in general were already engaging in a variety of ECEfS practices, the improvements in reported practices were small but encouraging. For example, the increase in the dimensions' means varied between 0.02/4 and 0.27/4 and were reported by only one to four educators per dimension. Considering the widespread difficulties experienced by the ECE sector outlined in the previous section, these small positive changes are promising and provide evidence that educators are committed to develop their ECEfS practices.

The challenges experienced by the educators during the data collection explain in part the modest improvements in their ECEfS practices. Though other factors may have also played a role. For instance, Cochran-Smith and Lytle (1999) state that for meaningful learning to occur within a constructivist approach, educators need time and opportunities to make connections between their previous knowledge and the new understanding they acquired. My PD was designed to extend over a period of time as recommended by Darling Hammond et al. (2017) and Russel (2009) within the constraints of my PhD studies and followed a constructivist approach; however, more time and opportunities would be required for the participating educators to continue to make connections between recommended ECEfS strategies and their own practices more consistently. Additionally, the environmental aspect of sustainability had, before and after the PD, the highest average score, which shows that the educators' practices were more developed in this aspect and continued to be after the PD. Although environmental practices are to be embraced and celebrated, Hill et al. (2014) point out that work is needed to achieve a more holistic conception of sustainability beyond the focus on environmental practices to better include the other aspects of sustainability. Perhaps this strong emphasis on the environmental aspect can become a foundation upon which to develop the other two aspects of sustainability in future ECEfS PD.

The Educators' Engagement in Reflective Practices about ECEfS

Besides from the small improvements in the educators' ECEfS practices, throughout the research process and in particular during the PD, the participating educators reported on engaging in reflective practices about ECEfS. Several educators said they were pleased about having engaged in reflective practices with colleagues and having the opportunity to think deeply about their use of resources and about the ECEfS needs of their programs. The reflective practices that took place during the PD among educators were of a high level and in line with the important characteristics of reflective practices outlined by Stacey (2018), such as complex thinking, intentionality, and a concern with practical issues. While ECEs are expected

to engage in reflective thinking because the Ontario early year's pedagogical framework *HDLH* states that educators should participate in “ongoing reflective practice and collaborative inquiry with others” (OME, 2014, p.16), reflective practices should not be taken for granted or be considered simple processes. As noted by Brock (2015), to address complex issues, educators need to engage in reflective practices that require deep analysis and an exploration of perspectives from different angles. In this context, the PD was an initial step for educators to start developing reflective practices about ECEfS with colleagues. The analysis of the datasets presented in Chapter 4 revealed that although ECEfS reflective practices did take place during and after the PD, more opportunities are needed for these ECEfS reflective practices to develop.

The reported reflective practices about ECEfS that took place during the PD also fully align with a concept of ‘re-cognition’, which is central to the schools of Reggio Emilia and to the teachings of Malaguzzi (Cagliari et al. 2016). Re-cognition means reflecting about experiences frequently in collaboration with other educators and re-examining the meaning of those experiences (Moss, 2016a). As a matter of fact, Moss (2016a) illustrated the meaning of re-cognition with the following example that describes exactly the type of reflections and engagement that took place among participating educators during the PD: “a small group rejoins the larger group and tells what they have been doing, creating in the process new shared knowledge, whilst themselves ‘re-knowing’ the original experience through sharing it with others” (p. xxiv). Although I did not make an intentional effort to engage the educators in the process of re-cognition as conceived by Malaguzzi, the striking similarities between the educators’ reflective practices outlined in Chapter 4 and the process of re-cognition highlight one more pedagogical point of intersection between Malaguzzi and ECEfS, which suggests that there may be further practical applications of Malaguzzi’s teachings to ECEfS PD.

Loose Parts as a Medium to Engage in Sustainable Practices

Among the ECEfS topics that the educators reflected upon during the PD, the use of loose parts as a medium for sustainable practices was the most prevalent. The extent to which

educators referred to loose parts in connection to all three aspects of sustainability highlights the importance of loose parts as a medium to engage children in ECEfS. Even though loose parts have been defined in multiple ways (Houser et al., 2016), a general definition that is succinct and captures the main idea behind loose parts is “materials that can be moved, redesigned, put together and taken apart in a variety of ways” (Dietze and Kashin, 2012, p. 153). At first glance, this definition may not make the connection between loose parts and ECEfS evident but Nicholson (1971), who coined the term loose parts, highlighted the connection between loose parts and environmental education. Nicholson advocated for a comprehensive understanding of environmental education even before the concept of sustainability became fashionable. In this context, he argued fervently for a change in the educational system to a more hands-on approach that would include the engagement of children with loose parts in local environments.

Although five decades have passed since Nicholson first coined the term, no empirical studies linking loose parts to ECEfS have been published. However, practitioner friendly resources such as a textbook by Daly and Beloglovsky (2018) highlight the connection between loose parts and culturally sustainable environments and invite readers to create environments that celebrate diversity through the introduction of culturally representative loose parts. The versatility, composition, and open-ended nature of loose parts, which includes recycled materials such as tires and boxes or natural materials such as pebbles or pinecones (Gull et al., 2019) makes loose parts a suitable medium for children to engage in ECEfS. Therefore, the reflections of the participating educators about loose parts in the context of ECEfS call for further exploration of how loose parts are or can be used as a medium for children and adult to engage in ECEfS practices.

How did Early Childhood Educators’ Practices Impact ECEfS PD?

In this section, I describe how the educators’ practices presented in Chapter 4 will impact future ECEfS PD. I start by explaining the need for a greater engagement with the topic

of ECEfS. Then, I refer to the need to put a stronger emphasis on the economic aspect of sustainability. Next, I outline the importance of continuing to foster dialogues about ECEfS among ECE stakeholders. Subsequently, I argue that dialogues about the sustainability of ECE profession should be at the forefront of future ECEfS PF. To conclude, I highlight the potential benefits of disseminating the educators' ECEfS practices and projects, which were shared with me throughout the research process.

The Need for a Broader and Deeper Engagement with ECEfS

My analysis of the educators' reported practices revealed an affect-oriented engagement with issues related to ECEfS that went beyond recommended strategies outlined in exemplary ECEfS projects (e.g., Silkworm Project, Fuji & Izumi, 2008) or in the adapted ERS-SDEC scale (Siraj-Blatchford, 2016b). For instance, some educators reported modeling a profound affection for all living things including plants and insects, and other educators indicated taking action to promote a deep sense of wellbeing for the children and families in their early learning settings. These types of engagement shared by the educators put into question the content of the PD delivered, which was more focused on ECEfS information and strategies, and point to the need to reframe future PD to highlight and cultivate these types of reported engagements. Such reframing would be inline with Inoue et al. (2016), who cast doubt on professional development that focuses on strategies and recommended PD with opportunities to develop richer understandings about sustainability.

Considering that a more holistic understanding of ECEfS is needed for transformational sustainable learning to occur for both adults and children (Hill et al., 2014), in the future, the current content of my PD may constitute a first step at familiarizing the educators with the basics of ECEfS but the long-term focus ought to be on channeling the educators' reported engagement more purposefully. A suitable path to expanding on the PD that I designed might be *practice study*, a Japanese form of PD in which educators decide on an educational theme that they would like to pursue (Inoue et al., 2016). Subsequently, the educators plan, document,

enact, reflect upon, and discuss the theme under the supervision of a more experienced educator or research (Inoue et al., 2016; Inoue, 2019). For instance, Inoue (2019) highlighted the extended learning about sustainability that took place for children and educators in a nursery centre in Osaka, Japan over a period of 5 years following a practice study type of PD. A deeper and more prolonged format of ECEfS PD would allow for educators and children to enact more comprehensively constructivist practices (e.g., engage in local ECEfS projects). Additionally, this ECEfS PD format would allow for the adoption of systems thinking approach so the learning about ECEfS goes beyond individual educator initiatives, and becomes a broader systems-wide enterprise as suggested by Davies (2008).

A Stronger Emphasis on the Economic Aspect of Sustainability

In addition to the need for an expansion of the breadth and depth of PD in ECEfS, my analysis of the educators' practices also pointed to a need to further highlight practices related to the economic aspect of sustainability. Despite a modest improvement in the mean scores of individual dimensions under the economic aspect of sustainability, this aspect was the aspect with the lowest score and fewest reported practices both before and after the PD. Within the economic aspect, the educators' practices increased the most in the responsible purchases dimension but even with this improvement in scores and reported practices, mean scores remained in the minimal range.

These findings about the economic aspect of sustainability are consistent with ECEfS literature, which identifies the economic aspect of sustainability as the least addressed from the aspects of sustainability (e.g., Borg, 2019, Grindheim et al., 2019). To illustrate, Borg (2019) contends that more research is needed on this topic in order to support children's understanding of other children's lives and economic situations. Also, children are capable of experiencing and recognizing complex matters such as economic issues (Pramling Samuelsson, 2011). Consequently, despite the PD having covered the economic aspect of sustainability and its

connection to the other two aspects, future PD should more strongly emphasize the economic aspect to make up for the identified neglect on practices in this aspect.

The Importance of Fostering Dialogues in ECEfS PD

One more element that was evident in the analysis of the datasets was the relevance of dialogues, which was highlighted by the participants both during and after the PD. These findings put in evidence the need to maintain and expand the spaces for dialogue in future PD. Dialogues need to be conceived beyond the mere learning about ECEfS in future PDs by educators and include other early learning stakeholders. As noted by Malaguzzi, children and parents should also be invited to participate, debate, and engage in dialogues with each other in a position of equality with academic research (Cagliari et al., 2016). The inclusion of children, parents, and other members of the community in matters of sustainability is already inherent to ECEfS. To illustrate, Ballantyne et al. (2001) observed that young children were capable of influencing their families everyday household practices such as walking or riding a bike to school, taking shorter showers, and turning off taps and lights.

In addition to the benefits of engaging in dialogues within local communities, broader forms of dialogue should also be considered as platforms to move the field of ECEfS forward. ECE practitioners and researchers with an interest in ECEfS can join recent initiatives such as the *Transnational Dialogues in Early Childhood Education for Sustainability (TD- ECEfS)*. *TD- ECEfS* is an informal international collaborative network of individuals with different professional and academic backgrounds who share an interest on ECEfS and who foster international conversation and join forces to advance the research on ECEfs (Emery et al., 2016). As a matter of fact, I intend to join this initiative upon completing this dissertation and I will invite likeminded educators to join as well. Engagement in the types of dialogues that occur in *TD- ECEfS* may constitute an important part of PD in ECEfS. In such dialogic learning environments, “participants become equal contributors to the creation of meaning, articulating, examining, elaborating, or revising their own and one another’s thinking” (Crafton & Kaiser, 2011, p. 113).

Also, within a constructivist approach, language is an important medium to scaffold a group in the pursuit of achievements (Crafton & Kaiser, 2011). In this context, a pursuit for the development of ECEfS within an international collective of people who share the same interest.

The Lack of Sustainability of the ECE Profession

An important idea that is closely related to the topic of dialogues that merits being at the forefront of conversations and collaborations in future ECEfS PD is the sustainability of the ECE profession. This unexpected idea was mentioned by a number of participants in the first interview when they were asked about their understanding of the concept of sustainability. The educators referred to mental health and emotional challenges that they experienced and the difficulties of sustaining commitment in a job that is demanding. The idea of the sustainability of the ECE profession, although unforeseen as an outcome of my study, cannot be ignored because if educators are expected to enact ECEfS principles, a discussion about the importance of fair and sustainable working conditions within their early learning settings also need to be part of the dialogues.

On the topic of working conditions in early childhood settings, Moss (2010) noted that there is an urgent need to address several issues experienced by ECEs in Canada such as shamefully low pay as well as a lower status in comparison with K-12 teachers. As a matter of fact, in comparison to other female-dominated professions, which require comparable educational credentials, ECEs earn among the lowest salaries, significantly below the Canadian salary average (Atkinson Centre, 2022). Additionally, ECEs face difficult working conditions that include, among other challenges such as low access to health benefits and pension plans, high staff turnover, and workforce shortages (Atkinson Centre, 2022). Although in 2021 the Government of Canada announced substantial funding for the childcare sector (Department of Finance Canada, 2021), improvements in the ECE sector are likely to take time to crystalize. The recognition of how the economic, social, and environmental issues interconnect within the ECE profession may constitute a powerful catalyst for educators to develop a greater

understanding of how the three aspect of sustainability impact each other. This understanding would likely allow educators to engage more deeply in ECEfS and perhaps also advocate for change towards a more sustainable model of ECE. Although the sustainability of the ECE profession was a topic that I did not address in the PD because I became aware of its importance only after the implementation of the PD, it is certainly a topic that merits attention in the future ECEfS PD.

The Dissemination of Participants' ECEfS Practices and Projects

Lastly, upon closer revision of the participants' interview transcripts, I noted the richness and beauty of the specific practices and projects described by the participating educators that touched upon one or more aspects of sustainability (e.g., planting a Three Sisters garden, making recycled paper). These practices and projects were mentioned in Chapter 4 of this thesis, but certainly merit a more detailed promotion with a wider ECE audience. When approached, all the educators expressed joy and excitement about sharing their practices with other ECEs and granted me permission to share their practices. Although I still need to decide on a suitable platform for compiling and sharing these practices and projects, it is likely that a website would be an appropriate option. Regardless of the format, the compilation may be used as a companion resource for future PD or as a source of ideas and inspiration for educators looking forward to expanding their ECEfS practices. The wide range of practices and projects contributed by participating educators provides evidence that the small body of ECEfS literature does not equal an absence of educator practices. In fact, the field of ECEfS has been mostly advanced by practitioners (Davis & Elliott, 2014).

Connections between Findings and Influential Theories

In the introductory section of this dissertation, I argued that social constructivist theory and systems theory supplemented each other as influential theories of my study because social constructivist theory included notions such as socially mediated knowledge and active learning, which were enhanced by systemic ideas such the interconnection and interdependence of

sociocultural and natural systems. To follow, I highlight how the findings discussed in the previous section tie back to these two theories. Although I already included brief mentions to how some of the findings connected to the two theories, next, I make the connections more explicit to all the findings.

The influence of the COVID-19 pandemic on the educators' ECEfS practices, the need for a stronger emphasis on the economic aspect of sustainability and the lack sustainability of the ECE profession are findings that relate closely to systems theory. In each of these findings, it is evident that issues of sustainability are interdependent and cannot be understood in isolation. For example, the COVID-19 pandemic had a negative impact on the educators' practices across the three aspects of sustainability, the concept of sustainability cannot be achieved if one of the three aspects is not addressed, and educators should not be expected to teach about ECEfS if the sustainability of their profession is compromised.

The small improvements in the educators' ECEfS practices, the need for a deeper engagement with ECEfS, the dissemination of the educators' projects and the use of loose parts as a medium to engage in ECEfS connect in different ways with important social constructivist ideas discussed in Chapter 1. The first two findings relate to the construction of the educators' knowledge about ECEfS which took place during my study but needs to be further developed. The third finding relates to the role of a more knowledgeable other in further disseminating ECEfS practices. Lastly, the fourth finding connects to both the importance of play and active learning while engaging with materials such as loose parts.

The relevance of fostering dialogues and the educators' engagement in reflective practices contain elements of social constructivist theory (e.g., socially mediated learning) and systems theory (e.g., an emphasis on interconnection and relationships). In the previous section, these two findings were linked to the teachings and the work of Loris Malaguzzi. This connection is particularly noteworthy because it is relatively unknown that Malaguzzi's work included elements from both social constructivist theories and systems theory. In fact, in an

earlier period of his life, Malaguzzi drew from constructivist theorists including Vygotsky and Dewey (Cagliari et al., 2016). However, upon closer examination of his work, I noted that in a later period of his life, Malaguzzi moved to ideas from a second set of scholars including Gregory Bateson and Francisco Varela (Cagliari et al., 2016) whose work and an ideas were seminal to the development of systems theory.

In summary, certain findings in my study such as the development of the educators' ECEfS practices, the need for sustained opportunities to engage in ECEfS, the further dissemination of practices, and the use of loose parts were more closely related to social constructivist theory. Whereas the impact of the COVID-19 pandemic on the three aspects of the educators' ECEfS practices, the need to develop the economic aspect and the importance of addressing the sustainability of the ECE profession were more closely connected to systems theory. Other findings such as the importance of dialogues and reflective practices pertained to both theories. As a result, by adopting a systemic and constructivist approach, I had the opportunity to review the findings of my study in a more comprehensive and meaningful manner than if I had based my study on one of the two theories only.

Chapter 6

Conclusion

In this chapter, I start by presenting an overview of the dissertation in which I highlight the main elements of my study. Then, I summarize the most important results for each of the four research phases. To continue, I outline the limitations of my study along with strategies to overcome some of the limitations. Next, I describe directions for future research in ECEfS that became evident in the context of my study. Lastly, I present my concluding remarks in which I express my optimism about the future of ECEfS.

Overview of the Dissertation

Our world faces urgent problems that negatively impact natural environments and socio-cultural relationships (Siraj-Blatchford, Smith, & Pramling Samuelsson, 2010). Although issues of sustainability concern everyone, children have greater stakes because they will stay longer on the planet (Elliot & Davis, 2009) and because they are typically hit the hardest by disasters and social injustices (Siraj-Blatchford & Pramling Samuelsson, 2016). Therefore it is important to advance research in the field of ECEfS to support ECE stakeholders at searching for avenues toward a more sustainable future. Despite incorporating a wide range of concepts and interpretations, ECEfS is concerned primarily with children internalizing values of sustainability in their formative years (Siraj-Blatchford et al., 2010) and with children working alongside educators, families, and community members to seek solutions to local issues (Engdahl & Ärlemalm-Hagsér, 2014) and sometimes also larger scale issues (Engdahl & Rabušicová, 2011; Philips, 2014).

The purpose of my study was to create PD to support educators in engaging in ECEfS with the children under their care. To develop the PD, I followed the principles of two PD frameworks, Darling-Hammond et al. (2017) and Russell (2009). Darling-Hammond et al.'s framework was based on the systematic review of 35 rigorous studies on the topic of teacher PD. Russell's framework was developed specifically for early childhood educators working in

childcare programs. Although created for two different educational audiences, the two frameworks have very similar principles (e.g., active learning, built-in feedback). The pedagogical approach I adopted to create the PD was based on the work of Malaguzzi, who highlighted the importance of relationships in early childhood and argued for pedagogical practices with an emphasis on democracy and cooperation (Moss, 2016b).

The research process was informed by the work of leading scholars in the field of ECEfS (e.g., Davis & Elliot, 2014; Pramling Samuelsson & Kaga, 2008), by official Ontario early childhood education documents as well as by United Nations' documents that highlight the role of children as agents for social and environmental change. The two main theories that informed my study were social constructivist theory and systems theory. Although both theories concerned the relationships among ECE stakeholders, the former focused more on the learning dynamics that took place during my study and the latter was more concerned with the systemic nature of issues related to sustainability.

The participants of the study were 14 in-service early childhood educators who worked in a variety of early learning settings (e.g., kindergarten classrooms, childcare centre, home care). The educators worked with 1.5- to 5-year-old children. All the educators held an ECE diploma and three participants had pursued further education (e.g., bachelor's degree, master's degree). The majority of educators had more than 10 years of experience, three of them had over 20 years of experience and three had over 30 years of experience.

The methodology of my study consisted of a complex mixed methods design with four research phases. In Phase 1, I collected qualitative and quantitative data about the educators' ECEfS previous knowledge and practices by means of the adapted ERS-SDEC and interviews. In Phase 2, I merged the qualitative and quantitative data, created ECEfS PD, implemented the PD, and let 2 months pass for the educators to implement the strategies learned in the PD. In Phase 3, I conducted a second implementation of the adapted ERS-SDEC scale and a second round of interviews. In Phase 4, I performed a final merged interpretation of the data.

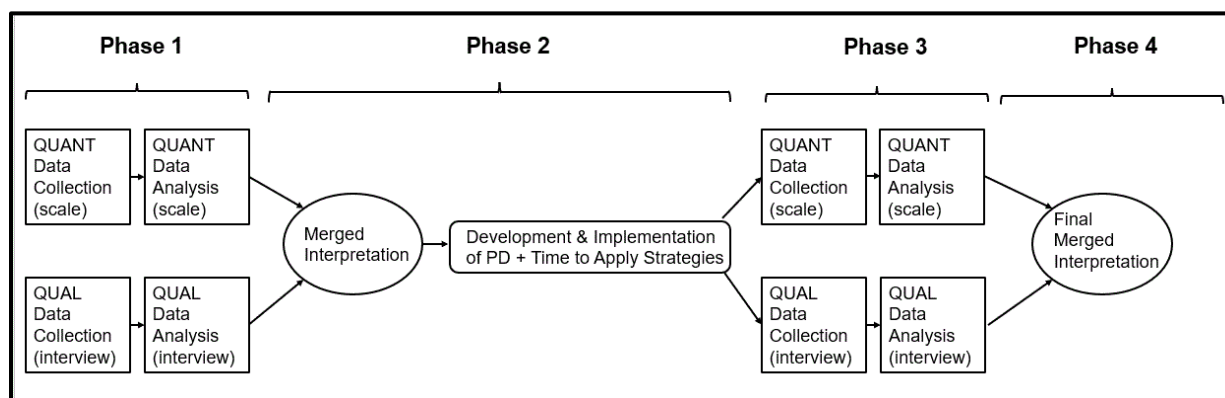
The results of the study indicated that some of the participating educators' ECEfS reported practices improved slightly after the PD while other ECEfS practices decreased due to strict COVID-19 restrictions put into place during the time of data collection. Although the modest improvements in the educators' ECEfS practices after the PD point to the need for a deeper and broader engagement with ECEfS, the educators' reported engagement with ECEfS was rich and meaningful, and manifested in a variety of ECEfS practices and projects. The educators' engagement also provided evidence about the importance of fostering professional dialogues and reflective practices in ECEfS, and highlighted the widespread use of loose parts as a medium to engage in ECEfS.

Summary of Results

In this section, after Figure 28, which highlights the four research phases of my study, I summarize the results obtained by analyzing the quantitative and qualitative data collected throughout the research process. I also summarize how the development and implementation of ECEfS PD were informed by the data collected in Phase 1.

Figure 28

Procedural Diagram for the Development of Meaningful PD in ECEfS



Summary of Results for Phase 1

In Phase 1, I collected quantitative data by means of the adapted ERS-SDEC rating scale (Siraj-Blatchford, 2016b) and qualitative data by means of the semi-structured interviews.

Analysis of the quantitative data showed that from the three aspects of sustainability, the mean score for the environmental aspect was the highest with 3.09/4. The mean score of the social and cultural aspect followed with 2.86/4, while the mean score for the economic aspect was the lowest with 2.83/4.

My inductive analysis of the qualitative data revealed that the participating educators engaged in a variety of ECEfS practices. The practices related to the environmental aspect of sustainability, and in particular to the dimension of interactions with natural environments, were the most frequently reported by educators. The social and cultural aspect followed the environmental aspect in the overall number of practices reported by the educators with a particularly high number in the dimension of interactions with community members. The economic aspect had the least amount of practices reported although all the educators indicated engaging in the dimension about reusing or recycling practices.

After conducting a deductive analysis of the qualitative data following an emergent approach, I identified six themes: (a) the impact of COVID-19, (b) care for the planet, (c) a sense of belonging, (d) the use of loose parts, (e) Indigenous partnerships, and (f) the application of Catholic beliefs. The first four themes were widely discussed by the participating educators, while the fifth and sixth themes were less prevalent but still meaningful because the educators shared interesting information and hands-on examples of practices.

Summary of Results for Phase 2

In Phase 2, I conducted a merged interpretation of the data collected in Phase 1 and I designed and implemented ECEfS PD based on that interpretation. In Phase 2, I also offered the participants additional support on demand for a period of 2 months after the PD. The merged interpretation of the quantitative and qualitative data revealed that although the majority of educators were not familiar with the field of study of ECEfS, they already performed a variety of ECEfS practices as outlined in the adapted ERS-SDEC scale. Analysis of the inductive coding that I conducted to complement and enhance the insights obtained through the

deductive analysis showed that the participating educators demonstrated an affective engagement with matters of ECEfS that went beyond recommended practices associated with the three aspects of sustainability.

With regards to my design and implementation of the PD, based on the information from the merged interpretation, I planned two small blocks of theory about ECEfS to address the participating educators' need for conceptual knowledge about ECEfS. In the first block, I outlined the origins of ECEfS and described the features of the three aspects of sustainability. In the second block, I highlighted common approaches to research in ECEfS and explained the alignment of ECEfS with modern ECE pedagogies. Regarding ECEfS practices, considering the already broad engagement of the educators with ECEfS, I capitalized on their experiences and engagement with ECEfS by allotting large blocks of time for the educators to share with each other their ECEfS practices. Additionally, I presented two formal ECEfS projects, one conducted in Japan and another one in Canada. I also discussed an example directly related to participating educators' reported recycling and reusing practices to illustrate how the three aspects of sustainability can be effortlessly incorporated into ECEfS projects.

Concerning the additional support that I offered to the educators, shortly after the PD three educators asked me for supplementary resources so that they could continue learning about the topic of ECEfS alongside their colleagues in their early learning centres. I selected two publicly available and practitioner friendly resources to support the educators in expanding their knowledge about ECEfS. The first resource was an electronic book *Education for Sustainable Development in the Early Years* (Siraj-Blatchford et al., 2010), which included more information about the three aspects of sustainability as well as further strategies to develop their ECEfS practices. The second resource was the electronic book *The Contribution of Early Childhood Education to a Sustainable Society* (Pramling Samuelsson & Kaga, 2008), which contained short chapters written by ECEfS researchers from all around the world.

Summary of Results for Phase 3

In Phase 3, I collected quantitative data by means of a second implementation of the adapted ERS-SDEC (Siraj-Blatchford, 2016b) and qualitative data by means of a second round of semi-structured interviews. My analysis of the quantitative data revealed that although there were changes in most of the dimensions under the three aspects of sustainability (the mean scores of some dimensions increased and some decreased) when compared with the scores from the first implementation of the ERS-SDEC, the mean scores for the economic and environmental aspect of sustainability remained the same, 2.83/4 and 3.09/4 respectively. Concerning the mean score of the social and cultural aspect, there was a small decrease of 0.01 in the mean score to 2.86/4.

Results from the second round of qualitative analysis using deductive coding, showed that in the social and cultural aspect of sustainability, several of the participating educators reported an increase in practices in the dimensions in which they were able to act. Conversely, several educators reported a decrease in practices in the dimensions over which they had no control due to strict COVID-19 related restrictions such as reduced interactions with community members. In the economic aspect of sustainability, the majority of the educators reported no changes in the different dimensions, changes in practices were mostly reported by single educators. In the environmental aspect of sustainability, several educators reported an increase in practices in the dimension of classroom activities, in which they had the capacity to act. On the other hand, several educators reported a decrease in practices in the dimension of classroom materials, in which they did not have control due to stricter COVID-19 disinfection protocols.

After following an emergent approach to conducting the second round of deductive analysis, I identified five themes. The first two themes, (a) the impact of COVID-19 and (b) the use of loose parts, were the same as in Phase 1 and contained similar information. The next

three themes, (c) reflective practices, (d) virtual interactions, and (e) documentation of practices, were new and referred mostly to educators' experiences of participating in the PD.

Summary of Results for Phase 4

In Phase 4, I conducted a final merged interpretation of the quantitative and qualitative data that I had collected throughout the research process. My merged interpretation revealed consistency between the quantitative and qualitative data. In the few instances when the qualitative and quantitative data differed, my merged interpretation yielded additional insights (e.g., a lack of variation in the mean score of a dimension did not mean a lack of changes in the educators' practices). Overall, there was an increase in practices associated with some of the dimensions (e.g., social and cultural classroom materials, social justice initiatives, and environmental classroom activities increased). Conversely, there was a decrease in other practices due to COVID-19 restrictions (e.g. interactions with community members, environmental classroom materials).

Similar to my analysis in Phase 2, I conducted an inductive analysis to complement and enhance the insights that I obtained through deductive coding. This analysis revealed the participating educators' engagement with matters of ECEfS that went beyond my intentions of promoting practical strategies associated to the three aspects of sustainability during the PD. The analysis showed that the PD impacted the educators' ECEfS practices in unforeseen yet meaningful ways; for instance, generating reflection about the impact of COVID-19, loose parts, virtual interactions, documentation practices, and reflective practices.

Limitations of the Study

In this section, I outline the limitations of my study along with strategies to overcome some of them. The first limitation is the inability to generalize the results of the study to the wider ECE community. The second limitation is the educators' workplaces, which are not fully representative of the collective of early learning settings. The third limitation is my biases as an experienced RECE. The fourth limitation is the educational credentials of the educators.

The main limitation of my study was the inability to extend the results to a wider population of early childhood educators. The engagement with 14 participants allowed me to conduct an in-depth study of the educators' ECEfS practices but my findings are not generalizable to the rest of the ECE community. However, neither generalization nor the creation of 'one size fits all' strategies were the goal of this study; rather the aim was the creation of PD to support the meaningful engagement of the participating educators with ECEfS within their local contexts. Consequently, studies with a greater number of participants are needed to develop ECEfS practices at a larger scale.

Another limitation of the study concerned the nature of the organizations in which the participants worked. Although my study included participants who worked in a variety of early learning settings (e.g., kindergarten programs, childcare centres, home childcare), these types of settings represent only some among many other types of programs available for young children such as Head Start programs, nursery schools, and drop in centres (Dietze, 2006). Additionally, as noted by Sinha (2015), only 60% of 2- to 4-year-olds and 50% of 5- to 7-year-olds are enrolled in some type of childcare; the rest are cared for by parents or legal guardians. As a result, future research in different ECE contexts is needed to advance the knowledge and practices of ECEfS in Ontario and the rest of Canada.

A third limitation of my study was my biases as an experienced early childhood educator. Although my professional connections allowed me an easier access to participants and granted me a higher likelihood of conducting the research in a climate of mutual trust, it is possible that my familiarity with the participants influenced my views and my analysis of the perceived impact of the PD. To reduce the impact of my biases in the research process, I counted on the mentorship of my supervisor with whom I regularly discussed the challenges of the research process. Additionally, I followed methodological recommendations such as the guidelines that Rubin and Rubin (2014) outlined as part of their responsive interviewing method to maintain an ongoing process of self-reflection and to acquire an enhanced awareness about how biases and

expectations influence the interview process. In my study, I applied the responsive interviewing method by, for instance, being cautious of avoiding the use of leading questions and refraining from imposing my opinions on the interviewees through either overly encouraging or discouraging comments even if I had opinions about ECEfS or any of the topics discussed.

A fourth limitation concerned the background, qualifications, and experience of the participants in my study. Thirteen of my participants were experienced Registered Early Childhood Educators (RECEs) who abide by the Code of Ethics and Standards of Practice (College of Early Childhood Educators, 2017) and who enact modern early childhood education pedagogies. As a result, these participants were not representative of the collective of early childhood workers, which also includes new graduates and staff without ECE qualifications. Consequently, future PD in ECEfS will need to be adapted to meet the needs of early learning workers with different educational backgrounds and varying years of experience.

Implications and Contributions

Despite these limitations, my study yielded important implications for ECE stakeholders and made contributions to the field of ECEfS. In this section, I start by discussing two pairs of implications for early childhood education. The first pair of implications pertains practicing educators. The second pair of implications involves ECE policy makers and administrators. Then, I outline contributions for the field of ECEfS. The first set of contributions concerns research in ECEfS. The second set of contributions refers to the theories upon which to base research in ECEfS. The third set of contributions concerns to ECEfS research methodology. The fourth set of contributions relates to future PD in ECEfS.

Implications for Educators

The main implication of my study for practicing educators is the understanding that ECEfS practices are inherent to the work that they already carry out in early learning settings. In my study, all the educators were engaged in a variety of ECEfS practices and expressed pride and happiness with the realization that sustainability was already part of their practices. As

noted by Pramling Samuelsson and Kaga (2008), to engage in ECEfS it is advisable to build on existing ECE pedagogical practices as opposed to create entirely ECE new pedagogies. Therefore, it is important for educators to recognize their own ECEfS practices and learn how to further cultivate them.

Another implication for educators relates to the adaptation of the ERS-SDEC originally created by Siraj-Blatchford (2016b). The adapted ERS-SDEC may constitute a useful and practical tool for educators who want to develop their ECEfS practices and track their progress. Although the ERS-SDEC was already a tool available to educators with an interest in ECEfS, the adapted version of the ERS-SDEC scale was developed following the scale evaluation procedures outlined by Johnson and Morgan (2016) and with the peer review of three specialists in early childhood education and two experts in data collection instruments, resulting in a clearer, better organized, and more accessible pedagogical tool to promote the development of ECEfS practices.

Implications for ECE Policy Makers and Administrators

The analysis of the ECEfS content in Canadian ECE frameworks conducted in Chapter 2 and the results of the study presented in Chapter 4 suggest that ECE policy makers (e.g., framework developers and advisors) ought to include more consistent guidance about ECEfS in pedagogical documents. The need for direction about ECEfS in early learning frameworks was previously identified by Grogan and Hughes (2020) who indicated that the relationships between ECEfS and sustainability is complex, which causes some educators to struggle with the implementation of ECEfS. Although six provincial Canadian ECE frameworks include strategies to develop sustainability in early childhood in different quantities, the remaining four frameworks do not include any specific strategies related to sustainability, or even any mention of the topic. Consequently, a concerted effort to strengthen the content of ECEfS at a national level, with the aim of consistency across frameworks, would be beneficial for the ECE sector especially considering that the principles of ECEfS and ECE align seamlessly.

Concerning ECE educational administrators (e.g., coordinators of ECE college programs), the implications of this study are twofold. First, the compatibility of ECEfS principles with the early childhood frameworks across Canada that I outlined in the Chapter 2 highlights the need to add explicit ECEfS content to the curriculum of ECE training programs (e.g., including an ECEfS focused course). Second, the results of the study, which show that educators already engage in a variety of ECEfS practices, suggest the possibility of developing ECEfS learning partnerships between ECE students and practicing ECEs. In these type of collaborations, for instance, students on placement could be tasked with identifying ECEfS practices and sharing their observations with their supervising ECEs.

Contributions to Research in ECEfS

The results of this study contribute to the body of knowledge in ECEfS, which is a small yet growing field of study (Somerville & Williams, 2015). The practical nature of my study, which resulted in the development of refined PD for early childhood educators, may be particularly useful to ECEfS because as pointed out by Hedefalk et al. (2015) most of the research in ECEfS touches on theoretical subjects and as a result, more empirical work is needed on the teaching and learning processes of ECEfS.

More specifically concerning ECEfS research in Canada, despite the favourable pedagogical preconditions such as the compatibility of all the provincial early learning frameworks and the principles of ECEfS (e.g., a focus equitable social and cultural relationships, an emphasis on local contexts), very few publications featuring research in ECEfS have been published to date (e.g., Harwood et al., 2020; MacDonald, 2015). Consequently, my study not only adds to the emerging research ECEfS in Canada; it may also promote ECEfS research at a larger scale because the goal of my study was to create and refine ECEfS PD to reach a broader audience.

Contributions to Theory for Research in ECEfS

The first contribution to the theory of research in ECEfS refers to my approach of basing my study on social constructivist and systems theory. As noted in the discussion section, social constructivist notions such as socially mediated knowledge and active learning were enhanced by systemic ideas such the interconnection and interdependence of sociocultural and natural systems. Although other studies have adopted a combined approach based on systems theory and constructivist theory on the topics such as knowledge construction (e.g., Oeberst et al., 2014), gaming learning and instruction (Kriz, 2010), teacher professional development (Zehetmeier et al., 2014) and sustainability communication (Siebert, 2011), my study highlights the strengths of adopting a systemic-constructivist approach to research in ECEfS. For instance, by illustrating the intersection of systems theory and constructivist theory in my findings about dialogues and reflective practices.

A second contribution is directly linked to the one mentioned above but refers more specifically to the work of Loris Malaguzzi. While ECEfS is a field of study that emerged after Malaguzzi's lifetime, his work is well suited to ground future research in ECEfS, in particular for researchers who would like to adopt a combined systemic and social constructivist approach. Although Malaguzzi is commonly referred to as a constructivist influential personality in ECE because he indeed based a considerable amount of his work on the theories of renowned constructivist theorists such as Vygotsky and Dewey, it is less known that later in his life, he adopted a systemic approach to his work in early childhood education and explored the theories of seminal figures to systems theory such as Gregory Bateson and Francisco Varela.

Contributions to Research Methodology in ECEfS

The main contribution of my study to research methods in ECEfS is the rigorous mixed methods approach I adopted. In a review of ECEfS research, Somerville and Williams (2015) identified that most the research conducted in ECEfS was qualitative and often lacked methodological rigor. In my clearly outlined study, I labeled and justified the mixed methods

approach I adopted. Additionally, I explained in detail the methodology of my study including research phases and data collection instruments. As a result, other researchers interested in adopting a mixed methods approach to ECEfS can easily replicate, adapt or build on the methodology outlined in my study.

A second contribution of my study to research methods in ECEfS concerns the explicit deductive and inductive coding of the qualitative data, which was grounded on theory (e.g., Linneberg & Korsgaard, 2019). In the analysis of the data, I complemented deductive coding, which was based on same constructs covered in the adapted ERS-SDEC scale with inductive coding, which consisted of adopting an emergent approach to search for further insights in the data beyond the aspects and dimensions of ECEfS. By making use of deductive and inductive coding, I was able to obtain richer results than if I had conducted a deductive coding only (e.g., the impact of COVID-19 across all aspects and dimensions of ECEfS). A thorough analysis of the data in my study is particularly relevant to research methods in ECEfS considering that Sommerville and Williams (2015) stated that ECEfS studies often include “thematic coding with little theoretical intervention into the meaning of their findings” (p. 111).

A third contribution is the revised ERS-SDEC scale, which I described in the section about implications for practicing educators. The revised scale may be further utilized as a data collection instrument for scholars interested in researching early childhood educators' ECEfS practices as well as the changes in their practices after implementing an intervention (e.g., workshop, PD, course). The revisions of the ERS-SDEC outlined in Appendix B (e.g., consistency of format, alignment of constructs) are likely to make this scale a more user-friendly data collection instrument for both researchers and participants in future ECEfS studies.

Contributions to PD in ECEfS

An unforeseen contribution of my study for PD in ECEfS was the remote delivery via Zoom video conference. I adopted this mode of delivery in light of the COVID-19 closures of early learning settings and the social distancing recommended by health authorities. Even

though initially I considered that the remote delivery would be a hindrance for the effective collection of data and implementation of the PD when compared to in-person encounters, the richness of the data and the engagements of the participants in the PD suggested otherwise. In reality, the remote delivery greatly facilitated the process of delivering PD to in-service early childhood educators from a variety of early learning settings because they were able to join several sessions (2 interviews and one PD) from the comfort of their homes despite their full time jobs and busy schedules. This mode of delivery may be used more extensively to facilitate PD in ECEfS at a larger scale in the future.

Another contribution for future PD in ECEfS refers to the importance of fostering dialogues among educators. As evidenced by the results of the study, although the vast majority of educators initially indicated not being familiar with the concept of ECEfS, they already engaged in a variety of ECEfS practices in all three aspects of sustainability. As noted by Crafton and Kaiser (2011), participants who engage in dialogues have opportunities to collaborate in the creation of meaning, formulating, exploring, and reviewing their own as well as each other's thinking. Consequently, it is important to design PD with a strengths-based approach that cultivates the existing knowledge and experience of the educators and that allows plenty of time for rich discussion.

Recommendations for Further Research

In this section, I make three suggestions for future research in the field of ECEfS that became evident during the analysis of my datasets. The first suggestion is to involve very young children in ECEfS in age-appropriate ways by building on existing documents and further adapting the ERS-SDEC scale. The second suggestion is to promote the development of documentation practices and in particular pedagogical documentation to foster research in ECEfS. Lastly, the third suggestion is to foster the connections between ECEfS and Catholic teachings in early learning settings that follow Catholic beliefs.

ECEfS Research with Very Young Children

The need to conduct ECEfS research with younger age groups (children under 2.5 years old) became evident in my study serendipitously when ECEs working with infants and toddlers joined as participants. The importance of engaging very young children such as infants (0 to 18 months old) and toddlers (18 months to 2.5 years old) in issues of sustainability has already been identified by the provincial government of New Brunswick, Canada (ECRDT-UNB, 2008). The New Brunswick early learning framework has a companion document (Elliot et al., 2011) that focuses exclusively on infants and toddlers and contains an entire section allotted to the topics of diversity and social responsibility. In this document, numerous activities and strategies related to the three aspects of sustainability are illustrated by means of real life pedagogical examples (e.g., toddlers learning about natural resources, infants practising fairness). Consequently, this document may be used as a starting point to facilitate future PD in ECEfS for educators working with infants and toddlers. Afterall, as noted by Moss (2010) “we, humankind, are in a period of such crisis and peril [...] that we must review fundamentally the purposes of all education and, therefore, the values, qualities and practices needed of all educators, whether working with 15-month-olds or 15-year-olds” (p. 10).

Another way to promote research in ECEfS for infants and toddlers is to make further adjustments to the adapted ERS-SDEC scale that I used to collect data. After revising some of the dimensions that were identified by participating educators as too advanced for younger children, the scale could be used as a guide and as a self assessment tool for ECEs working with infants and toddlers. In my study, the educators who worked with the younger age groups already outlined some suggestions for modifying the ERS-SDEC scale to better suit the developmental level of younger children. For example, they suggested replacing the children’s engagement in discussions and initiatives in the three aspects of sustainability with a purposeful modeling on the part of the educators, which would familiarize children with issues of sustainability in a more age-appropriate manner.

Relationships between ECEfS Practices and Pedagogical Documentation

Another area for further research in ECEfS that became evident during my study was documentation practices. Several educators indicated that they would like to see ECEfS documentation samples of other early childhood settings. Additionally, one educator indicated that sharing my own documentation about ECEfS in future PD would have a greater impact on the participants than presenting someone else's work. The participants' interest in ECEfS documentation is warranted because documentation practices such as *pedagogical documentation* are an important part of the pedagogical approaches outlined in *HDLH* (OME, 2014). Specifically, pedagogical documentation refers to the process of "gathering and analysing a wide range of evidence of a child's thinking and learning over time and using the insights gained to make the child's thinking and learning visible to the child and the child's family" (OME, 2016, p. 36). This definition supports the appropriateness of using pedagogical documentation and the resulting documentation samples to highlight children's learning about ECEfS. Such documentation samples could potentially be shared with colleagues and the greater ECE community to promote ECEfS PD and practices.

In addition to fostering research about ECEfS documentation, the process of pedagogical documentation itself may be a powerful medium to generate engagement with, and research about, ECEfS. The symbiotic possibilities of ECEfS research and pedagogical documentation are highlighted in Malaguzzi's conception of pedagogical documentation as an ongoing, rigorous, and methodical process, which connects practice with research and is part of the daily lives of teachers in Reggio Emilia schools (Dahlberg, 2016). Although these promising connections are still to be formally explored, there is already evidence that documentation can be a part of the research process in ECEfS. To illustrate, in a study conducted by Johannesson et al. (2020) in a Swedish preschool, which aimed at involving preschool children in promoting sustainable development approaches, two participating teachers made use of documentation practices throughout the process. Johannesson et al. noted that "documentation occurred

throughout the entire project and, in this iterative process, children learnt how to reflect upon their own learning” (p. 167). This example highlights the role of documentation in children’s engagement with ECEfS and offers evidence of metacognitive processes that occurs when documentation is used in a purposeful manner.

Connections between ECEfS Practices and Catholic Teachings

Another topic that may be explored in future research in ECEfS is the connection between ECEfS practices and Catholic teachings, which became evident at numerous points during my research. Several participating educators worked in Catholic early learning settings and reported on ECEfS practices linked to Catholic beliefs or church activities during the initial and follow up interviews. For instance, one of the educators mentioned contributing to social justice initiatives by making Christmas boxes for people from disadvantaged communities. The connection between the topic of children and sustainable development and Catholicism is not entirely new. For instance, in November 2015, a conference entitled *Children and Sustainable Development* was held at the Vatican with the support of Pope Francis. The conference included presentations from scholars from around the world affiliated with Catholic and secular learning institutions. The edited book *Children and Sustainable Development: Ecological Education in a Globalized World* was published with contributions from the participants of the conference and included 32 chapters touching on a variety of topics related to education and sustainability (Battro et al., 2017).

Although the conference and the subsequent book had a strong emphasis on children and their role in shaping a more sustainable society, the focus was more on school aged children and not on children under 6 years old. Nevertheless, the conference and the book highlighted the intersection of sustainable practices and Catholic teaching, which are widespread especially considering that there are numerous points of intersection across the three aspects of sustainability (e.g., social justice initiatives, concern for others and the natural world). Therefore, it may be advisable to stress the points in common between sustainability

and Catholicism with a focus on younger children in the future with the purpose of developing fruitful collaborations between educators working in Catholic early learning settings and researchers, and foremost of fostering new PD initiative in ECEfS.

Each of these suggested avenues for additional research, which are grounded on the accounts of dedicated ECEs, offer new and vibrant opportunities for early childhood stakeholders to explore topics of ECEfS. Future research might focus on interactions as simple as young infants discovering that materials can be reused, for example by playing with toilet paper rolls as shared by participating educator Kira. The research could be more complex; for example, by including learning stories to see how other educators engage in sustainability as requested by Maria. Future research may include religious interactions such as Donna asking children to be mindful of the garbage because it is God's will to keep Earth beautiful. Future research may even include new topics that will emerge from future engagement with ECEfS. What matters is that we continue to "question where the gaps and silences in ECEfS research lie, to explore and add to" (Davis & Elliot, 2014, p. 10) the body of knowledge of ECEfS.

Concluding Remarks

Over the past several years, it has become more common than ever for us to feel overwhelmed with an endless cycle of devastating news related to health crises, war, and environmental disasters, which typically hit vulnerable populations such as young children the hardest. Although ECEfS scholars acknowledge that nobody has all the answers to current challenges or knows exactly how to deal with them (Grindheim et al., 2019), the precarious state of the world offers us new opportunities to reflect about the importance of ECEfS and to take action toward a more sustainable future. ECEfS is not about considering children as saviours or menders of adults' wrong doings; it is more about regarding them as thinkers, problem solvers, and earth stewards (Davis & Elliott, 2014). This empowered view of the child is essential to ECEfS and despite the challenges we are all facing, there are strong advocates for the development of ECEfS (e.g., Elliot et al., 2020). Humbly adding myself to the list of ECEfS

scholars and advocates, I decided to carry out my research in ECEfS with a focus on PD knowing that young children are still dependent on the objectives and issues their educators consider important (Ärlemalm-Hagsér, 2014). My examination of the participating educators' practices and the ECEfS issues that they regarded as pressing revealed that the educators engaged in a variety ECEfS practices in their early learning settings while following child-centred modern early childhood pedagogies, which fully aligns with ECEfS.

Continuing on the topic of PD in ECEfS, the importance of cultivating PD partnerships between practicing educators and ECEfS specialists cannot be overstated. Although as pointed out by Davis and Davis (2020) much more work is needed in the field of ECEfS teacher training because there is still very little research, my study has provided evidence that some educators are already highly engaged in ECEfS with an enthusiasm and affection that cannot be fully captured with words. The abundant accounts shared by the participating educators of children creating arts and crafts with recycled loose parts, of early learning centres building on their partnerships with Indigenous Elders, and of children tending herbs in a garden alongside the educators are likely representative of the meaningful work so many other educators are engaging in daily. Therefore, the lack of training identified by Davis and Davis combined with the encouraging results presented in this dissertation point to the need of further developing PD in ECEfS for educators.

In addition to the urgency of promoting ECEfS and the importance of further developing ECEfS PD, the participating educators' references to the sustainability of the early childhood profession should be a powerful reminder for everyone to advocate for better working conditions for educators and to not take their work for granted. The structural inequalities and vulnerabilities of the ECE workforce are evident in salaries significantly below the Canadian average, low access to health benefits and pension plans, high staff turnover, and workforce shortages (Atkinson Centre, 2022). Consequently, addressing these challenges must be an educational priority and in particular an ECEfS priority. Substantial funding for the childcare

sector announced by Government of Canada (Department of Finance Canada, 2021) may be a first step in the right direction but ECEfS principles can neither be aspired to nor achieved if educators face such precarious working conditions.

Lastly, in light of the meaningful ECEfS practices and projects generously shared by the participating educators, as well as their engagement in reflective practices and collaborative dialogues during the research process, it is evident that preconditions are in place for a bright and promising future for the field of ECEfS. However, it is important to acknowledge that at times, individual efforts may seem daunting and local contributions may feel ineffective in the context of the challenges the world is facing. During those moments of doubt and uncertainty, it may be helpful for all of us keep in mind the words of the beloved children's character the Lorax, "Unless someone like you cares a whole awful lot, nothing is going to get better. It is not." (Dr. Seuss, 1971).

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Appendix A

Original ERS-SDEC

Item	Inadequate		Minimal		Good		Excellent
	1	2	3	4	5	6	7
<i>Social and cultural sustainability (global social justice)</i>							
	1.1 Some books, pictures, dolls and display portray gender and ethnic or racial stereotypes		3.1 Some books, pictures and displays include images that do not conform to social and cultural stereotypes (e.g. showing a black teacher or police officer that is wearing a religious head scarf)		5.1 Many books, pictures and displays show images of men and women that do not conform to social and cultural stereotypes (gender, ethnic, tribal or racial, etc.)		7.1 The children share their ideas and knowledge of their own and others' cultures in group-sharing times and are able to speak openly about diversity
	1.2 No policy statement exists regarding the importance and value of social and cultural diversity in the setting		3.2 <i>Teachers and staff emphasize the commonality of the human experiences of different ethnic groups and the common needs, values and desires of all human beings</i>		5.2. Staff take advantage of the opportunities afforded in storytelling and/or other group activities (e.g. with multimedia, community visits) to encourage the discussion of social and cultural sustainability and interdependence		7.2 Children explore and investigate unfamiliar social and cultural contexts
	1.3 There is little or no reference in classroom discussion/materials that all people are equal regardless of social background, ability, gender, ethnicity, religion or other belief or sexual orientation in the preschool setting		3.3 Children discuss issues associated with inequality and suggest their own ideas for achieving social justice		5.3 Children participate in activities that cross stereotypical gender, racial, ethnic and tribal boundaries (e.g. providing diverse opportunities and materials for dramatic and social play)		7.3 The inherent and universal rights of all humans are discussed openly and regularly within the classroom
	1.4 There is little or no reference made to the importance of social and cultural sustainability either in classroom discussion or materials (toys, books, puzzles, etc.) in the preschool setting				5.4 Children regularly use services outside the setting (e.g. library, communal vegetable garden, swimming pool) or have community support and interaction within the setting		7.4 Where social inequality is identified, children contribute their own efforts to achieve social justice (e.g. through presentations, making posters, contacting appropriate persons or writing letters)
							7.5 Curriculum policies, plans and reviews explicitly include references to learning about social and cultural sustainability

Economic sustainability (equality)

	1.1 There is very little or no reference made to paper, electricity and water consumption in the setting		3.1 The children have the opportunity and are often seen to play with pretend or real money and point-of-sale technology (tills, etc.)		5.1 The children are encouraged to suggest ways in which costs can be reduced by conserving and/or recycling materials and resources such as paper, water and electricity in the setting, at home and beyond		7.1 The children are encouraged and supported in questioning the hidden costs and benefits of a range of products (e.g. factory farmed foods, high performance vehicles)
	1.2 There is rarely or never a time when the children are given the opportunity to talk about money, saving and/or the need for economising		3.2 The children are sometimes involved in purchase decision-making in the nursery		5.2 The children are regularly and routinely involved in purchasing decisions in the setting		7.2 The staff invites parents and community groups to participate in projects concerned with conservation of resources and recycling (e.g. related to paper, electricity and water consumption)
	1.3 There are no resources recycled in the setting		3.3 The children are sometimes involved in recycling activities in the nursery		5.3 The children are regularly and routinely involved in recycling activities in the setting		7.3 The staff provides support for the children and their families to engage in entrepreneurial and mini-enterprise projects and, e.g. the sale of herbs from an herb garden or greetings cards
			3.4 The use of materials and resources including water, paper and electricity are audited and conserved in the setting		5.4 The children's attention is specifically drawn to economic issues of concern to the local and international community (e.g. discussing a TV report that an individual child has identified)		7.4 Where the setting is fee paying, provisions are made to support the children of low-income families in gaining access to the facilities
					5.5 Wherever relevant, provisions are made to support low-income families to ensure access and participation in all the preschool projects or activities (e.g. outings, music classes)		7.5 Curriculum policies, plans and reviews explicitly include references to learning about economic sustainability

(continued)

Item	Inadequate		Minimal		Good		Excellent
	1	2	3	4	5	6	7
<i>Environmental sustainability</i>							
	1.1 No references are made to the environmental sustainability in the setting		3.1 Some sustainable environmental educational materials such as posters and books are included in the setting		5.1 Many resources are available including animals and plants in the setting		7.1 Classroom and/or school buildings are constructed using environmentally appropriate technologies
	1.2 The children are never encouraged to discuss any environmental problems		3.2 Children's attention is explicitly drawn to the need to care for the environment of the setting and in the local community		5.2 The children are encouraged to identify a range of environmental protection issues and to suggest their own ideas for solving them		7.2 The children are encouraged to provide a variety of actions, including narrative accounts, to represent their efforts to solve environmental issues
	1.3 The children are never taken on environmental visits to areas of natural beauty		3.3 Children are involved in at least one activity that involves caring for animals and for plants		5.3 The children routinely participate in projects and group activities to explore, investigate and understand environmental issues in their daily lives		7.3 Curriculum policies, plans and reviews explicitly include references to learning about environmental sustainability
	1.4 The children have inadequate access to clean drinking water		3.4 Environmental resources are provided for the children to use in their sociodramatic play (e.g. gardening play)				
	1.5 Staff or children are often unable, or fail, to wash their hands before eating and/or after toileting						

Appendix B

Details of the Adaptation of the ERS-SDEC

In this appendix, I provide details of the steps I followed to adapt the ERS-SDEC created by Siraj-Blatchford (2016b). To conduct the adaptation, I followed the scale evaluation guide proposed by Johnson and Morgan (2016) and addressed the recommendations that were pertinent to my study.

Content Evaluation

In this section, I explain how I reviewed the author's justification for including the items in the ERS-SDEC, the quality of the items in the scale, the currency of the content and the extent to which the content addressed diversity.

Creator's Rationale for Including the Items in the Instrument

If I considered the three main sections of the ERS-SDEC as items, the creator of the scale made a strong argument for including social and cultural, economic, and environmental aspects of sustainability, which correspond to the three pillars of sustainability (Siraj-Blatchford, 2016b). Additionally, ECEfS projects that touch on these three dimensions of sustainability are acknowledged as the most meaningful work in ECEfS worldwide (Siraj-Blatchford & Pramling Samuelsson, 2016). However, if I considered the sub-sections or dimensions of each one of the three aspects as items, there was no specific rationale outlined by the creator for including the dimensions aside from mentioning that the scale followed a similar format as the (ECERS), which is the most widely used assessment tool to evaluate the quality of early childhood settings (Early et al., 2018). As a result, I take a closer look at the dimensions in the following sections.

Quality of the Items

While assessing the quality of the dimensions under the three aspects of sustainability, I noted that some of the indicators did not follow a clear progression of one single construct or idea. For example, in the first dimension of the social and cultural sustainability aspect (see

Figure 29), the first three indicators refer to classroom materials but the last one refers to opportunities for children to share their ideas.

Figure 29

First Dimension of the Social and Cultural Aspect of Sustainability

1.1 Some books, pictures, dolls and display portray gender and ethnic or racial stereotypes	3.1 Some books, pictures and displays include images that do not conform to social and cultural stereotypes (e.g. showing a black teacher or police officer that is wearing a religious head scarf)	5.1 Many books, pictures and displays show images of men and women that do not conform to social and cultural stereotypes (gender, ethnic, tribal or racial, etc.)	7.1 The children share their ideas and knowledge of their own and others' cultures in group-sharing times and are able to speak openly about diversity
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Each item in a scale needs to focus on one idea only (Johnson & Morgan, 2016). Additionally, to be useful, scales with verbal labels such as the ERSD-SDEC must not only include precise information for the respondents but also labels that indicate moderately equal intervals along a continuum (Krosnick & Fabrigar, 1997). Consequently, I revised all the dimensions under the three aspects of sustainability to ensure that they followed a clear progression of one single idea (see example in Figure 30). For clarity, I also added a column on the left with a heading to indicate which dimension was being assessed in each row.

Figure 30

Revised First Dimension of the Social and Cultural Aspect of Sustainability

Classroom Materials (e.g., books, pictures, toys, and displays)	No materials portray social and cultural diversity	Almost no materials portray social and cultural diversity	Some materials portray social and cultural diversity	Many materials portray social and cultural diversity
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Additionally, drawing from the recommended pedagogical practices in the scale, I reorganized the order of the dimensions and, when needed, added dimensions to ensure that all the three aspects of sustainability had the same number of dimensions as well as similar types of dimensions such materials, discussions, activities, initiatives, and interactions. Each one of the aforementioned dimensions was tailored to each of the three aspects of sustainability. For example, the dimension of initiative under the social and cultural aspect was labeled 'social justice initiatives', the corresponding dimension under the economic aspect was labeled

'conservation initiatives' and the corresponding dimension under the environmental aspect, was labeled 'environmental initiatives'.

Currency of the Content Measured

Sustainable development in early childhood is a current topic in education in light of the social, economical, and environmental challenges reported daily in the news (Huggins & Evans, 2018). International initiatives currently in place such as Transforming our world: The 2030 Agenda for Sustainable Development (United Nations, 2015) also underscore the role of children in shaping a more sustainable future. Concerning the currency of the pedagogical practices measured by the ERS-SDEC, the child-empowering practices endorsed by the scale (i.e., where social inequality is identified, children contribute their own efforts to achieve social justice) are fully in line with *How Does Learning Happen?* (OME, 2014) and with all the other current provincial early learning frameworks in Canada that highlight the role of children as active participants as noted in Chapter 2. Therefore, the content of the ERS-SDEC scale is current because it aligns with ongoing international initiative as well as with provincial and national pedagogical approaches to early childhood education.

Relationship of the Items with the Research Focus

The main goal of my doctoral research was to develop meaningful PD to support early childhood educators in engaging in ECEfS with the children under their care. During the PD, the educators would learn about the three aspects of sustainability (social and cultural, economic, and environmental) and about pedagogical strategies to address these three aspects. The ERS-SDEC includes a number of relevant pedagogical strategies in ECEfS and the three sections of scale correspond to the three aspects of sustainability, hence the ERS-SDEC scale was in line with my focus of research. With the purpose of fully aligning the content of the scale with the focus of my research (PD for practicing educators), I removed indicators that referred to policy statements (see Figure 31) because although relevant for management teams, they were

beyond the scope of my doctoral research because my participants were all practising educators.

Figure 31

Fifth Dimension of the Social and Cultural Aspect of Sustainability

						7.5 Curriculum policies, plans and reviews explicitly include references to learning about social and cultural sustainability
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Also with purpose of aligning the content of the ERS-SDEC scale with the focus of my research, I removed the indicators that did not relate to the reality of the participants' workplace (see Indicators 1.4, 1.5 in Figure 32). The participants in my study all worked in schools, licenced childcare settings, or home childcares with access to drinking water and with facilities for children and staff to wash their hands.

Figure 32

Fourth and Fifth Dimension of the Environmental Aspect of Sustainability

1.4 The children have inadequate access to clean drinking water		3.4 Environmental resources are provided for the children to use in their sociodramatic play (e.g. gardening play)				
1.5 Staff or children are often unable, or fail, to wash their hands before eating and/or after toileting						

How Items are Inclusive and Attend to Diversity

Inclusion and diversity are embedded in the topic of the ERS-SDEC scale because, in general terms, ECEfS highlights the role of children as active agents for social change who challenge cultural domination and explore identity and diversity. For instance, with reference to recommended ECEfS practices, Ärlemalm-Hagsér and Pramling Samuelsson (2018) stated, "children share their ideas and knowledge of their own and others' cultures in group-sharing times and are able to speak openly about diversity" (p. 15). In addition to the general content of the scale, there are specific dimensions of the scale that explicitly address the development of pedagogical practices on the topic of inclusion and diversity such as promoting discussions on

social and cultural topics. See Figure 33 for an example of a revised dimension on the topic of social and cultural discussions featured under the social and cultural aspect of the scale.

Figure 33

Revised Second Dimension of the Social and Cultural Aspect of Sustainability

Discussions (social and cultural topics, e.g., family cultural backgrounds, current events)	Children have no opportunities to discuss issues associated with social and cultural topics	Children rarely have opportunities to discuss issues associated with social and cultural topics	Children have occasional opportunities to discuss issues associated with social and cultural topics	Children have frequent opportunities to discuss issues associated with social and cultural topics
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Concerning the formal features of the scale, to make sure the content of the adapted scale could be accessed by people with diverse abilities, I changed the font from Times New Roman to Arial. Arial font is recommended for people with low vision (Evetts & Brown, 2005), and due to its sans-serif features, it increases the text readability for people with dyslexia (Rello & Baeza-Yates, 2017). I also made the style of typeface consistent throughout the adapted scale because random sections of the scale were italicized unnecessarily.

Usefulness of the Results for Professional Practice

In this section, I examine Siraj-Blatchford's rationale for how the scale may be used, how the scale can improve practice, how the scale relates to the research questions in my study and if the scale overlaps with any other similar instrument.

Creators' Rationale for how the Instruments May be Used

Siraj-Blatchford (2016b) stated that the ERS-SDEC scale was a tool with which educators can identify areas of the early childhood sustainable development curriculum that they want to improve while keeping track of their progress. Siraj-Blatchford also indicated that researchers could use the ERS-SDEC scale but stressed that researchers would need to ask educators for information about their practices and search for corroborating evidence. The uses outlined by Siraj-Blatchford are both valid for improving practices in ECEfS. In my study, I made

use of the adapted scale in a way that combined both of the uses recommended Siraj-Blatchford; the scale was implemented by me (the researcher) but completed by the educators, and I utilized the results in my study to inform to development PD in ECEfS.

How the Instrument Can Improve Practice

As noted in the previous section, educators may use the ERS-SDEC scale to identify ECEfS they would like to work on, which would likely result in an improvement of their ECEfS practices. Concerning my study, by adopting and adapting the ERS-SDEC scale and utilizing it as an instrument of quantitative data collection, I used it to inform the development of PD and later examine the effects of the PD on the educators practices, which indeed resulted in the development of the educators' ECEfS practices as discussed in Chapter 4.

How the Instrument Relates to Research Questions

The scale includes recommended practices on the topic of ECEfS and relates to the topic of my study because I sought to create PD to support the development of ECEfS practices. I selected the scale because it constituted the only suitable published instrument of data collection to examine the educators' ECEfS practices before and after the PD. As a result, I decided to adapt it and to use it in combination with a qualitative instrument of data collection to address the overarching questions of my study: How do early childhood educators' practices impact ECEfS PD? how does ECEfS PD impact the practices of early childhood educators?

Overlap of the Proposed Instrument with Other Tools in Use

ECEfS is a growing yet still small field of study (Elliot et al., 2020) so the amount of research in ECEfS is still limited, which explains why the ERS-SDEC scale is the only published instrument for measuring sustainable practices in early learning setting. The closest similar instrument is one developed Waltner et al. (2019) to measure student sustainability competences but it was geared for students who were 9 to 16 years of age so it falls out of the scope of ECEfS.

Technical Evaluation

In this section, I explain why there is not yet empirical evidence of the validity of the scale and why it is highly unlikely that the implementation of the scale could have an adverse effect on vulnerable populations.

Types of Reliability Coefficients and Empirical Evidence for the Validity of the Instrument

The curriculum in education for sustainable development is still at an early stage of development and creating an assessment tool that might be considered an ultimate measurement of quality or excellence would not be appropriate (Siraj-Blatchford, 2016b). Despite there not yet being reliability coefficients and empirical evidence for the validity of the scale, Siraj-Blatchford highlighted his willingness to conduct systematic research efforts to demonstrate the scale's validity, and indicated that the scale's sponsor organization, World Organization for Early Childhood Education was also committed to future revisions and finetuning of the instrument.

Potential Adverse Effects upon Vulnerable Populations

It is very unlikely that the implementation of the scale would have an adverse on vulnerable populations because as outlined in detail in the literature review, the topic of ECEfS and its social and cultural, economic, and environmental aspects has a strong emphasis on social, economic, and environmental justice. In fact, the purpose of my research and more specifically of obtaining scores using the adapted scale was to support the development ECEfS practices and, consequently, to impact positively vulnerable populations.

Practical Evaluation

In this section, I examine the ease of administration of the scale and the costs of scoring and adopting the scale. I also outline the feedback received by three expert peer reviewers from the early learning sector.

Ease of Administration and Scoring

The ERS-SDEC rating scale was kept to a minimum of items for ease of scoring (Siraj-Blatchford, 2016b). Each subsection contained a set of practices associated with ECEfS in a 7-

point rating scale ranging from 1 (*inadequate*) to 7 (*excellent*) as shown in Figure 34.

Considering that each of the dimensions under the three aspects of sustainability included four indicators, I changed the seven-point rating system to a fourth point rating system (1 to 4) to match the number of indicators. Additionally, following the feedback of an expert reviewer on the adapted scale, I kept the numbers only and removed the original labels: inadequate, minimal, good, and excellent. Another format change that I made related to scoring was moving the title of each dimension of sustainability to the top of the page and placing the score heading under the title (see Figure 35) because identifying the aspect of sustainability should be the first step before considering a score.

Figure 34

Header of the Social and Cultural Aspect of Sustainability

Item	Inadequate		Minimal		Good		Excellent
	1	2	3	4	5	6	7
<i>Social and cultural sustainability (global social justice)</i>							

Figure 35

Adapted Header of the Social and Cultural Aspect of Sustainability

Social and Cultural Aspect of Sustainability				
Dimension	Descriptor			
	1	2	3	4

Estimated Costs of Adopting the Instrument

The ERS-SDEC scale is a resource that is openly available to the public world wide, in other words, this is not a copyrighted item that has to be purchased to be used. As a result, there were not costs neither for adopting the instrument nor for using the adapted version for my study.

Cost and Usefulness of Scoring Services

The scale does not require a financial investment to pay for scoring services. The scale is simple enough to be scored in just a few minutes by anyone interested in using it. Even though it is not possible to comment on the usefulness of scoring services because no specialized scoring services were required with the scale, I can comment on the usefulness of the scale's scores in the context of my study. The participating educators completed the adapted scale before and after taking part in the PD on ECEfS. Consequently, the initial scores provided insights to develop the PD and the second set of scores provided information on the effects of the PD on their practices.

Likely Reaction of the Public to the Scale (Practitioners and Peer Reviewers)

In the process of adapting the scale, I received the feedback and support from my doctoral advisor and committee members. I completed several iterations of adaptation and once my revisions were completed, I sent the scale to three experts in the early childhood education sector:

- Reviewer 1 is a professor of early childhood education with more than 30 years of experience in the early learning sector.
- Reviewer 2 is a practising early childhood educator with more than 30 years of experience in the early learning sector.
- Reviewer 3 is an advisor for the Ministry of Education in the early learning division.

Reviewer 1 mentioned that it was not easy to perceive the difference between the progression of the second and third indicators in some of the dimensions because they seemed very similar. For example, the reviewer mentioned that it was difficult to distinguish the difference between 'the terms 'few' and 'occasional'. To address this feedback, I changed the wording in the second indicators from 'few' to 'rarely' to better highlight the progression. Reviewer 2 indicated that the scale was clear and easy to use and did not make any suggestions for change. Reviewer 3 suggested a change in the scoring system, using numbers only as opposed to numbers and labels as this change would make the scale easier to use for

the educators. I kept the numbers only as suggested by the reviewer. After making the change, I also thought that an additional benefit of keeping the numbers only on the scale was a reduced risk of the educators feeling uncomfortable with the labels while completing the scale, especially the ones for the lower scores (inadequate and minimal).

Overall Evaluation

In this final section, I comment on the absence of published reviews of the scale and I highlight the positive and negative aspects of the scale. To conclude summarize the adaptations I made to the scale for the purpose of my research study.

Evaluative Comments on Published Reviews

At the time I adapted the scale, there were no published reviews with evaluative comments. However, in an edited book that included ten application trials of the scale in different countries around the world, Siraj-Blatchford (2016b) indicated that he received praise from colleagues and from the World Organization for Early Childhood Education (OMEP) for his work at creating the scale.

My Comments on the Positive Aspects

The main positive aspect of the ERS-SDEC scale was its structure, which contained three main sections corresponding to the three aspects of sustainability: social and cultural, economic, and environmental. This structure allows for anyone completing the scale to identify the aspects of sustainability and recommended practices within those aspects. The similarity of the scale with the ECERS is also a positive aspect as the familiar format makes it more likely for educators to feel comfortable using it.

My Comments on the Negative Aspects

The main negative aspect I observed in the ERS-SDEC scale was the inconsistency in the progression of most of the dimensions under the three aspects of sustainability. Consistency should be an essential aspect of any rating scale. There was also an imbalance in the number

of dimensions under each aspect of sustainability and the format elements such as font, design and spacing required improvements for enhanced clarity and readability of the adapted scale.

A Summary of my Adaptations

In summary, to adapt the ERS-SDEC scale for the purpose of my study, I deleted the content that did not apply to my participants such as the indicators that related to administrative practices and indicators that pointed to a different reality of early learning settings like the lack of running water. I also changed some of the indicators to ensure a clear progression of the practices and I changed the font and format of the scale to make it more accessible. I reorganized the dimensions in the scale and added dimensions when needed to ensure all three aspects of sustainability had a similar number and comparable type of dimensions to be assessed. I changed the scoring system from a seven-point scale to a four-point scale to reflect the number of indicators, and I used only numbers for the score as opposed to numbers and labels.

Appendix C
The Adapted ERS-SDEC

Social and Cultural Aspect of Sustainability				
Dimension	Descriptor			
	1	2	3	4
Classroom Materials (e.g., books, pictures, toys, and displays)	No materials portray social and cultural diversity	Almost no materials portray social and cultural diversity	Some materials portray social and cultural diversity	Many materials portray social and cultural diversity
Discussions (social and cultural topics; e.g., family cultural backgrounds, current events)	Children have no opportunities to discuss issues associated with social and cultural topics	Children rarely have opportunities to discuss issues associated with social and cultural topics	Children have occasional opportunities to discuss issues associated with social and cultural topics	Children have frequent opportunities to discuss issues associated with social and cultural topics
Social and Cultural Activities (e.g., songs, stories)	Children have no opportunities to engage in socially and culturally diverse activities	Children rarely have opportunities to engage in socially and culturally diverse activities	Children have occasional opportunities to engage in socially and culturally diverse activities	Children have frequent opportunities to engage in socially and culturally diverse activities
Social Justice Initiatives (e.g., posters, foodbank drive)	Children have no opportunities to suggest and/or contribute to social justice initiatives	Children rarely have opportunities to suggest and/or contribute to social justice initiatives	Children have occasional opportunities to suggest and/or contribute to social justice initiatives	Children have frequent opportunities to suggest and/or contribute to social justice initiatives
Interactions with Community Members (e.g., sharing community resources, library, community garden)	Children have no opportunities to interact with community members	Children rarely have opportunities to interact with community members	Children have occasional opportunities to interact with community members	Children have frequent opportunities to interact with community members

Economic Aspect of Sustainability

Dimension	Descriptor			
	1	2	3	4
Classroom Materials (e.g., pretend money, cash register, play store, price scanner)	There are no financial materials in the classroom	There are almost no financial materials in the classroom	There are some financial materials in the classroom	There are many financial materials in the classroom
Discussions (use and cost of resources, e.g., paper, water, electricity)	Children have no opportunities to discuss the use and/or cost of resources	Children rarely have opportunities to discuss the use and/or cost of resources	Children have occasional opportunities to discuss the use and/or cost of resources	Children have frequent opportunities to discuss the use and/or cost of resources
Reusing/ Recycling Activities (e.g., use cereal boxes for art materials, sorting waste material)	Children have no opportunities to participate in reusing/recycling activities in the centre	Children rarely have opportunities to participate in reusing/recycling activities in the centre	Children have occasional opportunities to participate in reusing/recycling activities in the centre	Children have frequent opportunities to participate in reusing/recycling activities in the centre
Conservation Initiatives (e.g., reduce the use of resources)	Children have no opportunities to suggest and/or contribute to conservation initiatives	Children rarely have opportunities to suggest and/or contribute to conservation initiatives	Children have occasional opportunities to suggest and/or contribute to conservation initiatives	Children have frequent opportunities to suggest and/or contribute to conservation initiatives
Responsible Purchases (e.g., acquiring secondhand toys)	Children are not involved in making responsible purchase decisions in the centre	Children are rarely involved in making responsible purchase decisions in the centre	Children are occasionally involved in making responsible purchase decisions in the centre	Children are frequently involved in making responsible purchase decisions in the centre

Environmental Aspect of Sustainability

Dimension	Descriptor			
	1	2	3	4
Classroom Materials (e.g., plants, animals, repurposed furniture)	There are no natural and/or eco-friendly materials in the classroom	There are almost no natural and/or eco-friendly materials in the classroom	There are some natural and/or eco-friendly materials in the classroom	There are many natural and/or eco-friendly materials in the classroom
Discussions (environmental issues, e.g., littering, water use)	Children have no opportunities to discuss environmental issues	Children rarely have opportunities to discuss environmental issues	Children have occasional opportunities to discuss environmental issues	The children have frequent opportunities to discuss environmental issues
Classroom Activities (e.g., caring for plants and animals)	Children have no opportunities to engage in activities that emphasize caring for the natural environment	Children rarely have opportunities to engage in activities that emphasize caring for the natural environment	Children have occasional opportunities to engage in activities that emphasize caring for the natural environment	Children have frequent opportunities to engage in activities that emphasize caring for the natural environment
Environmental Initiatives (e.g., fundraising, collecting rainwater, anti-littering) Mindful of protecting life	Children have no opportunities to participate in initiatives to protect the natural environment	Children rarely have opportunities to participate in initiatives to protect the natural environment	Children have occasional opportunities to participate in initiatives to protect the natural environment	Children have frequent opportunities to participate in initiatives to protect the natural environment
Interactions with Natural Environments (e.g., park, forest, nature path)	Children have no opportunities to interact with natural environments	Children rarely have opportunities to interact with natural environments	Children have occasional opportunities to interact with natural environments	Children have frequent opportunities to interact with natural environments

Adapted from "Appendix: The Environmental Rating Scale for Sustainable Development in Early Childhood (ERS-SDEC)," by J. Siraj-Blatchford, 2016b, in J. Siraj-Blatchford, C. Mogharreban, & E. Park (Eds.), *International research on education for sustainable development in early childhood education* (pp. 211-214), Springer

Appendix D

Interview Guide for Phase 1

Date:

Time:

Interviewer: Roxana Yanez Gonzalez

Interviewee:

Goal of the Study: Develop PD to support early childhood educators in engaging in early childhood education for sustainability (ECEfS) with the children under their care.

Goal of this interview: Obtain insights about the educators' ECEfS practices to inform the design of the ECEfS PD.

Background questions

Tell me about the program you work in at the moment?

Tell me about your past professional experience?

Introductory questions

1. What comes to you mind when you hear the word sustainability?

Possible follow up probes to the question: For instance, during school, secondary or post-secondary education; any influences from family, television, or radio shows.

2. Have you heard about Early Childhood Education for Sustainability?

If yes, what have you heard?

If no, what would you like to learn about this topic?

Pointed questions on the three aspects of ECEfS

Socio-cultural aspect of sustainability

1. Do you have materials in the classroom that reflect children's cultural diversity?

If yes, what kinds of materials?

2. Do you and the children have opportunities to engage in discussions about social and cultural topics? If yes, what kinds of discussions?
3. Do you and the children engage in any kind of social and cultural activities? If yes, what kind of activities?
4. Do you and the children take part in any kind of social justice initiative? If yes, what kind of initiative?
5. Do you and the children interact with members of the community in any way? If yes, please explain how.

Economic aspect of sustainability

1. Do you have any kind of economic materials in the classroom?
If yes, what kinds of materials?
2. Do you and the children engage in discussions about the cost and/or value of resources? If yes, please tell me about these discussions.
3. Do you and the children engage in recycling activities? If yes, please tell me about these activities.
4. Do you and the children engage in any kind of conservation initiatives? If yes, what kind of initiatives?
5. Do the children have any opportunities of taking part in any responsible purchases made in the program? If yes, please tell me about these opportunities.

Environmental aspect of sustainability

1. Are there natural or eco-friendly materials in the classroom? If yes, what kinds of materials?
2. Do you and the children engage in any kind of discussions about the environment? If yes, please tell me about these discussions.
3. Do you and the children have opportunities to care for plants and/or animals?
If yes, please describe these opportunities?
4. Do you and the children engage in environmental initiatives?
If yes, describe these initiatives.
5. Do you and the children interact with natural environments?
If yes, please tell me about these interactions.

Closing Questions

1. How do you feel about implementing sustainability learning experiences with the children under your care? Do you have any concerns moving forward with the study?
2. Is there anything else that you think might be helpful for me to know as I prepare the professional development?

Appendix E

Guetterman's Joint Display

 Template for a Side-by-Side Joint Display			
Theme	<u>Qualitative</u> Interview Findings	<u>Quantitative</u> Results of Survey	<u>Mixed Methods</u> <u>Interpretation</u>
Theme 1	Descriptive summary, codes, quotes, et.	Summary of results related to the theme	Summarize meta-inferences; convergence, divergence, expansion
Theme 2			
Theme 3			
Theme 4			

Appendix F

Interview Guide - Phase 3

Date:

Time:

Interviewer: Roxana Yanez

Interviewee:

Goal of the Study: Develop PD to support early childhood educators in engaging in issues of early childhood education for sustainability (ECEfS) with the children under their care.

Goal of this interview: Assess the impact of the PD on the educators' practices

Introductory questions

1. What are your thoughts and impression on the PD provided?
2. Was there anything about ECEfS in the PD that you think should be expanded on?
3. What elements of the PD, if any, were particularly informative to the topic of ECEfS?

Pointed questions on the three aspects of ECEfS

Socio-cultural aspects of sustainability

Since your participation in the PD approximately two months ago:

1. Were there any changes in the classroom materials that reflect children's social and cultural diversity? If yes, what kinds of changes?
2. Were there any changes in the opportunities for you and the children to engage in discussions about social and cultural topics? If yes, what kinds of changes?
3. Were there any changes in the social and cultural activities in your program? If yes, what kinds of changes?

4. Were there any changes in social justice initiatives? If yes, what kind of changes?
5. Were there any changes in the interactions with members of the community? If yes, what kinds of changes?

Economic aspect of sustainability

Since your participation in the PD approximately two months ago:

1. Were there any changes in the economic classroom materials in your program? If yes, what kinds of changes?
2. Were there any changes in the opportunities for you and the children to engage in discussions about economic topics? If yes, what kinds of changes?
3. Were there any changes in the reusing/recycling activities in your program? If yes, what kinds of changes?
4. Were there any changes in the conservation initiatives in your program? If yes, what kind of changes?
5. Were there any changes in the process of making responsible purchases in your program? If yes, what kinds of changes?

Environmental sustainability

Since your participation in the PD approximately two months ago:

1. Are there any new environmentally friendly materials in the program? If yes, what kinds of materials?
2. Were there any new discussions about environmental topics in your program? If yes, please describe these discussions.
3. Were there any new environmental activities in your program? If yes, please describe these activities.

4. Were there any new environmental initiatives in your program? If yes, describe these initiatives.
5. Were there any changes in the interactions with natural environments? If yes, please tell me about these interactions.

Closing Question

1. Do you have any suggestions for future PD on the topic of ECEfS?

Appendix G

Recruitment Letter



Université d'Ottawa | University of Ottawa
Faculté d'éducation | Faculty of Education

Dear ECE colleagues,

I am very excited to share with you that I will soon begin my PhD research on the topic of Early Childhood Education for sustainability (ECEfS) and that I am asking you to consider participating in my study which includes creating professional development for early childhood educators.

In case you are wondering what is meant by ECEfS, in short, it is about supporting children at developing their sense of agency and at working alongside families and community members to seek for solutions to local environmental, social, and economic issues. I am eager to share with you more about ECEfS but for now, I would like to highlight the fact that ECEfS is fully in line with the foundational frames of *How does learning happen?* and with its vision of the child as a capable, curious, and competent problem solver.

Overall, your participation in my study would allow you to learn strategies to engage in ECEfS with the children under your care and to contribute to the literature of ECEfS in Canada. Participation in this study would meet the guidelines for meaningful professional development as required by the College of Early Childhood Educators of Ontario and count towards the yearly requirements outlined in the Continuous Professional Learning (CPL) document.

Your participation will consist essentially of attending a two-hour professional development (PD) session, of completing the adapted Educational Rating Scale for Sustainable Development in Early Childhood (ERS-SDEC) before the PD and once again after the PD, which will take approximately 30 minutes each time, and of participating in two individual interviews one before and one after the PD that will be audio recorded and will also last approximately 30 minutes. The PD and the interviews will take place remotely via video conference. The completion of the scale will also take place remotely at your best convenience and you will send me the rating scale by email once you have completed it.

I am aware that as an ECE, you have a very busy schedule, so I look forward to sharing with you more about how the professional development and activities that are part of the research project will be tailored to accommodate your schedule and to ensure the minimum disruption of your educator duties. If you are interested in taking part in this innovative research project, please notify me by email as soon as possible because there will be a limited number of participants who will be recruited on a first come/first served basis.

I hope you will consider working with me in my project!

Roxana Yanez, RECE

Appendix H

Consent Form for Participants

 uOttawa	Université d'Ottawa University of Ottawa Faculté d'éducation Faculty of Education
Title of the study: Early Childhood Education for Sustainability: A Mixed Methods Approach to Generating Professional Development for Educators	
Researcher	Research supervisor:
Roxana Yanez Gonzalez, PhD candidate Faculty of Education University of Ottawa	Christine Tippet, PhD Faculty of Education University of Ottawa
Invitation to Participate: I am invited to participate in the abovementioned research study conducted by Roxana Yanez Gonzalez and supervised by Dr. Christine Tippet.	
Purpose of the Study: The purpose of the study is to develop and examine the impact of professional development (PD) to support early childhood educators in engaging in Early Childhood Education for Sustainability (ECEFS) with the children under their care.	
Participation: My participation will consist essentially of attending a two-hour professional development (PD) session on the topic of Early Childhood Education for Sustainability. The PD will take place online by Zoom and will be scheduled to ensure minimal disruption of my daily schedule.	
I will complete the adapted Educational Rating Scale for Sustainable Development in Early Childhood (ERS-SDEC) before the PD and once again after the PD. The completion of the rating scale will take approximately 30 minutes and will be completed on the time that is most convenient for me; I will send the completed scale to the researcher by email. I will also participate in two individual interviews that will be conducted via video conference before and after the PD that will last approximately 30 minutes and will be video recorded during which I will answer questions about my knowledge and practices on the topic of sustainability. The researcher will send me the transcriptions of the interviews by email originating from her UOttawa account for me to review and will be available to meet with me by video conference if any clarifications about or changes to the transcripts are needed. The completion of the rating scale and the interviews will also be scheduled at the time and date that is most convenient to me.	
Risks: There are no known or anticipated risks from participating in this research.	
Benefits: My participation in this study will allow me to learn strategies to engage in ECEFS with the children under my care and to contribute to the literature of ECEFS in Canada. By participating in this study, I will also take part in professional development as required by the College of Early Childhood Educators of Ontario and will meet the professional development requirements outlined in the <i>Continuous Professional Learning (CPL)</i> document.	
Confidentiality and anonymity: I have received assurance from the researcher that the information I will share will remain strictly confidential. I understand that the data will be used	
1	



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only for academic purposes and that my confidentiality will be protected by storing all the electronic research data (audio recordings of interviews, transcripts, and digital images) in a password protected laptop and the physical data (rating scales, observation protocols) in a locked cabinet. The research has informed me that only she knows the password for the laptop and has access to the locked cabinet.

Anonymity will be protected in the following manner: My identity will not be revealed in any publications. The researcher has informed me that pseudonyms will be used instead of my name.

Conservation of data: The electronic research data (video recordings of interviews, electronic copy of the rating scale and transcripts of interviews) and physical data (printed transcripts of interviews) will be kept in a secure manner. The electronic data will be kept in a password protected laptop and the physical data will be kept in a locked cabinet. All data will be kept for a minimum of ten years.

Compensation: A token of appreciation in the form of a \$50 gift card for a teacher store (Scholar's Choice) will be given to me even if I decide to drop out of the study.

Voluntary Participation: I am under no obligation to participate and if I choose to participate, I can withdraw from the study at any time and/or refuse to answer any questions, without suffering any negative consequences. If I choose to withdraw, all data gathered until the time of withdrawal will be destroyed and not used for subsequent analysis.

Acceptance: I, _____, agree to participate in the above research study conducted by Roxana Yanez Gonzalez (PhD candidate) of the Faculty of Education, University of Ottawa under the supervision of Dr. Christine Tippett of the Faculty of Education, University of Ottawa.

If I have any questions about the study, I may contact the researcher or her supervisor.

If I have any questions regarding the ethical conduct of this study, I may contact the Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 154, Ottawa, ON K1N 6N5

Tel.: (613) 562-5387

Email: ethics@uottawa.ca

There are two copies of the consent form, one of which is mine to keep.

Participant's signature: Electronic signature Date:

Researcher's signature: *Roxana Yanez Gonzalez* Date:

Appendix I

Agenda for PD in ECEfS



Workshop about Early Childhood Education for Sustainability (ECEfS)

Date: November 25th, 2020

Time: 6:00 - 7:30 pm

Agenda

Agenda Topic	Description	Estimated Times
1. Introduction	- Participants and host Introduce themselves - Host shares objectives of the workshop	6:00-6:10
2. Theory of ECEfS (Part A)	Host provides a brief overview of the origins of ECEfS and of the aspects of sustainability	6:10-6:15
3. First example of ECEfS project	Host describes through images an example of an ECEfS project that took place in Japan	6:15-6:20
4. The aspects of ECEfS in an example	Participants explore the aspects of ECEfS in a commonly implemented example	6:20-6:25
5. Theory of ECEfS (Part B)	- Host highlights the alignment of ECEfS with modern ECE practices and official pedagogical documents - Host reviews common approaches to research in ECEfS	6:25-6:30
6. Second example of ECEfS project	Host describes through images an example of an ECEfS project that took place in Canada	6:30-6:35
7. Possibilities and challenges of developing ECEfS	Participants engage in small group conversations about the possibilities and challenges of ECEfS.	6:35-7:10
8. Highlights of small group discussions	Participants share the highlights of their small group conversation with the rest of the group	7:10-7:25
9. Concluding remarks and steps moving forward	Host expresses her gratitude for the participants' contributions and outlines ECEfS plans for the future	7:25-7:30

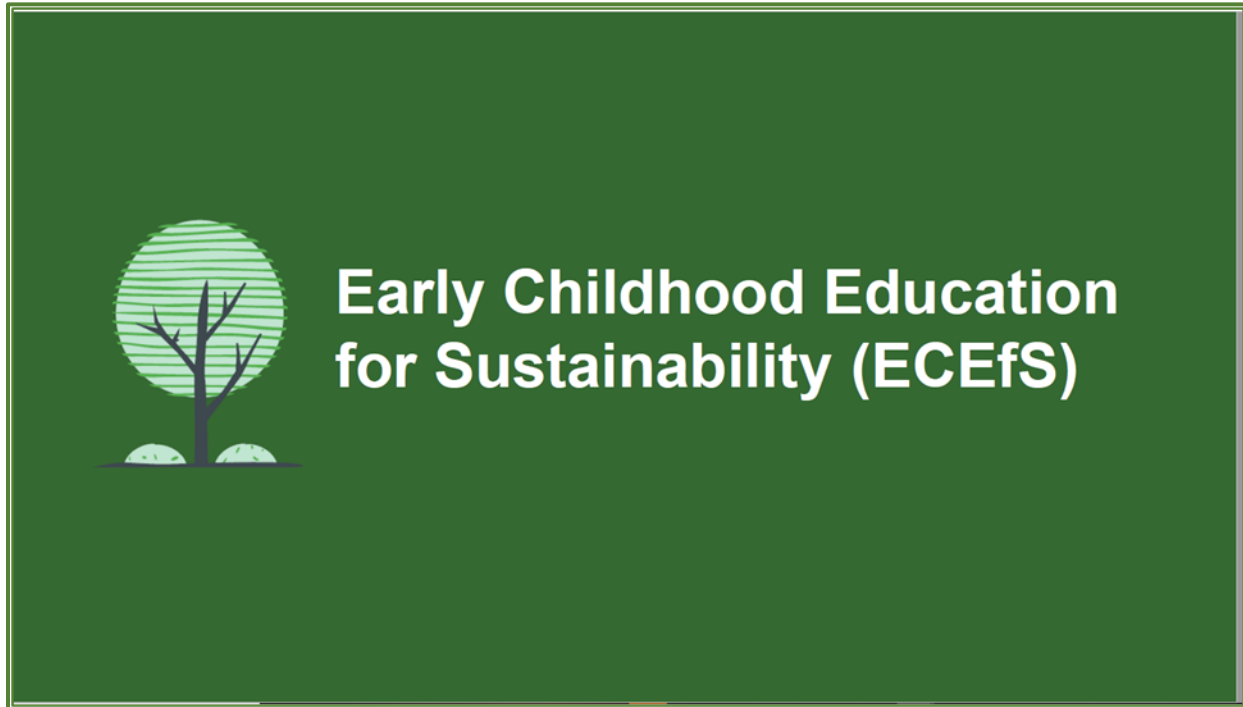
Points of Discussion for Small Group Conversations

ECEfS Points	Examples of Questions to Discuss
Possibilities of ECEfS	• What ECEfS related practices are you already engaging in? • What ECEfS practice or projects could you develop? • What examples of ECEfS related practices you would like to share with the group? • Any other topics you can think of about the possibilities of implementing ECEfS.
Challenges to implement ECEfS	• What are the challenges you perceive to develop ECEfS practices in your program? • Are there any strategies you can think of to overcome the challenges? • Any other topics you can think of about the challenges of implementing ECEfS.
General Topics to Consider in your Conversations	
• Pedagogical practices • Indoor and outdoor materials you use in your program • Conversations with children • Initiatives that children's can be involved in • Community involvement	
Space for group note taker to write notes 📝	

Appendix J

PowerPoint Slides of PD in ECEfS

Slide 1



Slide 2

The Origins of ECEfS



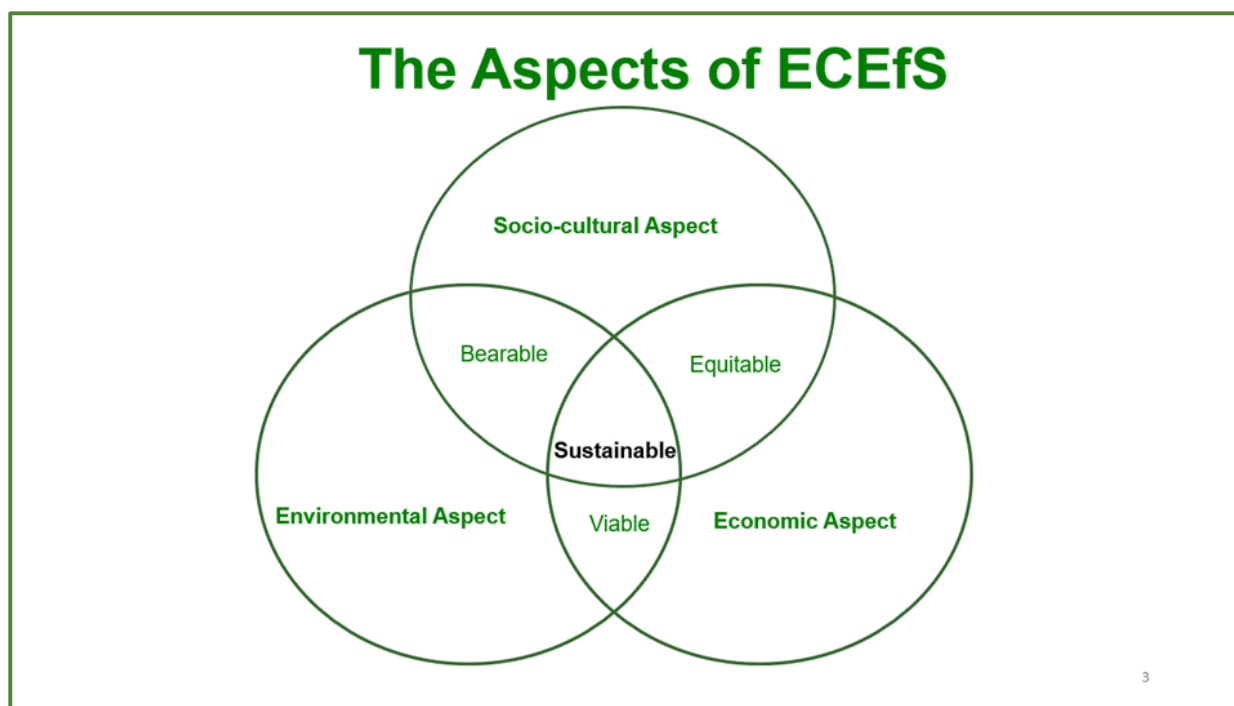
ECEfS has its historical origins in the early 1990s when a small number of researchers mostly in the United States and Australia established a connection between environmental issues and early childhood education (Davis & Elliott, 2014).



The term environmental education was progressively replaced by education for sustainability to integrate economic and socio-cultural dimensions (Ärlemalm-Hagsér & Pramling Samuelsson, 2018).

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Slide 3



Slide 4

First Example of an ECEfS Project



A Silkworm is a
Fascinating Insect for
Children
Japan (Fujii & Izumi, 2008)

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Slide 5

A Silkworm is a Fascinating Insect for Children



Slide 6

A Silkworm is a Fascinating Insect for Children



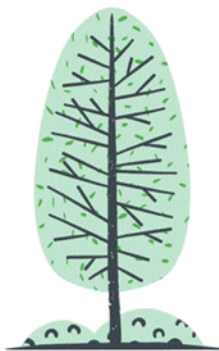
Slide 7

A Silkworm is a Fascinating Insect for Children



Slide 8

Examining the Aspects of ECEfS



A Recycled Arts and Crafts Exhibition

Slide 9

Alignment of ECEfS with Modern ECE Pedagogies



The View of the Child. In ECEfS, young children are viewed as competent and empowered agents for change (Caiman & Lundegard, 2014; Mackey, 2012). In Canada, all the existing ECE frameworks acknowledge the children as capable and competent problem solvers.



Families and Communities. A collaborative approach with families and community members is an essential element in ECEfS studies (e.g., Pressoir, 2008). The contents of all ECE provincial frameworks emphasize the importance of relationships with families and community members.

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Alignment of ECEfS with Modern ECE Pedagogies



Relationships with Nature. The respect for and connection to the natural world is a recurrent topic in the narrative of ECEfS (e.g., Prince, 2010). Correspondingly, all the ECE frameworks include references about the relevance of nature in the lives of young children.



Socio-cultural Relationships. ECEfS discourses stress the development of equitable socio-cultural relationships (Georgeson, 2018). All the provincial early learning frameworks include repeated allusions on the importance of nurturing social and cultural relationships.

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Slide 11

Approaches to Research in ECEfS



Nature-based approaches consist of studies in which outdoor experiences and contact with nature are the foundation for ECEfS practices (e.g., Chawla & Rivkin, 2014; Elliot, 2014; Knight & Luff, 2018).



Art-based approaches include studies in which creative arts such as storytelling, singing, painting or sculpting are used as means to engage children in issues of sustainability (e.g., Luff, 2018; O'Gorman, 2014; Phillips, 2014).

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Approaches to Research in ECEfS



Indigenous-based approaches refer to studies with a strong emphasis on Indigenous knowledge systems (e.g., Miller, 2014; Ritchie, 2012; Somerville, 2015).



Project-based approaches involve studies that engage children in ECEfS learning experiences on a particular topic for a prolonged period of time (e.g., Lewis, Mansfield, & Baudains, 2010).

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Slide 13

Second Example of an ECEfS Project



Unruly Voices: Growing
Climate Action Pedagogies
with Trees and Children
Canada (Nelson & Hodgins, 2020)

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Slide 14

Unruly Voices: Growing Climate Action Pedagogies with Trees and Children



Slide 15

Unruly Voices: Growing Climate Action Pedagogies with Trees and Children



Slide 16

Unruly Voices: Growing Climate Action Pedagogies with Trees and Children



Slide 17

The Possibilities and Challenges of ECEfS



Small Group Conversations