

Reconfiguring Environmental Sustainability in Early Childhood Education

Reconfiguring Environmental
Sustainability in Early Childhood
Education:
A Post-anthropocentric Approach

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ACTA UNIVERSITATIS GOTHOBURGENSIS

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ISBN 978-91-7963-022-5 (printed)
ISBN 978-91-7963-023-2 (pdf)
ISSN 0436-1121

Academic thesis in Educational Science at the Department of Pedagogical,
Curricular and Professional Studies, University of Gothenburg

The publication is also available in full text at:
<http://hdl.handle.net/2077/63258>

Subscriptions to the series and orders for individual copies sent to: Acta
Universitatis Gothoburgensis, PO Box 222, SE-405 30 Göteborg, Sweden or
to acta@ub.gu.se

Cover image by Margaretha Häggström. The dandelions finding its way through
the cracks symbolises the beauty, power and determination of nature. It also
connects with the weather as its seeds are spread by the wind. Dandelions also
produce affect, for instance, when children blow its seeds into the air like
parachutes. Bees love dandelions and they are believed to be an early nutrition
source in spring. Lastly, the striking yellow represents the colour that the
Ethiopian and Swedish flag have in common and as such unites the two
countries that have affected me most as a human being.

Photographer: Gunnar Jönsson

Print: Stema Specialtryck AB, Borås, Sweden, 2020



Abstract

Title: Reconfiguring Environmental Sustainability in Early
Childhood Education: a Post-anthropocentric Approach
Author: Kassahun Weldemariam
Language: English
ISBN: 978-91-7963-022-5(printed)
ISBN: 978-91-7963-023-2(pdf)
ISSN: 0436-1121
Keywords: Sustainability, Anthropocentric, Post-anthropocentric,
Assemblage, Subjectivity, Affect, Ontology,
Epistemology, Agency, Becoming-With, Distributed
Agency, Materiality

The purpose of this dissertation is twofold. First, it explores how the notion of
sustainability is conceptualized within early childhood education discourses and
how it is manifested in early childhood curricula. Second, the dissertation
examines post-anthropocentric possibilities of sustainability within early
childhood education.

A major finding of the two studies, relating to the first purpose, is that early
childhood education tends to have an anthropocentric bias and over-
emphasizes the importance of children's agency in enhancing their potential to
contribute to sustainability. Using this finding as a backdrop, the major finding
of the two subsequent studies, relating to the second purpose, is that post-
anthropocentric analysis can help to challenge these shortcomings and offer the
emergence of a different sustainability ethos. In doing so, sustainability is
reconceptualized as a generative concept that opens up possibilities for children
to learn-with, become-with and affected by non-humans, i.e. other species and
non-human forces.

Specific posthuman concepts such as assemblage, distributed agency and
becoming-with are used as thinking tools. Systematic literature review and
curricula content analysis are employed as methods for study one and study two
respectively. Study three and study four draw ideas from post-qualitative inquiry
which employ concepts that allow to experimentally engage with the world and
think with/become-with data.

The latter two studies empirically demonstrate emerging possibilities of learning for sustainability with the non-human others/material forces and other species. In the end, the dissertation highlights that post-humanist and new materialist perspectives can provide a post-anthropocentric conceptualisation of sustainability, which paves the way for a more relational ontology, one that could in turn create a pedagogical practice supporting sustainability.

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Acknowledgements

Next to none, let the utmost praise be to the ALLMIGHTY LORD for his relentless love, protection and enabling grace that has hold me firm toward the successful completion of this long and demanding journey over the last four and half years.

I am deeply grateful to Carl Bennet A.B. for the generous provision of funding for the PhD.

I am thankful to several people who have involved me and helped me along the way. I would like to convey my deepest gratitude to my supervision team. I could not ask for a better and stronger team than working with three well-grounded scholars; professor Arjen Wals, associate professor Helena Pedersen and associate professor Benjamin Knutsson. Thank you for all the intellectual engagements we have had over the years.

Arjen-I am indeed fortunate to have had the opportunity to closely work with you. Thank you for believing in me and standing by me from the outset to the end of the journey. You have remained unreserved to care, lift me up, encourage and support me despite geographical limitations. Thank you for all the enriching conversations and scholastic engagement throughout the course of the research. You have given me experiences that I will cherish for the rest of my life in academia. I have learnt a great deal from you, and you have certainly left on me an indelible imprint of perspectives for my future research around sustainability issues.

Helena-thank you for being an integral person in the team. Particularly, your well reputed expertise pertaining to the conceptual aspect of the work has remained quite fundamental throughout the course of my work. You have been a critical friend, a thought partner and have challenged my thinking over the years, which has helped me adopt a critical stance towards the concepts I dealt with. I remain grateful for the vital role you played as a supervisor.

Benjamin-thank you for getting on board with me from the onset of this journey. I am very grateful for your meticulous reading and critical engagement with my text. It has been a worthwhile endeavor to engage with your critique and the key questions you pose. I have significantly benefited from your several strategic tips in text structuring, precise formulation, cautious word choice and

how to deal with reviewers' comments. I would also like to thank professor Ingrid Pramling Samuelsson who was part of the supervision team halfway through the project.

I am very grateful to the children, the teachers, the parents and the school administration for their warm welcome, enthusiasm and wonderful cooperation shown during my school visits.

I remain thankful to the discussants at my planning, mid and final seminars: Helene Brembeck, Anna Palmer and Anne Beate Reinertsen, whose insightful and constructive comments has been of paramount importance to move forward in the project.

I am very honored to collaborate with the Transnational Dialogues for Sustainability Research in Early Childhood Education research group. I cannot thank you enough for all the scholastic engagement I have had with such an amazing group of international scholars. We shared a range of experiences from writing a joint publication to conference collaborations and engagement in a PhD course.

I extend my gratitude to Olof Frank and Christina Osbeck for creating the wonderful opportunity to join the book project which made my first publication possible while serving as a spring board for other articles in the dissertation.

I am very appreciative to the staff at the Gothenburg Center for Sustainable Development, GMV. It has been quite a rewarding experience to work as sustainability coordinator and to collaborate with the environmental management team. Particularly, it has been quite an enriching experience to closely work with Eddi Omrcen and to initiate two successful projects: GUSTA (Gothenburg University's Sustainability Thesis Award) and a series of the ESD Forum that has been running since 2017. Eddi-thank you for the excellent leadership style you demonstrate within the team.

I will always remain indebted to the Department of Pedagogical, Curricular and Professional Studies for offering such a flexible and conducive work environment. Particularly, I am thankful to Jonas Emanuelsson and Anita Wallin for the warm welcome that helped me start the journey with ease. Angelika and Sylvana-thank you for efficiently continuing that which Anita started. Thank you for all the follow up and facilitation of my progress along the way. My gratitude also goes to the administrative staff at the department, particularly Rebecca Namanzi, Cristina Sorensen and Ewa Stackelius. You all have been keen to help me in various administrative issues. Evalise Johannisson

and Anna Rehn-thank you very much for your cooperation at the final printing stage of the dissertation.

I am grateful to the ESD research group for their various engagement with my work at different occasions. I would also like to convey my gratitude to Miranda Rocksén and Maria Svensson for creating the opportunity to join and collaborate in the STINT project. Miranda-thank you for all the support and care in various matters.

I am also very thankful to Simon Ceder and Martin Hauberg for their engagement in reading and commenting my draft in its early phase. Catarina Player-Koro, I am thankful for your comments on my proposal right before the planning seminar.

I owe a great deal of appreciation to Jason Travis, Mulugeta Hailemeskel and Catherine Gunnarsson for proofreading different sections of the dissertation at different times along the way. I am also deeply thankful to Marie Grice, Jonna Larsson and Anna Maria Hipkiss for their engagement in translating the Swedish summary.

Last, certainly not least, I am deeply grateful my wonderful wife, Meron Mekonnen, who shouldered the toughest and most important responsibility at the home front. You have elegantly nurtured our girls, Eliana and Abigail (the joys of our lives) while I spent longer and longer hours at the office wrestling with the dissertation. I certainly owe you a great deal. I am also thankful for my entire family, my father in particular, for having faith in me, which has remained a source of fresh impetus and helped me remain committed throughout the project work.

Gothenburg, 8th February, 2020

Chapter One: Introduction

1.1. Orientations of sustainability in Early Childhood Education

We are living in an era where we are facing runaway climate change leading to massive loss, and extinction, of biodiversity. Humanity bears the responsibility for both the out of control and the, by now, enormous impact of these interrelated phenomena, and not just on the human species. However, not all humans bear these responsibilities equally. Some contribute far more than others; some by choice, some by force; some unwillingly, without knowing, others, perhaps not willingly, but being fully aware. Although humanity is not one homogenous entity, it has, as a species, the responsibility to respond, restore and regenerate in order to find other ways of living on Earth, ways that consider the intrinsic value of all life on Earth, the complex web of life and the existence of planetary boundaries (Rockström et.al. 2009). One way to do this is to explore and try-out alternative ways of being and knowing that facilitate more sustainable ways of living. Education has a key role to play in enabling people to contribute to such ways of being and knowing (UNESCO, 2016b) but how to do this remains disputed.

In this thesis, I look particularly at the way ECE (early childhood education) can contribute to possible responses to global sustainability challenges. It has been widely known for a long time that what happens early in life is foundational for future behaviour, in general but also in relation to environment and sustainability (Wilson, 1996). Early childhood education has been considered to play a central role in shaping values, attitudes and fundamental perspectives early in life (Siraj-Blatchford, 2009).

Historically, some early childhood scholars and educators have tried to conceptualize and develop early childhood education in ways that would enable young children to engage with issues related to nature, environment and, more recently, sustainability (Davis and Elliott, 2014). Based on a review of some of the key sustainability literature in ECE (see Article I in the appendices and Chapter Two of this dissertation), there are three major strands/orientations of research that have informed sustainability within early childhood education: an

ecological one emphasizing connection with nature and the development of ecological literacy; a socio-critical political one focusing on collective change and challenging structures and power relations; and one focusing on agency and empowerment of the individual child.

The ecological approach, having its roots in nature conservation education, is one of the long-standing and widely employed approaches and emphasizes the need to teach children the knowledge required to love and care for nature (Tilbury et al., 2005). The socio-critical and political dimension of environmental education draws ideas from Paulo Freire's critical theory (Tsoubaris and Georgopoulos, 2013). By highlighting the need for democracy and social justice, this approach emphasizes the political dimension of learning, which calls for change through action and social justice (Kellett, 2011; Malone, 2013). More recently, scholars such as Arlemalm-Hagser and Davis (2014); Caiman and Lundegård (2014); and Davis and Elliot (2014), argued for the need and importance of recognizing and empowering children's agency and their active participation in global, societal and environmental challenges.

The aforementioned earlier approaches in early childhood education for sustainability (ECEfS) can be considered anthropocentric in that they do not actively or consciously seek to decentre the human perspective. In other words, the child and the child-rearing adults are not seen as an entangled part of nature or as equally important to other species but rather as powerful actors that can master and shape nature in good or harmful way. This anthropocentric tendency is not specific to early childhood education but has become, and always has been, a characteristic of most mainstream formal education. It may, however, unwittingly, reproduce the root problem leading to environmental vandalism that, to a large degree, can be attributed, to the prevailing idea that humans are something other than, and outside of nature, and that nature can be commodified, objectified and reduced to a passive resource to be exploited.

Recently, an alternative perspective has been emerging that advocates decentring the human and developing a more relational, collective and entangled way of being in the world (Taylor et al., 2012; Lenz-Taguchi, 2010; Cutter-Mackenzie et al., 2019). This might be a critically needed perspective for alternative ways of knowing which helps to foster sustainable ways of living. Grasping what such a perspective entails, specifically in the context of early childhood education for sustainability, lies at the heart of this thesis. The section below further develops the rationale for exploring perspectives that are more

relational and that decentre the human by first addressing potential shortcomings of the aforementioned earlier orientations.

1.2. Problematization of singling out the individual, agentic and empowered child

The aforementioned three perspectives have positively impacted the expansion of environmental and sustainability education for multiple decades. However, it has not been well explored how far they challenge the essentialist ontological and epistemological assumption that separates the child from the non-human world, i.e. other species and non-human forces. Recently, a number of scholars have pointed out the tendency of these perspectives to be anthropocentric and to create an artificial boundary between the child and the non-human world by solely focusing on human agency and by perceiving non-humans as passive (Cutter-Mackenzie et al., 2019; Malone, 2017; Taylor, 2013). The ontological and epistemological premises of these approaches tend to rely on human agency and subjectivity, which unintentionally disregard the agentic characteristics of other species and non-human forces.

By confining themselves to human subjectivity and stressing children's agency, these approaches reinforce the ontological separation between the human child and the natural environment or what is commonly referred as "nature" (Taylor, 2013; Cutter-Mackenzie et al., 2019). In doing so, these strands overlook the agentic characteristics of non-humans. They are child-centred and mainly aspire to build up children's agency, considering non-humans as a background for humans to act on. By doing this, they foster an ontological and epistemological separation between the human child and the wider physical and non-human world. Underpinning assumptions in these child-centred pedagogies and research approaches rely on a pre-existing, knowing human child and what he/she is able to think and do (Taylor et al., 2012). The child is considered to be the centre of knowledge production while the non-humans and the material world are considered to be passive beings awaiting children's action.

Although the idea of empowering agency has helped challenge the romanticized view of children, it has not offered a way out of the established anthropocentric worldview in educational practices. Put differently, emphasizing children's agency has not (by and large) led to the recognition of

the entanglement of humans and the environment/"nature". The fundamental premises of this tenet relied solely on human subjectivity.

In particular, the focus on children's ability to think, understand, recognize and act has created a gap for the inclusion of non-human actors, as it often grants and attributes consciousness and agency to the human. The 'agentic child' perspective tends to emphasize the importance of the human and ignores that of the non-humans, the natural phenomena and their vital materialities. As a result, such a perspective is inadequate to challenge the deep-rooted anthropocentric approach which creates the divide between human and non-human. This is problematic when considering the realization of humans intricate entanglement with non-human others as a key stepping stone towards sustainable living.

I argue that a sole focus on children's agency is preventing us from rethinking the deep-rooted anthropocentric assumptions and practices that tend to dominate ECEfS. Emphasizing children's agency may also obscure other possibilities by perpetuating the existing anthropocentric practices (Weldemariam, 2017a, 2017b). It should be noted that my intent is not to disregard agency and empowerment of children, but rather to challenge the excessive emphasis and weight put on children's agency at the expense of others' (non-humans') agentic characteristics.

Although sustainability has been widely conceptualized in ECE, it has not adequately been empirically investigated in practice, particularly from a post-anthropocentric perspective. Therefore, drawing on concepts from the philosophy of posthumanism, I empirically explore whether such a relational and post-anthropocentric way of being in the world could be another way of knowing and becoming more sensitive to addressing global environmental challenges. How such perspective can be enacted and performed in practice is indicated in Articles III and IV.

Arguably, young children have not yet been enculturated with an anthropocentric perspective as much as their adult counterparts. The cultivated and, conditioned separation of the world into subject and object is not yet as well established in young children. In a sense this, perhaps somewhat ironically, offers better possibilities still for conserving and enhancing more relational ways of being in the world. Conventionally, early years education promotes an approach wherein children are guided and taught about the world by adults and learn from different experiences, which possibly creates division between human and non-human. This assumption entails that children are considered as

"isolated" subjects who are expected to learn and get it right, and eventually become environmental stewards.

1.3. (Re) conceptualizing sustainability in ECE

Despite its continuous expansion, reconceptualization and methodological rethinking within childhood studies, ECEfS has not been rigorously challenged from a conceptual and methodological point of view. How the notion of sustainability is understood, and how the complex concept of sustainability plays out in the lifeworld of children, its curricular manifestation and the accompanying pedagogical practices have not been sufficiently explored, and in some cases have remained vague and challenging to implement (Strange and Bayley, 2008). For instance, Inoue et al. (2016) show early childhood teachers in Japan and Australia do not have a well-developed set of ideas and practices in education for sustainability (Inoue et al., 2016).

This urges me as a researcher to interrogate the conceptualization of sustainability in early childhood. I argue that there is a need for more fruitful and generative conceptualizations of sustainability. The current focus on children's agency does not offer an adequate way to deal with sustainability challenges. Since curricula are important documents shaping practice, how sustainability manifests itself in curricula documents is an important question. This question is central in the second article of this dissertation where we (myself and international colleagues) conduct a cross-national dialogue on curricular manifestations of sustainability.

These questions are even more important in the current Anthropocene predicament. The Anthropocene highlights the era wherein human activities have increasingly and widely altered the planet's ability to regulate and sustain itself (Crutzen & Stoermer, 2000). The Intergovernmental Panel on Climate Change (Allen et al., 2014) has clearly indicated the precarious state of the planet, and that humanity has a dwindling window of opportunity to do something about it.

As many argue, there is a need to rethink our way of being in the world, to find an alternative way of knowing and a new ethical value: otherwise we, potentially, jeopardize our own existence as a species. For instance, Gibson et al. (2015) argue that to reverse the damaging human-centric behaviours, we first need to question our way of thinking and "become aware" of dysfunctional ontological predispositions, and to articulate and enact alternative ones.

Scholars such as Ives et al. (2018) attribute environmental sustainability problems to humans' lack of connectivity and relations with the world that we are enmeshed in and with other species. This attribution relates to the anthropocentric conceptualization of sustainability which is shown in Articles I and II of this dissertation.

Education has to play an important and pivotal role in rethinking our ways of being and ways of knowing. UNESCO's (2016b) global education monitoring report has emphasized the potential and critical role that education plays in connecting people and planet. Although there have been different efforts to reorient education towards sustainability and sustainable development, there has not been adequate research to suggest alternative ways of being to rethink humans' relationship with the planet. Among the existing efforts include the research by the Common Worlds Research Collective (2018), which challenges the ingrained idea of an autonomous individual child and reconceptualization of the child as entangled with the more-than-human world (Abram, 1999)-particularly animals. Pedersen (2019) also challenged the taken-for-granted human-animal relationship (animals as necessary resource to be utilized for teaching-learning process) that modern education perpetuates and introduced disruptive actions that could possibly lead to the liberation of animals. Hence, a corresponding pedagogy that nurtures a collective and a more relational way of being in the world might be one way out of this negative spiral towards unsustainability.

1.4. Sustainability and ECE in a United Nations context

There have been several global initiatives within education to address global environmental challenges. One significant initiative was the introduction of United Nations Decade of Education for Sustainable Development (2005-2014) aimed at integrating the principles, values and practices of sustainable development into all aspects of education and learning. However, this initiative has an inherently anthropocentric bias. Highlighting the limitations of the initiative, Kopnina (2014) pointed out that "ESD masks its anthropocentric agenda and may in fact be counterproductive to the efficacy of environmental education in fostering a citizenry that is prepared to address the anthropogenic causes of environmental problems" (p.73).

In common with other stages of education, the prevailing precarious state of the planet has continued to spur a lot of debate in early childhood education (ECE), which brings about different views regarding the position of young children. On the one hand, there is a view that promotes the idea of children as important agents, who hence have to engage, and act, to save their future (Watts et al., 2015; UNICEF, 2014). This posits children as important actors in dealing with environmental sustainability challenges. Others, for instance climate change deniers, are sceptical of both the problem per se and the need for children's involvement, and even consider this as an inappropriate manipulation of children to advance a particular socio-political agenda.

With the continuous increase in humans' extractive and destructive behaviour, children of the 21st century will be disproportionately affected by uncertain ecological futures as manifested in runaway climate change (IPCC, 2018) and the accelerating loss of biodiversity (Bongaarts, 2019). Given the urgency and complexity of the problem, ECE in particular has an important role to play helping young people cope with, challenge and respond to what some refer to as systemic global dysfunction (Lotz-Sisitka et al., 2015). Hence, the early years are considered to be a particularly phase in a child's life, where ways of being and ways of knowing are "established" that are crucial for future life chances and prospects. It is argued that if children are not engaged and involved in the endeavour towards sustainability from a young age, they will be forced to live in a world that adults create and design for them (Malone, 2017).

Yet, the wider educational practice in childhood in general and ECEfS in particular still remains resistant to change and retains an inherently anthropocentric world view, which is inadequate in dealing with the current planetary challenges. The learning theories in ECE are still predominantly based on child-centred sociocultural, social constructivist and Piagetian developmental approaches (Lave and Wenger, 1991; Piaget, 1997; Vygotsky, 1986). Parallel to the learning theories, different research paradigms have been used in ECE for the last 20 years.

Predominantly, most of the research within ECE in general and ECEfS in particular tends to have positivist, hermeneutic and interpretative characteristics. These dominant theoretical orientations and research paradigms emphasize children's social worlds, cognitive processes and human interactions, which leave humans to remain within habitual anthropocentric ways of learning and looking at the world. It is this deeply rooted and inherent problem that this

study tackles to offer a post-anthropocentric alternative way of conceptualizing and enacting sustainability in ECE.

1.5. Sustainability in ECE in a Swedish context

The Swedish preschool curriculum has for a long time been promoting the need to engage young children in environmental and societal issues. Preschools in Sweden are expected to engage children with activities addressing pertinent issues such as nature and the environment, as well as democratic values and social interaction (Skolverket, 2010). More recently, the new curriculum for preschool explicitly highlights the need to emphasize sustainable development in early childhood education (Skolverket, 2018). The preschool has a duty to ensure that children develop respect for all forms of life and care for the surrounding environment (Skolverket, 2018). Features of a strong nature-oriented outdoor education tradition and an ecological approach have long been evident in Swedish preschool education (Halldén, 2011). Children are viewed as part of nature and its cycle; how people, nature and society influence each other; conservation and caring attitudes towards nature have remained an important focus in the curriculum (Skolverket, 2010, 2018). However, the wider understanding and the pedagogical approaches employed focus on children's agency and their empowerment, i.e. they do not explicitly recognize the agentic characteristics of the non-human world.

1.6. Point of Departure

As indicated in the systematic review (Article I of this dissertation), there is a deeply rooted anthropocentric tendency in ECE, which is key obstacle in moving towards sustainability. This thesis challenges this tendency and looks for alternative post-anthropocentric approaches that are more relational and collective, which in turn require conceptual rethinking and alternative ways of knowing and being. Posthuman scholars such as Ferrando (2016) are calling for:

...“a post-anthropocentric turn by emphasizing the fact that the Anthropocene and the actual ecological collapse are only the symptoms; it is time to address the causes, which have been detected in the anthropocentric worldview based on an autonomous conception of the human as a self-defying agent...and hence a theoretical and pragmatic post-anthropocentric shift in the current perception of the human” (P.159).

How can we challenge, if not completely let go of, the deep-rooted and inherent anthropocentric privilege/child-centred approach within ECEfS? This further brings about a question on the underpinning ontological and epistemological assumptions within the field. Thus, environmental sustainability education within early childhood education might benefit from working with an ontological and epistemological precondition that acknowledges children in relation to the non-human environment, other species and material forces.

This necessitates alternative ways of being and knowing, which in turn brings about rethinking of existing approaches around environmental sustainability. Therefore, I began this study with an exploration of its conceptualization and the accompanying practice within the wider historical, policy, practice and research discourse in the field. This led to the need to be critical and explore alternative pathways and vantage points that have the potential for illuminating the entanglements and deep-rooted connections between humans and non-humans and possibly changing our ways of knowing/being and relationships.

1.7. Research aims

The purpose of this dissertation is twofold.

- First, it explores how the notion of sustainability is conceptualized within early childhood education discourses and how it is manifested in early childhood curricula.
- Second, the dissertation explores post-anthropocentric possibilities of sustainability within early childhood education.

1.8. Research Questions

In an effort to achieve the above aims, the study seeks answers to these key questions.

- How is the notion of sustainability typically understood and conceptualized within the ECEfS field?
- How is sustainability manifested and articulated in national early childhood curricula documents?
- How may post-anthropocentric analyses generate alternative ways of conceptualizing “sustainability”?

- What “learning spaces” might emerge in and from post-anthropocentric analysis of sustainability in the context of ECEfS?

1.9. Concepts and Methods

As stated in the point of departure section above, this study begins by unveiling and investigating existing ECEfS conceptualizations to be able to sketch a more comprehensive approach for conceiving sustainability from a broader context that includes and embraces a multitude of human and non-humans actors, subjects, forces and agents. In doing so, the study itself attempts to decentre the human and brings in non-human others and focuses on their relationship and entanglement with the human child (children, teachers and myself as a researcher), i.e. a post-anthropocentric perspective.

This study is intended to expand and enrich this very slim but emerging perspective in the context of finding more sustainable ways of living. In ECEfS particularly, empirical studies with post-anthropocentric analysis are very limited. Thus, drawing on some empirical data, I am striving to contribute to both theory (use of specific concepts) and methodology development (post-qualitative inquiry) for sustainability research in early childhood education.

Conceptually, this study draws ideas from posthuman theories. The study highlights post-humanist thinking (Haraway, 2008, 2016) and its subsumed notion of new materialist (Bennett, 2010) thinking as less utilized perspectives in ECEfS, essentially making it difficult to attune to human’s inevitable entanglement with the more-than-human world (Abram, 1999). Posthumanism criticizes anthropocentric humanism and opens its knowledge enquiry to other species and the non-human world.

In doing so, it calls for rethinking subjectivity and agency. It perceives agency as “distributed” (Bennett, 2010) and subjectivity as a “non-unitary” entity (Olsson, 2009). In other words, it is not conceptualized as something that is inherent only within conscious and intentional individual beings, but, rather, something that emerges in and through relations between humans and non-humans. Likewise, in posthuman thinking, knowledge is not just a cognitive entity that is acquired through. It rather embraces the whole socio-emotional-cognitive, affective, entangled and enmeshed way of being and knowing. Details of the theoretical framework and discussion of specific concepts employed are presented in Chapter Three.

The first part of the thesis, Article I, begins by investigating and challenging the notion of sustainability and how it has been conceptualized and evolved ever since it was introduced to the field of early childhood education. The second part of the thesis, Article II, looks at the place of sustainability within national curricula and examines how different nations (Australia, England, Norway, Sweden and the USA) embrace sustainability in their curricular frameworks. The last two studies, Articles III and IV, offer empirical cases in order to provide examples of how sustainability can be analyzed in early childhood education from a post-anthropocentric perspective. Article III addresses possibilities of engaging with ecological and climate issues by engaging with materialities of the weather. Article IV indicates alternative ways of engaging with species extinction issues through becoming-with animals, bees in particular.

Systematic literature review and curricula content analysis are employed as methods for Studies One and Two respectively. Studies Three and Four draw ideas from post-qualitative inquiry. Post-qualitative inquiry is a generative way of experimenting with the world (St. Pierre, 2018). It challenges the traditional conception of data, the position of the researcher and the concept of empiricism. In a post-qualitative inquiry, data is not something external to be collected by the researcher, but the researcher himself/herself “becomes-with” and “knows-with” the data. In doing so, it introduces the concept of infra-empiricism (Clough, 2009; MacLure, 2011), which is an expanded empiricism that embraces forces and perspectives beyond the perception of the conscious human subject. Thus, data is understood as an assemblage of the human researcher, human children, other forces and the wider non-human world. Studies three and four, in this dissertation, particularly focus on Nordstrom’s (2015) concept of data assemblage, which helps to empirically demonstrate possibilities of learning for sustainability with the non-human world/non-human actors, i.e. other species and material forces.

1.10. Dissertation Organization

The dissertation is composed of four introductory chapters and three synthesizing chapters. Chapter one introduces the purpose, perspectives and concerns of the dissertation. Chapter Two presents previous studies. Chapter Three presents the theory and discussion on specific concepts employed. Chapter Four presents the methodology and nature of inquiry section, which

consists of: systematic review for Article I, curricula content analysis for Article II and post-qualitative enquiry for Article III and IV. Chapter Five offers a summary of the findings in the four articles. Chapter Six presents a meta-level discussion and critical reflection by offering the knowledge contribution and broader implications of the study for sustainability education at large and ECEfS in particular. Chapter Seven contains ending remarks, recommendations and highlights the need for continuous quest for ways of knowing for sustainability. Table 1 provides an overview of the dissertation.

Table 1. Summary and tabular presentation of the dissertation

Introductory Chapters	
<ul style="list-style-type: none"> • Purpose, perspectives and concerns. • Previous work on ECEfS and sustainability. • Theory and key concepts. • Methodology and nature of inquiry. 	
Article I	Article II
<ul style="list-style-type: none"> • Conceptualization of sustainability in the history, policy and research within the field of ECEfS. • Systematic literature review. 	<ul style="list-style-type: none"> • Current status quo of sustainability as manifested in national curricula frameworks. • Curriculum content analysis.
Article III	Article IV
<ul style="list-style-type: none"> • Post-anthropocentric-analysis- Example I • Child-weather assemblage • Post-qualitative inquiry 	<ul style="list-style-type: none"> • Post-anthropocentric analysis - Example II • Becoming-WITH the bees • Post-qualitative inquiry
Synthesizing Chapters	
<ul style="list-style-type: none"> • Summary of “findings” • Discussion and critical reflections: Rethinking sustainability, education, the child and nature-of inquiry • Implications: Towards a relational pedagogy for ECEfS • Way Forward: The Pursuit of Multiple Ways of knowing for Sustainability 	

Chapter 2: Earlier and Emergent Research on Sustainability within Early Childhood Education

It is widely acknowledged that the quality of childrens' experiences in the early years can have lasting effects on lifelong learning and well-being, educational attainment, and, on society as a whole (Siraj-Blatchford et al., 2008; Karoly et al., 2005). As values, attitudes, behaviours and skills are formed during the early years, scholars argue that sustainability education needs to be featured in early childhood education (Cutter-Mackenzie & Edwards 2013; Pramling Samuelsson, 2011; Siraj-Blatchford, 2009; Davis, 2008).

The recognition of the link between environmental sustainability issues and early childhood education (ECE) dates back to the 1990s. Davis and Elliott (2014) argue that it is the recognition of the unique affordances of children's curiosity that has led to the identification of ECE as a foundation for lifelong learning and the development of pro-environmental values and attitudes. Despite this recognition and movement, until recently, the notion of sustainability had not been widely researched or overtly incorporated into ECE policy frameworks and pedagogical practices. UNESCO's first official report on the subject, *The Contribution of Early Childhood Education to a Sustainable Society*, by Pramling Samuelson and Kaga (2008), was the first initiative to explicitly address sustainability within ECE. This report contributed to an increased interest in the concept of sustainability within early childhood pedagogy, curricula and research. Building on the work of UNESCO, the World Organisation for Early Childhood Education (OMEP) made a plea for the expansion of the field by highlighting the link between ECE and sustainability (Siraj-Blatchford et al. 2010). Today, although there is an expansion of the body of knowledge, there is still a need for more research in the field to inform practice (Somerville and Williams, 2015).

In this chapter, I present and discuss earlier and more recent studies relevant to the aim and the research problem in focus. I will first present and discuss earlier studies focusing on: their thematic focus, their theoretical and philosophical approaches and their methodological orientations. I will then

discuss emerging trends of posthumanist research within ECEfS. Subsequently, I will zoom in on studies within the Swedish context, as this is the context in which my research is located. In the closing section of the chapter, I will demarcate the point of departure of the present study and indicate how it relates to existing bodies of knowledge.

2.1. Earlier Research on Sustainability within Early Childhood Education

As indicated in Chapter One, there are three major strands of sustainability research informing early childhood education: ecologically oriented, socio-critically oriented and studies oriented towards agency and participation. Research within these three strands has played an important role in shaping sustainability education in early childhood education. These studies have employed different theoretical/philosophical and methodological orientations including: positivist, interpretivist/hermeneutical, critical-theory oriented and rights-based approaches. Detailed descriptions of each strand follow in the sections below.

2.1.1. Ecologically Oriented Research/The Ecological Approach

Emanating from nature conservation education, the ecological approach has long been emphasizing the need to teach children the knowledge and sensitivity required to love and care for nature. Among other things, this includes the knowledge-based approach (Tilbury et al., 2005) and the immersive learning approach influenced by Jean-Jacques Rousseau's classical work which promotes children's learning in "nature" (Rousseau, 1979). Oftentimes, experiential and immersive pedagogy is advocated to intensify children's exposure and connection to nature. Drawing from Jean-Jacques Rousseau (1979) and, more recently, Richard Louv (2008), outdoor education is considered critical in creating possibilities for children to develop love and care for nature. Rather than the explicit teaching of nature as a topic, the immersive approach considers "nature" as a natural learning context (Sobel, 1996; 2008; Louv, 2008). While this approach has been a common practice in different parts of the world, it has been given explicit emphasis in the Scandinavian context (Robertson, 2008).

Most of the studies within this strand are conducted within the so-called positivist empirical analytical research paradigm which considers children as a research object and education as an intervention that can be designed, implemented and evaluated on the extend to which they achieve pre-determined outcomes. Positivist studies within ECEfS are often quantitative in nature, and tend to examine behavioral aspects such as: children's environmental knowledge, attitudes and beliefs regarding the environment and how environmental education influences these 'behavioral components'. For instance, Hadzigeorgious et al. (2011) made a comparison of teaching methods, and concluded that storytelling is a better pedagogy to teach young children about the value of trees than directly teaching about trees. Other studies within this vein explore children's knowledge and awareness of environmental issues such as global warming; tropical rainforests; biodiversity loss; and waste management (Palmer, 1995; Palmer & Suggate, 2004) or their attitudes, beliefs, perceptions and achievements in environmental education and outdoor learning spaces (Kahriman-Öztürk et al., 2012; Hadzigeorgious et al., 2011). Typically pre and post tests and control groups are used to show whether a particular educational intervention leads to a change in these behavioural aspects.

A range of methods has been employed by positivist studies having an ecological focus. For instance, scholars such as Ergazaki & Andriotou (2010); Palmer et al. (2003); and Palmer & Suggate (2004) used individual interviews, illustrations and photographs to explore children's knowledge, awareness, understanding, thoughts and views. Others used a questionnaire to explore preschool children's environmental attitudes and the level of their environmental knowledge (Grodzieska-Jurczak et.al, 2006).

Another theoretical orientation is the interpretative hermeneutical approach. Scholars using this approach are mainly situated within dominant "connection to nature" and "children's rights" discourses (Gambino et al., 2009; O'Gorman and Davis, 2013). Emanating from the legacy of Rousseau, studies that are situated within the "connection to nature" discourse are concerned about children's alienation from nature, and they stress the need to reconnect children to nature (Taylor, 2013). An assumption underlying these studies is that children are alienated from nature - and that they should be reconnected to it. Implicit here is the notion that nature and culture are separate entities. Likewise, an interpretative study by Cutter-Mackenzie & Edward (2013) has revealed the

possibility of intentionally integrating sustainability issues, such as biodiversity, in to children's pedagogical play.

Research within this strand emphasizes behavioral change for a sustainable future, that is, they are human/child-centred and rely on the cognitive and meaning-making processes of the autonomous and learning child.

2.1.2. The Socially Critical Approach

The socially critical approach recognizes that there are powers and structures at work that steer away from a more relational and equitable way of being in the world and promote the need to challenge, question and change these powers and structures.

Some of the research under this strand addresses children's rights (Engdahl and Rabusicova, 2010) and is mostly related to the ESD initiatives by the UN and is oriented towards the three pillars of sustainability: environment, society/culture and economy (Brundtland, 1987). Research within this paradigm is not so much pre-occupied with dissecting children's behaviour into variables and understanding how they influence each other, but rather in coming to understand the world of children 'through the eyes of the children' and interpreting what that might mean for how we might best support their learning.

Researchers within this strand employ a critical perspective and allow teachers and children to be involved in the research process, and the purpose is to bring about change and transformational processes. An example of this is a study by O'Gorman & Davis (2013), who analyzed preservice teachers' and students' responses to an ecological footprint calculator as a tool for engaging staff and students in the learning and teaching of sustainability. Likewise, guided by critical theory and an ecofeminist perspective, Årlemalm-Hagsér (2013) conducted a curriculum-oriented study that examined children's agency and meaning making within sustainability pedagogy in preschool. Her study indicated the prevalence of sustainability issues in a preschool setting as a content-based and thematic approach within the curriculum. This study also indicated the potential of preschool as a transformative arena for the expression of different political and practical agendas. Unlike the ecologically oriented strand, research within the socially critical strand puts much weight on coming to understand what role resilient structures and power relationships play in shaping the world of the child and children's learning.

Another widely employed theoretical orientation under the socially critical strand is the constructivist and sociocultural framework. Researchers using this orientation are interested in children's learning for sustainability within their social context and surrounding community, involving teachers, parents and the wider community. These researchers emphasize the importance of home/school partnerships, children's community experience and active participation as citizens (Barratt et al., 2014; Engdahl and Årlemalm-Hagsér, 2014; Ji and Stuhmcke, 2014; Mackey, 2014; Phillip, 2014; Young and Cutter-Mackenzie, 2014). This framework indicates the need for those involved in ECE to facilitate and organize such opportunities for children.

Research within this strand tends to employ mixed method approaches to generate data from children, teachers and parents with various degree of participation. As children do not always have a wide range of first-hand personal experiences of people and society, they depend on indirect and socially mediated sources of information, such as parents, teachers, friends, siblings and TV (Barrett & Buchanan-Barrow, 2005). There are some studies that have explored the influence of parents' attitudes and behaviours on children's attitudes and practices in terms of environmental issues. The results indicated a positive relationship between child and parent attitudes and behaviors (Grodzieska-Jurczak et al., 2006; Musser & Diamond, 1999). Within this approach, there is a tendency to conduct research with children, although the analysis of these studies is dominated by adults.

2.1.3 Agency and Participation Strand

In the past few years, the early childhood field has continued to emerge as an important phase in education that can contribute meaningfully and significantly to the quest for sustainability and sustainable development (Engdahl, 2015). In line with this, the international OMEP world project revealed the power of children's voices on issues pertaining to sustainability (Engdahl & Rabušicová, 2010), which led to the emergence of the agentic child discourse. According to this initiative, the notion of children as active citizens and important stakeholders in this endeavor, has become an important agenda item for researchers, educators and advocates. Altogether, this has led to the expansion and promotion of children as active agents and meaning makers. This brings about the necessity to pay attention to children's voices and perspectives, and

hence to their active engagement in the data collection process, i.e. research by children approach.

The notion of children as agents for critical change has been strongly promoted and represents a counter reaction to the idea of children as immature beings who are on their way to becoming adults (Taylor, 2013; 2017). This conceptualization of the agentic child has continued to shape research, policy, curriculum and pedagogy in early childhood education. Apart from challenging a romanticized view of young children, the agentic child discourse has enhanced the field of Early Childhood Education for Sustainability (ECEfS) by emphasizing their role in societal global challenges. This has resulted in the notion of children's agency becoming a widely accepted and celebrated view in early childhood education (Caiman and Lundegård, 2014)).

2.2. Emergent Research in ECE in general and ECEfS in Particular

This section presents and discusses emerging posthuman research within early childhood education in general and ECEfS in particular. In the first half of this section, I will present general studies on posthumanism in early childhood education. The second half specifically focuses on sustainability studies from a posthuman perspective.

2.2.1 Posthuman Studies within ECE

There is a growing body of research within early childhood studies that uses posthuman theories and explores issues beyond the human child. A study by Bradley et al. (2012) examines infants' mealtime from an assemblage point of view within Australian family day-care. Using the concept of assemblage, which will be elaborated in Chapter Three, the study described how a group of toddlers interacted during mealtime through verbal and non-verbal means such as touching and the exchange of food and beverages. In this study, the assemblage is constituted by not just the human child but also the non-humans involved - the bottles, highchairs, technologies, regulations, food, gravity, etc. While embracing the ethos of participation, the study steps away from a binary logic of identity (e.g. self-other, adult-infant, subject-object) that usually implicitly underpins such approaches. Instead, it demonstrates the generativity of concepts of 'assemblage,' 'event,' 'line of flight,' in rethinking what should form the focus for the theorizing, pedagogy and practices surrounding infants

and toddlers. The study indicated that a recognition and appreciation of this complexly assembled relations helped the researchers unpack some of the layered effects of connection, power and becoming. Through the relations afforded by and made between these diverse elements, the descriptions of mealtime show how highchairs and their allies may afford a new infant world symbiosis that entails not just a time and place to eat, but access to unanticipated relations of power, opportunities for connection, and ways of becoming (Bradley et al., 2012).

A multi-sensory ethnography by Renold and Mellor (2013), involving working-class children in the UK, explored how children are "doing gender" in the social, material and cultural world of the nursery. It examined how gender works on, in and across bodies and things while focusing upon the affective and actively embodied aspects of nursery-room assemblages. They describe infants' relations within the nursery environment as an assembled series of multisensory doings: 'a complex affective assemblage of other bodies and things' (p. 24).

While much of the literature on 'place-based pedagogy', for example, Somerville (2015) and Duhn (2012), argues for a commitment to place-based local environments as a counterpoint to globalization, 'place-as-assemblage' circumvents such politics of resistance. Instead of critique and opposition, the emphasis lies on finding ways for critical engagement and new perspectives through an understanding of the forces and forms that make places, and shape pedagogies (Duhn, 2012). The article draws on New Zealand-based research to reconsider the often taken-for-granted relationship between place and pedagogy.

Drawing on the notion of assemblage, Duhn (2012) challenges the well-established subject-object binary thinking within early childhood pedagogy. She considered that 'place' as "an assemblage of humans and their multiple 'others' puts emphasis on the productive nature of forces and forms as vibrant matter" (p.99). Her notion of 'place-as-assemblage' overcomes the conventional understanding of place-based pedagogy which considers local places as a counterpoint for dealing with and learning about global issues. In doing so, she demonstrates how understanding place as assemblages of vibrant material opens up possibilities for critical engagement and new perspectives, which in turn shape pedagogies (Duhn, 2012).

Building on Loris Malaguzzi's concept of environment as a third teacher, Bone (2013) challenges the taken-for-granted human-animal relationships. She

highlighted the need to consider human and animal relationships in early childhood settings in all their complexity and variety, which calls for a new ethical dimension (Bone, 2013). She argued that animals need to be acknowledged as the fourth educator and they need to be considered respectfully as a pedagogical support and motivator for learning. This in turn suggests the need to ensure similar benefits to be accrued for both animals and young children in the settings where they are learning to live together (Bone, 2013). Similarly, using animals as figures, Blaise (2014) challenges the thoughts around children, race, and class in contemporary Hong Kong. In both examples, the animals are active agents in relation to human beings: both as part of a temporary interaction and as a part of a deeper entanglement.

Timmerman and Ostertag (2011) challenges human-animal relationships portrayed in children's media such as books, toys, songs, clothing, and electronic media. Their study urges parents and environmental educators to question and challenge the message conveyed in the media. Their study particularly demonstrated "how young children's media reinforces anthropocentrism by mis-and dis-placing animals, anthropomorphizing animals, and silencing animals' subjectivity (p.31)". They in turn argue that "media diminishes the possibilities for children to know and learn from/with the more-than-human before they learn to read, write, or even speak" (p.31).

Moreover, Prout (2005) challenged the well-established child-centric way of theorizing childhood which has been widely discussed within developmental and social constructionist theory. Prout called for the re-theorization of childhood as a heterogeneous assemblage (Deleuze and Guattari, 1987), consisting of humans and a range of non-human entities including child/family/reproductive technology assemblages; child/pharmaceutical/school assemblages; and child/animal/popular culture assemblages. Olsson (2009) argues against the idea of measuring and governing children with predetermined standard measures and instead calls for more open, fluid and process-oriented ways of learning. She concludes her study of young children's relational learning in a Swedish early childhood centre by characterizing learning itself as the effect of mutable 'assemblages of desire' (pp. 133–178).

In her doctoral thesis, Hultman (2011) examined how subjectivity in preschool pedagogical practice is constituted by the interplay between humans and nonhuman materiality. Using actor-network theory, Hultman (2011) argues that children are constantly engaged in significant relations, both with humans

and nonhuman matter, and that nonhuman materiality such as pedagogical material, toys and furniture partake in and play an important role in the construction of children's subjectivities. Her study empirically exemplifies that a spade, chairs, or a ruler are not just passive tools to be used by a human agent, but also agents that affect the child and co-constitute their subjectivity.

Drawing on Barad and Deleuze, Lenz Taguchi's research (2010) promotes the agentic characteristic of pedagogical documentation in a learning environment, and introduces the notion of intra-active pedagogy. In doing so, Lenz Taguchi's research has highlighted the agential materiality of education, and the need to understand agency as an "entangled becoming" as opposed to an autonomous human subject acting alone. It is this research of hers that contributes to the disruption of hegemonic binary thinking such as: theory - practice, mind - body, and material - discursive (Lenz Taguchi, 2010). As such she argues that learning has to be conceived of as a series of post-anthropocentric intra-actions in a state of potential transformation - not just a process within a separate, independent and autonomous human/individual subject. Thus, Lenz Taguchi (2010) points out the limitations of early childhood education that focuses on measuring children's abilities in order to compare them to a specific norm of expected development, and instead argues for the idea that children "co-exist and are in a state of becoming-with each other" (Lenz Taguchi, 2010, p. 87). These important contributions suggest that the expansion of posthuman theories within ECE research might be generative.

2.2.2. Sustainability and Environmental Studies from a Posthuman Perspective within ECE

More recently, a few studies within early childhood have started to approach sustainability and environmental issues from a posthuman perspective. Highlighting the agential nature of place and its elements, Somerville and Green (2015) point out how understanding children's embeddedness in everyday local place provides a rich, natural and non-hierarchical context for connecting and engaging children with sustainability matters. By highlighting examples from children's imaginative play, they elucidate how the material and agentic qualities of place offer possibilities for learning through a direct relation with place. According to them, place offers: 'a common language that can link the local and global, indigenous and non-indigenous and different disciplinary orientations' (Somerville and Green, 2015, p. 17). They introduce a conceptual framework

of place in sustainability education that includes concepts and ideas like: ‘thinking through country’, ‘place as region’, a ‘global sense of place’ and ‘place as assemblage of more-than-human-worlds’ (p. 9).

Drawing on the notion of relationality and Maori indigenous values, Ritchie (2013) argues and empirically demonstrates how children’s understanding of their inter-connectedness and interdependence to living creatures (humans and non-humans) and non-living matter, can be pedagogically extended, as a stepping stone for enacting ecological sustainability. Ritchie (2013) points out that educators need to provide opportunities and nurture children with dispositions of relationality to humans and more-than-humans with whom we share our place and spaces in the planet.

In his study of children’s engagement in an Auckland city council’s recycling project in New Zealand, Tesar (2017) shows how having a materialist lens helps expose a force that unintentionally keeps children from becoming engaged in the project. His visual data portrays children passing by a row of huge plastic waste bins without noticing them since the bins were taller than the children. Thus, the encountered proximity between the large sized recycling bins’ bodies and the smaller bodies of the children, witnessed the “absence” of the children in the waste project. So, the encounter reveals how the non-human plastic enacts its agency and in turn elucidates how the children were overlooked in the city’s waste management project.

In an effort to respond to the critique of the anthropocentric view of nature and to disrupt the nature-culture binary, Cutter-Mackenzie et al. (2019) introduce and argue for the concept “childhoodnature” which highlights children’s entanglement with nature, and hence the need to rewrite children as nature, not separate from nature. The coined concept of childhoodnature refutes the notion of humans as the sole superior agents to care for and safeguard nature. This is also in line with Taylor’s (2017) critique of the notion of stewardship, which simply relies on human agency and the glossing over of the agency of nature/the more-than-human world. In a similar fashion, drawing on Deleuze and Guattari’s concept of becoming, Reinertsen (2016) proposes that humans need to build partnerships with the Earth and introduce the concept of “becoming Earth”. She argues that humans at large and children in particular, are not ontologically separate from the Earth. She instead calls for an educational direction that creates knowledge and practices that ensure children’s partnership with the natural world with all its inherent agentic values (Reinertsen, 2016).

With a view to rethinking child-animal relationships and pertinent pedagogies, scholars have been calling for a paradigm shift that promotes the entanglement and enmeshment of human/children with the more-than-human world at large and other forms of life in particular. A notable example is the Common Worlds Research Collective (2018), which challenges the ingrained idea of an autonomous individual child, and introduces the common worlds framework which calls for the reconceptualization of the child as entangled with the more-than-human world – particularly animals. They argue that this entanglement has concomitant ‘ethical, political and pedagogical’ implications (Taylor, 2013, p.115). Scholars within the collective (e.g. Nxumalo & Pacini-Ketchabaw, 2017; Taylor et al., 2012; Taylor & Pacini-Ketchabaw, 2015; Taylor & Pacini-Ketchabaw, 2018) have been advocating a collective future rooted in a more-than-human entanglement thinking that intentionally invites children to ‘learn-with’ other species in their everyday common world in a non-hierarchical manner.

Drawing on the case of child-pet encounters in urban classrooms, Nxumalo & Pacini-Ketchabaw (2017) highlight the inadequacy of simplistic and anthropocentric relationships to loving, caring and learning about animals. Instead, they underline the need to engage with situated, complex and emerging temporal relationships producing different affective and ethical engagements while learning with the animal. They suggest this is a pre-requisite for learning how to deal with contemporary anthropogenic challenges that children are inheriting. Likewise, Nxumalo (2018) reveals how children’s everyday entanglement with the dying bumblebees offers possibilities to relate to, learn with and respond to anthropogenic loss through various affective and embodied modes of knowing.

Moreover, drawing on the case of the swamp hen, eel and the turtle, Gannon (2017) demonstrates how an encounter with these animals can serve as a pivotal point for affective and creative engagement leading to critical inquiry and multiple modes of responding to their coexistence with humans. Although Gannon’s work is empirically anchored with secondary school students, its conceptual approach is situated within the ‘common worlds’ framework of early childhood studies. While Nxumalo & Pacini-Ketchabaw (2017) employed a multispecies ethnography to explore children’s encounter with a walking stick pet introduced to a classroom, Nxumalo (2018) employed a worlding methodology as a mode of attuning to the child-bee encounter.

The aforementioned examples highlight how a child's life is always entangled with other agents which include: materialities, the atmosphere, artefacts, places and other species and the difficulty of exploring research and practice without being mindful of such an ontological coexistence. The examples elucidate that knowledge production for environmental and sustainability learning is not necessarily limited to the human subject, but also includes other non-human subjects and their capacity to act and create affect in both humans and non-humans-see definition and description of affect in chapter three. Although the potential of posthuman thinking for addressing environmental and sustainability issues has been pointed out by the aforementioned scholars, not much work has been done on how such thinking can be employed for sustainability research. In particular, studies with post-qualitative research orientations are very scarce in environmental sustainability research within ECE. This study seeks to expand this emerging approach to ECEfS and to doing research.

2.3. Sustainability Studies within Swedish Early Childhood Education

In Sweden, where this project is mainly located, children have long been recognized as important agents for change. Preschools in Sweden have been working on various aspects (environmental, social and economic) of sustainability for a long time (Ärlemalm-Hagsér, 2013; Dahlbeck, 2014; Dahlbeck & Tallberg Broman, 2011). All the three earlier research strands can be found in the Swedish context. Topics such as personal health, lifestyle issues, individual competence and children as actors shaping a better future society, characterized by social stability, health, and economic progress, have been deep rooted in preschool pedagogical activities (Dahlbeck, 2012). Children have long been recognized as important agents influencing the moral and ethical values of families and the wider community (Dahlbeck, 2012; Dahlbeck and Tallberg Broman, 2011).

As clearly pointed out both in the earlier and recently revised Swedish curriculum for the preschool, nature-oriented outdoor education has a longstanding tradition in Swedish preschool (Skoleverket, 2011, 2018). The curriculum highlights that themes such as: cycles in nature-the importance of connections between species, interdependence; relations, caring and empathy; and ecological relationships have remained an inherent tradition in the early

years education. More recently, such focus has been made even more explicit. The revised preschool curriculum states that "Education should be undertaken in democratic forms and lay the foundation for a growing interest and responsibility among children for active participation in civic life and for sustainable development-not only economic, but also social and environmental" (Skoleverket, 2018, p.5).

Despite such well-reputed practices, research on sustainability related topics is scarce but is expanding. One of the early works by Pramling Samuelsson & Kaga (2008) demonstrates several different examples from all over the world and explores examples of life questions, gender perspectives on outdoor education and communicating science in the Swedish context. Another study, drawing on data from a nine-month ethnographic study with six Swedish preschoolers, by Endgahal (2012) focuses on social sustainability with an emphasis on democracy and gender issues. Endgahal's study has particularly focused on toddlers' social competence and how they form friendships. The study shows the various ways through which children make friendships.

A study concerning teachers' understanding of and work with Education for Sustainability (EfS) was conducted in 187 Swedish preschools and the data was gathered through the use of a questionnaire. The results showed that EfS was mainly associated with environmental issues, such as nature experiences, recycling, reuse of resources and reduction of waste (Ärlemalm-Hagsér & Sundberg, 2016).

Hedefalk et al. (2014) explicitly focus on Education for Sustainable Development (ESD) and action competence as a theme and explore various aspects of ESD which include: education about, in and for the environment; education including economic, social and environment pillars; and also teachers' understandings of ESD and how it can be implemented, its curricular integration, pedagogical adaptation and children's meaning making for ESD. Considering teaching and children's participation as meaning making, they explored how pedagogies and critical actions are executed in Swedish preschool settings. Drawing on John Dewey's notion of pragmatism, Hedefalk and her colleagues observed the meaning making activities that take place in the preschool setting which revealed that: children's development of action competence depends on the actions considered important by adults; and teachers' moves have been identified as an important factor influencing the meaning-making process; along with children's experience of critical actions involving making value judgments. The work by Hedefalk et al. (2014) calls for

a shift from literacy to action-oriented education (i.e. children as competent actors).

More recently, drawing on social learning theory, Borg (2017) examined children's knowledge and practices of sustainability as a way of caring for people and the planet. Focusing on eco-certified schools in Sweden, this study explored the role and impact of ecocertification in children's learning for environmental and sustainability issues. In doing so, Borg investigated and compared the knowledge and practices of sustainability among children attending eco-certified and non-eco-certified preschools. The study employed mixed methods, using interviews with children and questionnaires for guardians. Borg (2017) also explored preschool and home-related factors in children's learning for sustainability. She indicated that children's understanding was enhanced by: discussion with teachers, involvement in recycling and the priority preschool gives to EFS. Children's practical knowledge benefitted from active participation in activities, e.g. recycling, visit to recycling station with teachers.

As described above, all the earlier research strands can be found in the Swedish context. Yet, the emerging posthuman strand is not employed for addressing sustainability issues in early childhood education. Given this particular gap in the Swedish context, this study seeks to contribute to both a new conceptualization as well as a new methodological approach to sustainability in Swedish early childhood education.

2.4. Point of Departure for this Study

As described earlier, the ecological, socially critical and agency/empowerment strands have been identified as the most common approaches in the field. These research orientations tend to address human characteristics, focusing on the learning child, its knowledge and its agency. As indicated in the previous section, it is possible to see that the earlier research strands tend to have some biases, preferences and directions that are, albeit useful in their time, are omitting other perspectives that, given the current sustainability challenges, seem to have merit and are worthy of further exploration. Most of the aforementioned research in the three strands unintentionally reiterates the nature-culture divide, by separating humans and their activities from the rest of the world (Lenz Taguchi 2010; Taylor 2013). Thus, they fall short when it comes to acknowledging the agency and intelligibility of the more-than-human world. Consequently, their theoretical and philosophical orientations do not disrupt

the privileging of the human and the underlying humanist epistemological assumption.

A dominant characteristic of these earlier studies is their tendency to emphasize the cultures of human meaning-making and agencies, and to overlook what might be learnt with/from non-human agents. Hence, the ontological, and epistemological underpinnings of these studies remain human-centered. The human-centered bias in ECE-research, calls for different, alternative and broader theoretical orientations, especially when considering the challenges posed by realizing a more sustainable world. It is this gap or 'blind spot' that this study wants to empirically illuminate within the field of ECEfS. Besides exploring new theories, there is also a need for a broadening of methodological perspectives that can overcome the methodological limitations that underlies many of the earlier approaches to sustainability in the aforementioned research strands.

As a response to this prevailing discourse, I point out the limits and inadequacies of the practices within the existing body of knowledge and its anthropocentric narrative. Subsequently, I argue for the need to change our underlying way of being, thinking and living, which in turn can help re-shape our conceptualization of and our approach to sustainability education and the way it is researched. Current dominant knowledge within ECEfS is grounded in the notion of children's agency and it largely neglects the role of non-human factors in the children's learning for sustainability. Furthermore, non-humans (animals, objects and material forces) are usually considered as something to be used as instruments, not as actors.

However, as indicated in this review, it should be noted that this study is not the first one to approach sustainability from a posthuman perspective. There is a small emergent strand of research that employs contemporary learning theories, posthumanism in particular, and investigates the relationship between human and non-human from a non-anthropocentric point of view (Cutter-Mackenzie et al., 2019; Reinertsen, 2016; Somerville and Green, 2015; Taylor, 2017; and Taylor & Pacini-Ketchabaw, 2018). Despite the few existing conceptual studies, the post-anthropocentric approach to sustainability has not been widely applied in empirical studies. It is within this emergent strand of research that I am empirically exploring a post-anthropocentric way of understanding sustainability in early childhood education. In doing so, I employ specific posthuman concepts to uncover and address the blind spots of earlier conceptualizations and theorizations of ECEfS. By doing so, I question the

notion of subjectivity, agency and what it means to be human, but also prevailing norms about childhood and learning in ECEfS.

So, by building on emerging posthuman thinking, I investigate whether a post-anthropocentric perspective indeed presents a comprehensive context which can offer alternative ways of looking at sustainability within ECEfS. Joining these emerging posthuman initiatives, and following the recommendation by Somerville and Williams (2015) to explore the potential of post-humanism for researching planetary sustainability, I argue for the greater use of this perspective as an important theoretical/ philosophical lens for rethinking methodologies and methods when addressing research, pedagogy and curricular endeavours within ECEfS. In doing so, I strive to pay attention to the ontological and epistemological multiplicities that posthumanism offers and attempt to engage with the agency of non-humans, and to explore how such an endeavor contributes to a reconceptualization of sustainability. In that, I employ a post-qualitative inquiry approach that calls for an ontological, epistemological and axiological shift that allows for a non-anthropocentric understanding of the world.

The next chapter discusses concepts and illuminates how they help and enable me to conceptualize sustainability from a post-anthropocentric perspective.

Chapter Three: A Post-anthropocentric Conceptualization of Early Childhood Education for Sustainability

This chapter presents the conceptual premises of the dissertation, i.e. the post-anthropocentric conceptualisation of Early Childhood Education for Sustainability (ECEfS). It begins by describing the early signs of a post-anthropocentric turn in education in general and in early childhood education in particular. This is followed by a discussion of the notion of “assemblage” which, in this dissertation, is employed as an overarching concept to challenge child-centric thinking in order to open up possibilities for ontological and epistemological multiplicity. While assemblage is used as an overarching concept, other subsumed concepts such as subjectivity, agency, becoming and affect are also discussed.

3.1. The post-anthropocentric turn

Post-anthropocentric thinking emanates from the challenge and critique posed to the anthropocentrism of poststructural thinking by the posthuman turn (posthumanism), the material turn (new materialism) and the animal turn (Taylor, 2018). These three concepts, which are not mutually exclusive to one another, extend and deepen understandings of children’s subjectivity, their agency and their becomings. Since this dissertation is situated around the first two turns I will briefly describe both.

Posthumanism, by and large, seeks to reposition the human subject within a web of other non-human actors/agents. Although there are various branches of posthumanism, one of its important tenets is to challenge human exceptionalism in order to become aware of, problematize and, ultimately, avoid (as much as possible), anthropocentrism and species hierarchy (Braidotti, 2013). Posthumanism accepts the premise of critiquing transcendent explanations of human existence, but it decentres and redefines the human as a

part of (not separate from) the natural world, other species, technologies and other materialities. It challenges the longstanding idea of looking at the human subject as an exceptional and political agent, and considers the privileging of the individual human subject to be highly problematic, especially when confronted with those political problems that affect the human subject's very identity and anthropocentric actions (Braidotti, 2013; Poe, 2011).

Parallel to posthumanism, new materialism refutes the idea of considering matter and the material world as passive and inert entities to be perceived only by an active and agentic human subject. Instead, new materialist scholars argue that subjectivity is not limited to conscious subjects such as the human, but also recognize the subjectivity, vitality and responsiveness of unconscious subjects such as matter and the material world at large (Bennett, 2010). It recognizes the potentiality in an object/matter itself, which is not always identified and represented by humans and language. As such, a new materialist perspective advocates a monistic and entangled position where the human is enmeshed within the material world which encompasses humans and non-human forces.

Both posthumanism and new materialism promote the notion of humans as embedded within a more-than-human network or an assemblage (Deleuze and Guattari, 1987), and not alone as a sole agentic force in the world. From this notion flows the need to rethink agency and subjectivity, which ultimately reposition the human within a complex relationship with the non-human world. Hence, I draw on the significant commonality of posthumanism and new materialism perspectives in critiquing anthropocentric humanism to address sustainability in early childhood education (ECE) beyond its anthropocentric limitations.

Many scholars have criticized anthropocentric learning for its isolation of humanity from other realities and the rest of cosmic energy (Braidotti, 2013). These scholars argue for the need to recognize various ways of post-anthropocentric thinking. For instance, Braidotti (2013) advocates a vital materialism that identifies the whole of the universe as one infinite and indivisible substance. Likewise, Bennett (2010) introduces the concept of vital materiality and argues that things and objects are not just passive entities, but rather vibrant and agentic. McKenzie & Bieler (2016) and Poe (2011) highlight how humanity disregards the agency of the non-human, and in turn continue to dominate over the environment and other entities to continue as the Earth falters. Thus, post-anthropocentric thinking promotes the ontological multiplicity that precedes the constituency of subjects and actors.

In ECE, anthropocentrism has also been challenged from various perspectives. For instance, Lenz Taguchi (2009) highlights the need to rethink pedagogy and introduced the notion of intra-active pedagogy, while Clark (2012), MacRae (2012), Pacini-Ketchabaw et al. (2016) used new materialist thinking for re-theorizing arts education. Rautio and Winston (2015) challenge the conventional discursive aspects of children's learning and argue for the need to consider materiality. Hackett and Somerville (2017) employ new materialist thinking in order to decentre the human in their concern for planetary wellbeing. Moreover, Malone (2015) and Nxumalo and Cedillo (2017) have challenged anthropocentric ways of engaging with nature and the environment. Likewise, scholars within so-called 'commonworld' collectives (Pacini-Ketchabaw et al., 2016; Pacini-Ketchabaw and Taylor, 2016) have been challenging anthropocentrism by employing, what they refer to as, multispecies thinking which decentres the child and recognizes the agency of the more-than-human world (animals, plants, materials and places) and its entanglement with human life in children's immediate environment. However, these scholars have emphasized that decentring the human/the child is not an easy endeavour and suggested the idea of learning with/from the more-than-human world as a strategy to decentre the human (Pacini-Ketchabaw et al., 2016).

3.2. The ontological and epistemological multiplicity of Assemblage Theory

There are different types of post-anthropocentrism and they all vary in their way and extent of decentring the human. This section discusses one possible way of post-anthropocentric thinking by conceptualizing the notion of assemblage as an overarching concept, i.e. 'a post-anthropocentric perspective' through assemblage thinking. Early childhood education scholars have been employing different concepts from Deleuze and Guattari (1987), thereby introducing a conceptual and ontological shift in research and practice. Some of these concepts include: assemblage, affect, becoming, deterritorialization and immanence-see description of these concepts later in this chapter. Yet, despite their increasing use in early childhood, it should be noted that for Deleuze and Guattari concepts are not necessarily fixed and static entities, but they are in dynamic flux and their meaning might alter in different contexts.

One of the key concepts, encompassing most of the other concepts, which is widely used to challenge anthropocentrism is the notion of assemblage. The

term assemblage, emanating from the French word *agencement*, is a philosophical term introduced by Deleuze and Guattari (1987) with the literal meaning “arrangement”, “connectivity”, “fitting”, “fixing” or “composition”. The term broadly refers to a set of entities gathered in a context with some kind of dynamics that shift (e.g. change of meaning) and produce new affects which creates some impact in the course of the assemblage.

Assemblage provides a framework for analysing social complexity by emphasizing fluidity, exchangeability, and multiple functionalities through entities and their connectivity (Deleuze and Guattari, 1987). Assemblage theory asserts that, within a body (human or non-human), the relationships of component parts are not stable and fixed; they can be displaced and replaced within and among other bodies, thus approaching systems through relations of exteriority (Deleuze and Guattari, 1987; Braidotti, 2006). Assemblages are never fixed but their collective elements are always reconfiguring, transmuting and generative, and hence always do something and produce effects (Deleuze and Guattari, 1987).

Thus, the notion of assemblage assumes the interconnected nature of human and non-human entities and forces. While challenging the notion of agency as a uniquely human attribute, assemblage highlights the mutually constitutive relations between all human and non-human elements. It calls for the notion of relational and distributed agency which further questions human exceptionalism and the idea of the rational human. In doing so, assemblage thinking allows us to consider research within a ‘web of forces, intensities and encounters’ (Braidotti, 2006, p. 41) between human and non-human elements that produce multiple specifying and aggregating affects and effects. Hence, it is used as a thinking tool to help pay attention to humans’ intricate entanglement within more-than-human assemblages, which problematizes anthropocentrism, nature/culture dualism, species hierarchy, and considers more-than-human others as social, agentic and political participants in world-making and becoming with humans (Haraway, 2008).

According to Deleuze and Guattari, assemblages can be of two types: machinic assemblages and collective assemblages of enunciation. Machinic assemblages have to do with materials and social flow while assemblages of enunciation have to do with sign regimes or linguistic structures and language (Deleuze and Guattari, 1987). Both types of assemblages have relevance for this study as the encountered forces, intensities and affects created have social,

material and linguistic (e.g. the utterances from children, teachers and myself as a researcher) aspects.

Within early childhood education, the concept of assemblage offers a tool to break away from an exclusive focus upon the autonomous child and instead takes account of the complexity of relational events that constitute children’s lives and produce specific effects. Employing assemblage thinking has allowed several posthuman researchers in ECE to critique and challenge the well-established child-centric approach which focuses on the child’s meaning-making practices and subject formation. For instance, Taylor and Pacini-Ketchabaw (2015) argue for a shift away from child-centred developmental and environmental pedagogies toward pedagogies that bring attention to children’s entanglements within multiple human and more-than-human assemblages/relations. Hence, assemblage provides a useful theoretical tool to decentre the human child and to see the world without being constrained by an anthropocentric view, instead opening up alternative ontological perspectives that might be generative in moving towards more sustainable human ways of being in the world.

An assumption underlying this dissertation is that assemblage thinking extends and deepens understandings of children’s becomings. How these interrelated concepts (subjectivity, agency, affect and becoming) provide a stimulus for rethinking the ontological and epistemological conditions underpinning sustainability education, will be discussed next.

3.2.1 A Post-anthropocentric Conceptualisation of Subjectivity and Agency

Historically a *subject* is understood as a doer of an action, which mostly signifies it as proprietary to the human. However, posthumanism and post-anthropocentric thinking unsettles and challenges established ways of being as a subject and instead opens up new and generative possibilities of subjectivities. Drawing on the work of Deleuze, Braidotti (2002) refers to subjectivity as ‘an assemblage of flows of desire and affect of varying speeds and intensities, not bounded but constituted in relation to other human and nonhuman subjects, spaces, times, surfaces and events.....a subject is always ‘non-unitary’ and ‘inhabits a time that is the active tense of continuous becoming’ (p. 62). Likewise, Olsson (2009) points out that from a post-humanist point of view, subjectivity is not confined to the individual child, but instead it remains open

and refers to a collective and connected affective assemblage of other bodies, matter and things. Additionally, Kuby et al. (2018) stated that human beings are multiplicities, relational, embedded, always already material-discursive, co-evolutionary with other species, affected by pre-conscious and non-volitional forces, and thoroughly entangled with materials and technologies. While making the distinction between human and posthuman subject, Kuby et al. (2018) stated that while “the humanist subject sought to control the environment from outside, the posthumanist subject finds itself immersed in a network of vital relations, not autonomous, yet autopoietic, reproducing and transforming in relation to assemblages of which she is part” (p.185). Moreover, Mazzei highlighted that subjectivity is never an individual affair; rather, it is a “process of couplings and connections of different bodies, places, spaces, times, utterances and becomings” (2016, p.154).

Drawing on the above conceptualization and thinking with assemblage, a subject does not exist in isolation, but it is constituted within the assemblage dynamics. Therefore, from a post-anthropocentric perspective, instead of asking what or who the subject is, it is more relevant to ask: under what conditions do we become subjects? Put differently, subjectivity becomes a relative concept because it does not stand alone. As it calls for the decentring of the human, one cannot just stick with a subject or subjectivity, but rather an intersubjectivity and intrasubjectivity is called for. In doing so, post-anthropocentric thinking challenges the liberal human subject and urges a shift from the notion of an independent isolated individual to a co-existing relational being.

Agency is another key concept that is often discussed together with subjectivity. Different scholars within the posthumanist and new materialist landscape, describe agency in different, but overlapping manner. For instance, Alaimo (2017a) defined agency as “the ability to act in such a way as to produce particular results” (Alaimo, 2017a, p.415). It is not something that only humans’ possess, but rather emerges in a relationship (Bennett, 2010). As pointed out by Cielemecka & Daigle (2019), “all beings have the capacity to act, to impact others, even if they may not be exercising a willful agency like the human that, for example, decides to pluck a flower and offer it to a loved one and carries through its intention”(p.7). Barad (2007) describe agency as “a matter of intra-acting; it is an enactment, not something that someone or something has...Agency is “doing” in its intra-activity...Agency is about changing

possibilities of change entailed in reconfiguring material-discursive apparatus of bodily production”(p.178).

From the aforementioned description, agency is not an entity that is bound to an intentional subject, but is diffused across multiple entities and achieves its capacity within assemblages. It is fundamentally understood as a porous, relational, inclusive and distributed/collective entity. Thus, from a post-anthropocentric perspective, it is relevant to talk about what happens to agency or who/what becomes agentic in a given situation or context instead of who or what an agent is. However, it should be noted that a non-anthropocentric reconceptualization of agency does not absolve human responsibility. It simply challenges the “vertical or dualist ontologies” in an effort to “pave the way for a more eco-centric environmentalism” (Coole, 2013, p.461) and encourage “an enlarged sense of inter-connection between self and others, including the non-human or ‘earth’ others” (Braidotti, 2010, p.47).

Such a rethinking of subjectivity and agency opens up possibilities and has allowed me to look at the notion of ‘sustainability’ beyond the discursive level and expand it to ontological multiplicities of vital materialities and forces, affective becomings, encounters and relationships. This in turn paves the way to interrogate and re-conceptualize what ‘becoming sustainable’, ‘sustainable becomings’ or ‘learning for sustainability’ would mean in early childhood education.

While arguing for the agency and vitality of matter, Jane Bennett offers a critique of the traditional understanding which considers non-living matter as passive and lifeless entities that simply await and receive action and direction from agentic and rational humans (Bennett, 2010). In doing so, she introduces the notion of vital materiality which recognizes the vital and agentic characteristics of forces and matter. Vitality refers to “the capacity of things - water, storms, land, flora, fauna, and the elementals in all their permutations to impede or block the will and designs of humans to act as agents with forces, intentionalities, propensities or tendencies of their own” (Bennett, 2010, p.2). Thus, Bennett argues that non-living materials are vital and lively and have the power to act, to create affect and effect, to alter the course of events, and hence to make a difference in the world. Bennett borrows and builds on Latour’s notion of actant to characterize the vitality and agentic characteristic of non-living matter. An actant refers to “something that acts or to which activity is granted by another...an actant can literally be anything provided it is granted to be the source of action” (Latour, 1996, p.373). Yet, the limitation of Bennett’s

above definition of vitality is that she merged all the non-humans (including animals and plants) into one whole thing, which is not in line with my post-anthropocentric stance in this dissertation.

Bennett points out that vital materiality is not within each separate actant, but is rather a relational ‘swarm of vitalities at play’ (2010, 32). The agency is distributed and it swarms, or intensifies when things, forces, or materialities come together within an assemblage. Bennett explains that all actants within the swarm are agentic, with their own unique efficacy, trajectory and causality. Efficacy refers to “the creativity of agency, to a capacity to make something new appear or occur” (ibid., 31). “A body’s efficacy or agency always depends on the collaboration, cooperation, or interactive interferences of many bodies and forces” (ibid., 21). Trajectory refers to an agent’s “directionality or movement away from somewhere even if the toward-which it moves is obscure or even absent” (ibid., 32), and causality refers to the “contingent coming together of a set of elements” (ibid., 34).

Again, drawing on Deleuze and Guattari and Latour’s notion of assemblage, Bennett introduces the notion of “agency of the assemblage” (ibid., 20), which sees agency beyond the moral human subject and highlights its distributive nature across a swarm of simultaneous actants and vital materialities. Hence, Bennett’s notion of agency “does not posit a moral subject as the root cause of an effect” (ibid., 31), but rather a collection of actants within a lively assemblage. She defines an assemblage as “an ad hoc grouping of diverse elements, of vibrant materials of all sorts” which helps us to understand agency “as a confederation of human and nonhuman elements” (ibid., 23). She argues that we humans are in an inextricable enmeshment with these webs of forces that she refers to as an assemblage.

For Bennett, assemblages are constituted of affective bodies, which she describes as “associative bodies within an assemblage which are continuously affecting and being affected by other bodies while entering a relationship, an assemblage” (ibid., 21). She argues that “the more kinds of bodies with which a body can affiliate, the better. As the body is more capable of being affected in many ways and of affecting external bodies...so the mind is more capable of thinking. Therefore, bodies enhance their power in or as a heterogeneous assemblage” (ibid., 23). The notion of affective bodies has urged me, in the third paper of this dissertation, to look into the affect created within weather-child assemblages and the thinking it might provoke.

Along with subjectivity and agency, the notion of *affect* and *becoming* are key concepts that are concurrently discussed within assemblage thinking. The concept of affect has been described in different ways by various theorists. Drawing on Spinoza, Massumi (1987) refers it as body’s (of humans’ and non-humans’) capacity to act or be acted upon. According to this description, how a practice may enhance or diminish a body’s capacity or power to act or be acted on is dependent on its affective characteristics. Likewise, Deleuze & Guattari (1987), drawing on Spinoza, describe an affect as an action or force that operates at the moment of contact of a body to another body (human and non-human bodies). Put differently, Deleuze and Guattari (1987) describe affect as a becoming, a pre-personal and inorganic force that drives transformative movements of becoming through the power “to affect and be affected” (p. 261). While Barad (2007) conceptualizes affect as a phenomenon, Braidotti calls it a force for “successive waves of becoming” (2013, P.136). Although there seems to be a slight difference in the conceptualisation of affect, the aforementioned descriptions commonly point to a certain characteristics of vitality, movement, persistence and change.

Affect theory allows for posthumanism to highlight the “non-cognitive and non-volitional expression of life, including feeling, animation, tactility and habituation” (Roelvink & Zolkos, 2015, p.1). In doing so, the concept of affect serves to draw attention to what moves us, that is, to relations in which the children either expand or restrict their capacity to act and respond. In this dissertation, affect is conceptualized as it occurs through relationships of bodies (of human and non-humans) in Article III and through events and performance in Article IV.

Parallel with affect, *human becomings* occur within relational assemblages of heterogeneous elements which might include: objects, other living bodies, affects, practices and semiotics (Deleuze and Guattari, 1987). Ferrante and Sartori (2016) also argue that “human identity is an impure product derived from an ongoing miscegenation and contamination with the non-human, which entails that human beings become such only through a process of hybridization with the environment, as well as with those forms of otherness that inhabit it, which can be considered as co-evolutionary partners” (P.177). In line with this, Haraway (2008) pointed out that ‘to be one is always to become with many’ (p. 4).

In early childhood education, unlike the developmental psychologist’s understanding of the child as one who is heading to become a mature and

rational adult, the posthuman becoming is understood as a desire-driven and relational way of being with the more-than-human world (Taylor, 2017). The concept of becoming entails a relational, open-ended, transformative, fluid and affective way of approaching children's subjectivities and modes of being through which children relate to other species, non-human forces and move through the world around them (Olsson, 2009; Lenz Taguchi, 2014). It challenges the developmentalist assumption which views the child as a unified individual subject and primary unit of study. Thus, children's subjectivity and becoming is continuous and emergent from their relations (embodied, affective) with the more-than-human world around them (Davies, 2014; Somerville, 2011). Children's relations with the weather (embodied relations) and the bees (affective relations) are empirically explored in Articles III and IV of this dissertation. Thus, children's subjectivities emerge through 'becoming worldly with' (Giugni, 2011).

3.3. Anchoring Concepts with the Empirical Work

In this dissertation, two (Articles III and IV) of the four articles empirically investigate post-anthropocentric analysis of sustainability. Article III addresses possibilities of engaging with ecological (e.g. climate) issues by engaging with materialities of the weather. Article IV indicates alternative ways of engaging with species extinction issues through becoming-with animals, bees in particular. In doing so, the concept of agency, affect, becoming and subjectivity are employed. It should be noted that these concepts are inextricably intertwined and reinforce one another. The following paragraphs describe how these concepts are empirically put to work in article III and article IV of this dissertation.

Thinking through the intersection between the weather and Bennett's notion of vitality and lively assemblages, in Article III, I have extended and reconceptualized the ongoing child-weather relationships at the preschool. In doing so, I see weather as a constitutive vital force acting within human-non human assemblage (Bennett 2010). This conceptualization allows me to see child-weather relationships beyond the limits of anthropocentrism (only ever thinking about the agentic child), but rather enmeshed within lively assemblages. Besides, Bennett has reminded us that whether we recognize and

experience it or not, the force of matter (e.g. the weather) exists regardless, and can and will thwart human intentional agency.

Haraway's notion of "becoming WITH others" has been particularly useful in article IV as she is concerned about real-life multi-species relations (Haraway, 2008), which has an implication for sustainability. The notion of becoming WITH suggests a relational being in the world that is both present and emergent at the same time. As such, being and becoming are relational as a result of relations that are formed, maintained and lost in an assemblage constituted of vital materialities and the agency, subjectivity and affect they generate.

Haraway is concerned about actual human-animal relations, which is more relevant to the situation of the dying bees in Article IV of this dissertation and to sustainability education at large. Although real bees are not part of the theatrical assemblage, it is designed based upon real bee behaviours with pedagogical intent. Moreover, real bees joined the assemblage at a later stage of the becoming-with process, which makes Haraway more relevant here although her concept of becoming-with builds on Deleuze and Guattari who originally introduced the term.

In Article IV, Haraway's (2008) concept of 'becoming-with' as a practice of 'becoming worldly' (p. 3) has helped me rethink humanness and experience "bee-ness". Haraway points out that being human is inextricably tied to 'becoming with' multi-species others. Haraway specifically writes about political 'becoming with' in cross-species relations, i.e. becoming-other of humans. While working with Haraway's notion of becoming-with, Giugni (2011) highlights that 'cross-species relational entanglements are useful to transgress all kinds of "borders" of "self", "other", spaces, places, languages, politics, pedagogies in new ways' (p. 12). By highlighting the entangled world we live in and share with multiple other species, Haraway's (2008) notion of becoming-with captures the relationality and interdependence between humans and non-humans, which could have significant implications for sustainability education. Humans and non-humans (e.g. animals) share agency and become together while influencing each other. As much as what humans do matters and affects the bees, what the bees do also matters and affects humans. Hence, the theatrical performance of the child-bee assemblage helps make the entanglement explicit.

In her book, 'When Species Meet', highlighting her relationship with her dog, she emphasizes the need to think deeply and take seriously "our" relationship, entanglement and encounter with other species, which has a

potential for the “redoing” of each other (Haraway, 2008). She argues that to be a human is always to be in a relationship with a host of others: plants, animals, humans, dead, living, and to be on earth is to be in a companion-species relationship in the sense of coming into being with a crowd of others, and in the sense that we shape and reshape each other into what we are (Haraway, 2008; 2016). She calls for a rethinking of our perspective towards being in tune with both history and the tangled complexities of now. Doing so will force us to be aware of many things and might make us more responsible, ethical, connected, ecological, and sustainable (Haraway, 2016). Likewise, her relational ‘worldly’ ethics foregrounds the ways in which human lives are discursively and materially entangled with other species, multispecies co-existence (Haraway, 2008).

Haraway argues that these new ways of thinking, which involve others and our entanglement with others, will help humans affectively embrace the challenges of the 21st century better. Among the questions she poses are the following: how can we live better and beyond the nature-culture binary, with the unfolding relational and entangled worlds with other critters? (Haraway, 2008).

In Article IV, I employ Haraway’s concept of becoming-with by analysing the theatrical performance of a child-bee assemblage. The assemblage enacts the collective agency of bee-ness where children are performing ‘becoming-bee’ and enacting ‘bee collective agency.’ The theatre invites the children: to become bee-like, to try out bee behaviour, and enact bee concerns. The theatrical assemblage is constituted of: actors (in bee suits), a bee set and props, children-becoming-bee-like, and an ecological narrative about bee pollination. In doing so, the theatre captures the urgency and what is at stake within the temporality of the created space (see Article IV). However, it should be noted that Haraway has not paid appropriate attention to power asymmetries in her “multispecies” analyses.

In this chapter, I have introduced the key concepts in the dissertation which include: assemblage, agency, subjectivity, affect and becoming. The concepts used and perspective taken also has methodological consequences. These methodological implications will be discussed in the next chapter.

Chapter Four: Methodology and Nature of Inquiry

This PhD dissertation is composed of four studies. Each study addresses different questions, and the nature of each question drives the methodology and associated methods employed. The methodology section is organized into two different major parts: the interpretive hermeneutical part and the post-qualitative part. The focus on new, or rather alternative, ontological perspectives in ECE in relation to emergent sustainability questions, called for a research design that allowed for adaptation of the guiding of questions as the research unfolded. Indeed, the nature of questions shifted during the course of the research, as did the methodological approach used to investigate them. With the shift in the nature of the questions, the methodology shifted from an interpretative descriptive one (the world can be analyzed, interpreted and described) towards a one that precludes initial framing and interpretation to allow for immanence and emergence. Such an approach strives to be methodology-free which indeed might seem impossible, but as will be elaborated in 4.2, post-qualitative inquiry “encourages concrete, practical experimentation and the creation of the not yet instead of the repetition of what is” (St. Pierre, 2018, p.1).

4.1. Interpretive descriptive component of the study

The first part, which covers the first two studies, is of an interpretive descriptive nature. Study one (which engages with the conceptualization of sustainability) constitutes a systematic literature review of the history, policy and research within Early Childhood Education for Sustainability (ECEfS). Study Two, which explores curricular manifestation of sustainability within early childhood education, is a content analysis of national curricula. Studies Three and Four draw on post-qualitative ideas.

4.1.1. Systematic Literature Review

The first theoretical study is a systematic literature review that examines the notion of sustainability within early childhood education from a posthumanist and new-materialist perspective. In a broader sense, a systematic literature review is a method to review relevant literature in a particular field through a systematic process. Fink (2005) describes a systematic literature review as a systematic, explicit, comprehensive and reproducible method for identifying, evaluating, and synthesizing the existing body of completed and recorded work produced by researchers, scholars, and practitioners. Systematic review involves examination of contents in the field using certain methods and criteria. It requires an a priori specification of the review question, the methods of searching, methods of quality appraisal and methods of synthesis (Silverman, 2011).

Highlighting its benefits, Webster and Watson (2002) indicate that a systematic literature review “...creates a firm foundation for advancing knowledge... facilitates theory development, closes areas where a plethora of research exists, and uncovers areas where research is needed” (p8). The main purpose of this systematic review was to engage and familiarize myself with the field and to develop an overall understanding of the conceptualisation of sustainability in the history, policy and research activities within the field of ECEfS.

Accordingly, the review provides an overview of the current state of the art and prevailing research discourses within ECEfS and briefly summarises the content of the available publications and policy documents in the field from 1996 (earliest traced) onwards. While searching for publications, key terms such as: childhood and sustainability; early childhood and environmental education, early childhood and ESD, and early childhood education for sustainability were used to search for articles, books, book chapters, special issues, review articles, research collectives and policy reports within different databases which included: Scopus, ERIC, Web of Science and Google Scholar. Moreover, cross referencing and hand searching of key journals and policy documents were employed as part of the searching strategy.

Although this search generated quite a number of references, specific inclusion criteria were employed to obtain the most relevant ones for analysis. These criteria were: 1) the material had an educational aspect, i.e. is published within educational studies or a related field; 2) the material focused on early

childhood education, i.e. 0-8 years, and 3) the material also focused on the environmental aspect of sustainability, and hence should address nature and environmental issues. The search was made within the field of environmental education research, early childhood research and sustainability research.

While laying the foundation for my empirical research, the systematic review broadened my understanding of how sustainability is conceptualized within ECEfS. The review helped me identify what is done, how the history evolved over time, what pertinent policies in the field exist, what theory and method are used and what conceptualizations are made. This in turn elucidated a limitation in underpinning ontological and epistemological assumptions within ECEfS, which serves as a backdrop, and paves the way, for the empirical part of the dissertation—Articles III and IV. This has helped me build a knowledge base which lends itself to generating an alternative conceptualization of sustainability within ECE, but also enabled me to develop an appropriate form of methodological inquiry for the empirical part of the dissertation.

4.1.2. Curricula Content Analysis

After obtaining a better understanding of the historical development of the field of ECEfS and of the conceptualization of sustainability, the next step was to look into current scenarios of how sustainability is enacted in practice. As curricula are critical documents that govern practice, examining current curricula seemed to be a sensible step towards understanding the manifestations of sustainability in practice. Accordingly, the second study in this dissertation endeavours to form a content analysis of five early childhood curricular documents, addressing the question of how sustainability is embraced and integrated in the documents.

The purpose of the content analysis is to provide an overall picture of curricular manifestation of sustainability within early childhood curricula. Content analysis is “a research technique for making replicable and valid inferences from data to their context” (Krippendorff, 1980, p. 21). Content analysis is chosen as it offers the opportunity to answer questions directly related to the materials analysed through simple classification or tabulation of specific information (Borg and Gall, 1989).

With the intention of broadening the scope and coverage, I organized and led a group of international scholars with a similar research interest. An opportunity at my disposal was the Transnational Dialogues for Sustainability

Research in Early Childhood Education research group, which is an international research group of which I have been a member since 2014. In one of our meetings, I proposed a possible collaboration for comparative study. Six members of the team, from four different countries, accepted my proposal to engage in a cross-national study and dialogue on how sustainability is manifested in ECE curricula frameworks. This led to the formation of a group with seven scholars representing five different countries: Australia, England, Norway, Sweden and the USA.

Since content analysis does not necessarily require the physical presence of the collaborating researchers, it has become a suitable method for a long distance collaboration endeavour. The joint force among international authors allowed the possibility of collaborative inquiry to conduct a comparative content analysis of the 5 early childhood national curricula based on four criteria: sustainability presence, views of the child, human-environment relationship, and philosophical/theoretical underpinnings on ideas expressed about sustainability.

The group pursued the project by collecting data within a table using a collaborative file-hosting service (Dropbox). The table and the ensuing bodies of text were scripted through an online word processor (Google Docs). This community of practice (Lave and Wenger, 1991) was further enhanced by face-to-face meetings in Boston, USA, in September 2016. The analyses were guided by critical inquiry using a posthumanist framework as a backdrop. Critical inquiry is a dialectical process involving the comparative weighing of a variety of positions and arguments, while argumentation is seen as a way of arriving at reasoned judgements on complex issues (Battersby and Bailin, 2011). The posthumanist framework is mainly utilized to look into the human-environment relationship and how it is manifested in the curricula.

At first, the primary investigation of the individual early years' curriculum was conducted by each author-researcher in their home country. Each author drew on local knowledge and experience, thus enhancing the grounding of the investigation. This was followed by successive discussion amongst the research team which resulted in the identification of the four curricular aspects on which to focus in order to guide the comparative analysis. In addition, we (the researchers/authors) shared the "coding frame" (Silverman, 2011, p. 65) during the data collection and analysis processes through completion of an evolving "running" table with the commonly identified four curricular aspects of sustainability: sustainability presence, views of the child, human-environment

relationship, and philosophical/theoretical underpinnings on ideas expressed about sustainability. While focusing on the identified four aspects of the curricula, an inductive thematic analysis (Guest et al., 2012) was employed. As the process developed, the interplay between individual and group reflection was conducted through dialogues (Bray et al., 2000) which sometimes led to a rethinking of our own knowledge and understanding of our "home" curriculum frameworks. For a meaningful exemplification and elucidation of curricular characteristics, various excerpts are quoted in the findings section. See details of the methodology in Article II.

4.2. Post-Qualitative Inquiry

The second methodological part, which comprises the latter two empirical studies, addresses the post-qualitative aspect of the dissertation. Studies Three and Four have a similar underlying question, and both seek a post-anthropocentric analysis and conceptualization of sustainability. To make this possible, a methodological shift towards post-qualitative inquiry was realized. This section has two sub-sections. The first sub-section offers an overall description of the essence and characteristics of post-qualitative inquiry. The second sub-section offers two examples of post-qualitative inquiries, which draw ideas from Nordstrom's (2015) concept of data assemblage.

4.2.1. Characteristics of Post-Qualitative Inquiry

Post-qualitative inquiry emerges as a critique of the conventional humanist qualitative study (language and interview based) and aims to think, and do, educational inquiry outside normalized structures of humanist epistemology, ontology, and methodology (St. Pierre, 2015). Ontology refers to 'claims and assumptions that are made about the nature of social reality, claims about what exists, what it looks like, what units make it up and how these units interact with each other. In short, ontological assumptions are concerned with what we believe constitutes social reality' (Blaikie, 2000, p. 8). Likewise, Blaikie (2000) describes epistemology as 'the possible ways of gaining knowledge of social reality, whatever it is understood to be. In short, claims about how what is assumed to exist can be known' (p.8).

Post-qualitative inquiry works with an ontology of immanence (Deleuze and Guattari, 1987) which challenges and denies the popular dominance of the signified and refutes the language that is so often seen as immutable.

Immanence ontology rather calls for a horizontal relationship/entanglement that entails embeddedness, immersion and connection from within. As St.Pierre (2018:4) puts it “in an ontology of immanence, one becomes less interested in what is and more interested in what might be and what is coming into being”. Thinking with immanence implies that data is not out there to be collected. It is everywhere but indeterminate, not yet created, not yet individuated and organized into the definite. It is the not yet, the yet to come characteristics of data that marks post qualitative inquiry (St.Pierre, 2018).

In post-qualitative inquiry, “the practices of knowing and being are not isolatable, but rather they are mutually implicated” (Barad, 2007, pp.829). Barad’s notion of “ethico-onto-epistem-ology (p. 90)” points out the inseparability of ethics, ontology and epistemology when engaging in (scientific) knowledge production, with scientific practices, and with the world itself and its inhabitants-human and non-human beings that intra-actively co-constitute the world (Barad, 2007). Barad (2003) argues that that the practices of knowing cannot be fully claimed as human practices, not simply because we use non-humans elements in our practices but because knowing is a matter of the world making itself intelligible in relation to another part.

A central idea in post-qualitative inquiry is to highlight the integral role that theory, concepts and philosophy play in governing research activity, as opposed to letting research be driven by method and methodology. For post-qualitative researchers, theory is the driver of their inquiry and method is kept in the periphery (Lather, 2012; St. Pierre, 2015). Post-qualitative researchers strongly stresses the importance of theory and argue that researchers need to become engaged in thinking with theory and spend more time in reading theory than being dictated to by rigid methodology (St.Pierre, 2015). They claim that concepts allow researchers to experimentally engage with the world and think with data as opposed to gathering pre-existing data (Lather, 2012; Lather & St.Pierre, 2013). Thus, post-qualitative research doesn’t have a pre-existing method and practice to be applied.

One important difference between post-qualitative inquiries and more traditional/conventional methodologies is its underpinning ontological assumption. The former are based on empiricism while the latter are based on rationalism (Lather, 2009; Lather & St.Pierre, 2013). By acknowledging radical empiricism emerging with the ontological and material turns, post-qualitative researchers challenge the ontological standpoint that solely relies on a speaking human subject and calls for decentering a pre-existing knowing and agentic

human subject. They rather argue that subjects are co-constituted with objects, and data comes to life at the intersection/entanglement of subject and object - what Barad (2007) refers as agential realism.

Proponents of this approach also challenge the adequacy of language in representing knowledge, and argue for researching without representation (MacLure, 2013), for example with the help of affects, intensities and force. Scholars such as St.Pierre (2015), Lather, (2012); MacLure, 2011, 2013) argue that language has become a signifying regime that unwillingly marginalises other forms of empirical and virtual existence and representation. They strongly question whether language can represent everything that happens in the world that we tend to explore in our research. They point out that in order to demystify the hidden or overlooked powers and forces within nonhuman actors, which are intrinsically resistant to representation, one has to work with affects and learn how to be affected (MacLure, 2013; St.Pierre, 2015, 2018). Hence humans as subjects and agents of research are not there in the field to simply observe, act, do, perform, speak or assess but also to be affected by others - the more-than-human intelligence.

A major critique that post-qualitative researchers make of conventional methodologies is that they consider method as a pre-existing structure or pathway that governs and normalizes thinking which produces “minds in a groove” (St.Pierre, 2015). They argue that method is a recipe that closes possibilities instead of opening up multiplicities. They essentially “trap”, control and discipline researchers, which hinders the critical level of their inquiry, and forces them to simply follow a prescribed order of thought and practices (St.Pierre, 2015). Such a *modus operandi* denies the experimental nature of transcendental empiricism (see further explanation below), and makes it difficult, if not impossible, to keep up with events, and prevents them from coming to existence. As St.Pierre (2015) has pointed out, this is why students need to learn more about ontology and epistemology rather than learning how to follow a rigid method. Hence, advocates of post-qualitative inquiry object to forms of method-driven qualitative inquiry which heavily relies on practices of formalization. In the words of Deleuze and Guattari (1987), a method can be conceived of as “a striated space that draws a path that must be followed from one point to another” (p.377). Instead, they suggest a methodology which they call “methodology unfold”, which has later been developed by St. Pierre (2018). As post-qualitative inquiry has no model to be applied, it should be noted that

there is no single specific post-qualitative method. It is rather situated, experimental, emergent and, inevitably and intentionally somewhat vague.

4.2.2 Empiricism and Data in Post-Qualitative Inquiry

Empiricism in a post-qualitative inquiry has a philosophical basis and does not entail a typical empirical experience as in conventional humanist qualitative research. As St.Pierre (2018) puts it, “the image of thought that guides post qualitative inquiry relies on an ontology of immanence and transcendental empiricism (p.4)”. Transcendental empiricism problematizes classical ontology and transcends time and space, i.e. it works with the ontology of immanence.

Such empiricism has been described by various scholars in a more or less similar manner. Drawing on Deleuze’s concept of ‘transcendental’ empiricism (1994:181), Massumi (2002) refers such an empiricism as ‘expanded’ empiricism. Clough (2009:2) calls it ‘infra-empiricism’ and argues that such empiricism embraces forces beyond human conscious perception. Clough (2009) argues that infra-empiricism permits a rethinking of bodies (human and non-human), matter and other non-humans through encounters and affect.

MacLure (2010:2) also used Clough’s concept and argues that infra-empiricism does not privilege human interpretation or conscious perception but it rather ‘attends to affects, forces and movements in bodies, in matter, as well as between individuals and groups’. This is where post-qualitative differs from phenomenological studies which rely on human perception. Phenomenology addresses what is available to human consciousness, but transcendental empiricism goes beyond human’s phenomenological gaze of a lived experience. Infra-empiricism is materially engaged and experimental in nature, and hence, it traces intensities of affect that move and connect bodies physically and culturally (MacLure, 2010).

In post-qualitative research, inquiry and data are not perceived exclusively in connection with methods. Post-qualitative scholars argue that researchers are already entangled with data from the very onset of their project. They claim that researchers’ mundane encounter in everyday life, their reading of the literature, their writing, discussions with family, friends and colleagues are all possible sources forming data (St.Pierre, 2015; MacLure, 2013).

Data emerges in and with more-than-human research assemblages- it does not represent a pre-existing entity to be collected by an outside researcher. One does not collect data, but enters a form of experimental engagement with the

world in an effort to think with data as opposed to gathering a preexisting data (Lather, 2012; Lather & St.Pierre, 2013). Data is co-created with the researcher and the researched and there is no “official” data collection place and time. Thus, taking immanent ontology and transcendental empiricism into account, post-qualitative inquiry is an ongoing process that happens in multiple ways, such as reading, writing, discussing, and thinking, and data might emerge any time along the way (St.Pierre, 2015; Richardson & St.Pierre, 2008).

In this same vein, one avoids procedurally analyzing and coding empirical data with the search for “themes and patterns” to emerge because every data is unique and different. Post-qualitative inquiry opens a room for speculation, and hence everywhere is a potential research site. Viewed as such, a research site is a transcendental field that is limitless and has not yet been actualized into real experience (St.Pierre, 2018). As a result, a post-qualitative inquirer is always empirical and always in the field because the virtual cannot be systematized.

It is also important to understand that post-qualitative inquiry is not one definite method that can be applied. There are countless ways of doing a post-qualitative inquiry. One possible way of carrying out a post-qualitative study is to consider research as an assemblage (Nordstrom, 2015; Nordstrom, 2018; St.Pierre, 2018; Fox & Alldred, 2015) and speculatively search for multiplicity of affective relations in the research process, including the ‘events’ to be encountered and researched. Events to be researched within an assemblage could be any instance of bodies, things, settings, languages/utterances or social formations, or of assemblages of these; research tools such as recording devices, field notes, theoretical frameworks and hypotheses; research literatures and findings from earlier studies; the ‘data’ generated by these methods and techniques; and the researchers themselves (Fox & Alldred, 2018). In particular, this study employs Nordstrom’s (2015) concept of data assemblage which I will discuss in the next sub-section.

4.2.3. Data Assemblage

This sub-section discusses the two post-qualitative empirical studies in Articles III and IV. For both studies, I have employed Nordstrom’s (2015) concept of data assemblage. Nordstrom (2015) states that “Data assemblage is a dynamic onto-epistemological entity in which the constitutive lines open up new ideas of thinking about data in a study and what that data can do and become” (p.166). I will first discuss Article III and then move on to Article IV.

During the process of “data generation”, I spent about 6 months (December 2016 – June 2017) at a preschool following 16 children and three teachers, documenting various encounters forming more-than-human assemblages, and exploring how these formed assemblages could open up possibilities for analysing sustainability issues from a post-anthropocentric perspective. Throughout this period, the inquiry attempted to probe deep into these assemblages, and their implications for sustainability. Video recordings, audio recordings and field notes were used as a tool for capturing children’s, teachers’ and my own encounters and entanglements, and were all combined to form ‘data’. Although the study began with open-ended assemblages (without pre-defining the non-human aspect), the study has been framed around weather and bees as non-human subjects (see Articles III and IV respectively).

Article III discusses the emergence of generative child-weather assemblages. As indicated by St. Pierre (2018, p.9), one way of carrying out a post-qualitative inquiry is to “begin with the fortuitousness of the encounter (not with method) that guarantees the necessity of what it forces us to think”. This particular inquiry began with the data that emerged from my random bodily encounter with a rain shower on a stormy morning, which elicited and lent itself to the emergence of multiple other forms of encounters with elements of the weather. I lingered, immersed in the moment, and began to consciously attend to the encounter, which rhizomatically elicited different forces and weather encounters, which led me to think of “data as an assemblage” (Nordstrom, 2015, p.167) of different forces: some human (children, teachers and myself) and some non-human (different elements of weather, slide/metal, flashcards, weather charts etc.), which can be seen in the vignettes in Article III.

The thinking that started with my own bodily encounter with the rain has opened up different lines of thought, which in turn enabled different materially and discursively generated weather events to enter the data assemblage. The assembled data in this article formed a dynamic line of thought that offered varieties of data (Nordstrom, 2015, 2018). Children’s and teachers’ conversations during the preschool’s calendar routine, the researcher’s reading about weather and several other material and discursive manifestations of the weather, all formed the assemblage. Thus, the concept of data-assemblage allowed me to assemble data from different weather encounters and weather-generated vignettes, which are presented as narrative snapshots of the weathering-child assemblages. The vignettes are analysed and discussed in light of Bennett’s (2010) concepts such as: ‘material vitality’, ‘lively assemblage’,

‘distributed agents’, ‘swarms of vitalities’, ‘efficacy’, ‘trajectory’ and ‘causality’ (see Article III for details on this inquiry).

Article IV discusses how my inquiry began with an intelligible random encounter with a theatrical performance of child-bee assemblage that compelled and pressed me to think with the bees. The theatre was hosted by a grocery called COOP and the idea was to create ecological awareness, ideas about organic food and sustainable environmental thinking among children (3–7years old). We (children, teachers and myself) encountered the theatre during an educational excursion to the grocery. While beginning and thinking with the encounter, I speculated on what might possibly emerge, which St Pierre refers to as the ‘not yet’ (St. Pierre, 2018), rather than articulating what is expected or planned for, as tends to be the case in conventional structured methodology.

While serving as a moment of potentiality, the encounter created an affect that forced me to rethink and feel the threats posed to the bees. The theatre presents a moment portraying humans’ encroachment in the bees’ life through destruction of their habitats. My prior knowledge of the central role bees play in the ecosystem, in the real-world entangled scenario, was activated and urged me to rethink humans’ entanglement with this insect, and the resulting vulnerability. The theatre not only created affect in me, it also affected the children and the teachers, who were captivated and drawn to the bees and their threatened predicament.

Thinking and becoming-with the theatre has elicited different responses, affects and effects in the children’s verbal reactions (discursive responses) and doings (material responses), forming what Nordstrom (2015) refers to as data assemblage. During the weeks and months after the theatre, the children and also the teachers had been repeatedly coming back to the bees every now and then in relation to their everyday pedagogical activities, mundane conversations, outdoor free play, and other instances in the pre-school environment. Various verbal utterances, comments, a song about a flower, bee drawings, bee crafts and a bees’ ‘swimming pool’ also constitute the data assemblage.

In Articles III and IV, Nordstrom’s (2015) data assemblage inquiry approach is chosen to overcome the child-centric/anthropocentric methodological individualism that underlies dominant approaches to sustainability in early childhood education. By doing so, such an approach offers a more comprehensive context that is inclusive of different ways of being and knowing that are typically left out of sustainability and environmental discourse in general and within ECEfS in particular. Thus, drawing on the notion of posthumanism,

the data assemblage has helped me to seek and illuminate relational ways of being in the world and develop a deeper and entangled understanding of interspecies and material connectedness.

Apart from methodological implications, assemblage theory served as an analytical framework for the study. Such analysis shifts attention away from the individual child to the relationships and becomings within the material assemblages of bodies, things, ideas and social institutions, and focuses upon the micropolitics of research and the capacities these assemblages produce (Fox and Alldred, 2015). For Deleuze and Guattari (1987), an assemblage is a machine that links affects together to produce or do something. This perspective has helped me achieve a methodological (analytical) objective by serving as a tool to capture the established interconnectedness and composition and flows of affects. Thus, the research capabilities (such as analytical framework) that are enabled as we consider the human (researcher, children, teacher), the more-than-human (weather, climate, bee) and the research process (field work, audio recording, video recording, pictures) as machines that are plugged into the research assemblage, have served as a unit of analysis for Articles III and IV. As such, the relationalities, the responses and the becomings produced within the assemblage are a central focus of the inquiry.

4.2.4. Researcher's Journey and Experienced Challenges

As stated in the beginning of this chapter, the nature of the research questions evolved during the course of the project, which in turn brought about a methodological shift towards post-qualitative inquiry for article III and IV. Having used Vygotsky's sociocultural theory and conducted interview-based studies in my Master's degree, making this shift was not easy for me. The challenges emanated from four main dimensions: adjusting my own subjectivity and ethical position as a researcher, adopting to conventional dissertation genre, engaging with the supervision team and also factors related to the research setting. I will describe each dimension in the following paragraphs.

One thing that post-qualitative research requires of the inquirer is to feel at ease, have trust in the world and hope for the "new" to emerge. I knew my interest is not what we (I, the children and the adults) think, know or say, but rather how we might be affected by non-human forces, events and other species that are entangled with us. This implies the need to decenter myself, as much

as possible, and not being in the lead position, but instead to assume an honest 'not knowing' position so that non-human actors and forces could come into play and act on different human and non-human bodies. Bringing in the humbleness and humility required to research within this new and ethical ecology of things and beings was challenging as it involves: repositioning myself from "researcher" to "researched", from "knower" to "being affected", from "knowing" to "becoming-with", and from "responsible" to "response-able".

Finding myself into ethical modes of becoming-with and affected by non-human others has been a constant struggle. It took me a while to learn not being preoccupied with the cognitive, but instead to affectively embrace and remain attuned to the agentic forces of the non-human world. As indicated in article three, the agentic force of the weather creates affect in my body. Thus, the attunement to physical encounter with the weather became a pivotal point and agentially changed me, and eventually the research process as well. So, attuning to the emerging lines of thoughts, which had the potential to agentially influence me as a researcher and the entire research process, was challenging. Language has also remained a major source of ethical, ontological and epistemological challenges. English language by default grants agency to human subjects as doers of actions, which contributes to the difficulty to ethically attribute and express the agentic characteristics of other non-human subjects in a written and spoken language.

The second dimension of challenge is in connection to the difficulty to avoid the hegemonic dissertation genre pertaining to methodology and theory. I struggled while framing the methodology section of the research proposal during the first planning seminar, which is mainly meant for examining and approving the overall research plan. As I was in the early stage of the project development, I was not completely certain on how to frame and "label" the methodology part of the proposal. In an effort to be obedient to what post-qualitative inquiry demands, I emphasized on the concepts (assemblage, affect, becoming-with, and agency) that guide my inquiry and left the "application" aspect somehow open-ended. As, St. Pierre (2018) argues there is, in fact, nothing to be applied in post-qualitative study, but instead to experimentally engage with the world. Additionally, the combination of "conventional qualitative" (systematic review and content analysis) and post-qualitative, contributes to the challenge in structuring the dissertation (e.g. theory-method invisibility) and creating the required command of language. As a result,

adopting to the hegemonic dissertation genre has remained a challenge through the writing process.

On top of that, there was an expectation and demand from supervisors and the discussant to have a methodological rigour. Some of the comments from my supervisors include: “the methodology section is a bit fussy and it will need strengthening-will you work more inductively or deductively or both-that could be clearer”. “How are you going to organize and analyze the data? Are you going to code and look for patterns and categorize data thematically?”. “You cannot leave the methodology open like this-be specific and state what you observe, the number of visits (months/weeks) and hours you will be at the preschool for data collection”.

These comments put me in dilemma of being either methodologically rigorous, thorough, logical, systematic, objective and ensure its validity and reliability or still have the trust and remain curious of what sort of affect and encounter might emerge while thinking with the concepts. This dilemma also inflicted a sort of fear and insecurity of not getting approval as it might be viewed as “unclear” or not “well thought out” project. This in turn led me wrestle with the balance between the formalization and the theorization aspect of the research development process.

The fourth confrontational point was during the fieldwork at the preschool. The preschool management asked me to write some brief information about myself, my research and what I intended to do during my stay at the preschool. I knew I had to be as clear as possible, and struggled a lot to find the “right” language that clarify my post-anthropocentric interest and the non-human world that I aspire to deal with, and also where to position the children in my description.

When I started the field work, I made a general introduction about my topic, research questions and some insights about the theory. I told the teachers (and also stated in the consent letter) that I will be at the preschool 2-3 times a week for a couple of hours for about six months. We agreed on that and the journey began. During the school visit, I simply availed myself and followed the flow of their everyday pedagogy. I went to the school with my field note book, a dictaphone and a video camera without knowing what to encounter, yet with the hope that something would emerge.

The teachers were not at ease seeing me there and simply following them without being proactive, lead, provoke and ask questions. After a couple of weeks, the teachers started posing questions to me: “what exactly are you

observing, do you want to talk to/interview the children, perhaps in a smaller group? Or maybe one on one?” At this point, I was unsure of how much I could open up and explain about my inquiry approach. I responded to the teacher that I prefer to see as things unfold spontaneously and naturally. It looks like she was not contented with my answer. As we talked, she recalled and shared a story about a Master’s student who visited the preschool a year before and did an interview with the teachers. She described how interesting the interview was. This made me realize that the teachers possibly have their own ideas about what constitutes good research.

I came to realize that perhaps unconsciously, despite being taught very clearly that the researcher is always entangled and involved in his or her research, I had nevertheless, in a sense tacitly, wanted to see myself as an observer, not contaminating the research. It seems as if the power of previous epistemologies lives on in the common sense thinking of culture and has a tendency to resurface in our unexamined views of self. Yet it’s an impossible illusion. We are always entangled in our world, our research. There is no omniscient God’s eye view (Alaimo, 2017b) for the researcher. As Haraway (1988, 581) pointed out, we are not performing a “god trick” and make “a conquering gaze from nowhere”(581), but we are always already situated: always already entangled with other species and non-human others.

A key message lying at the heart of my research is that in order to realize our entanglement and change how we relate to the environment, we need to change our way of knowing and being. There is no discrete ‘we’ hermetically cut off, cropped neatly and completely from an environment either stewarded or exploited. Rather there is an assemblage of agents-some human and some non-human. Similarly, this change in ways of knowing and being can and should lead to questions about the different cultural and geographic features of human actants.

My research does not primarily address this aspect (though neither is it immune to it as these reflections attempt to foreground). However, as humans are always entangled with the wider environment and other species of which they are apart, a researcher is also entangled with his or her stories of origin and culture. Reality is more complex and human existence, regardless of geographical differences, is not detached from the complex flaws and intricate entanglement with all sorts of fellow human species, other species, non-human others and material worlds. As such, there is a need to rethink the narratives of

environmental and sustainability education, but also of climate science, with the view to embrace diverse voices and influences.

In summary, despite the challenges I encountered along the way, the post-qualitative approach that I embarked on gave me the freedom and flexibility to be experimental and creatively engage with environmental issues such as climate and biodiversity issues. The methodological journey has taught me how difficult it is to unlearn earlier methodological approaches that were fossilized in my mind to try and learn to think afresh.

4.3. Ethical Considerations

The ethical implications of this study is an important aspect of the research. Children have rights which are specific to them and they should be treated and consulted accordingly while involved in research activities (Greig et al., 2013). Likewise, the study has been conducted in such a way that children's safety, participation, freedom, willingness to engage and rights to withdraw are handled in a professional, legitimate and respectful manner.

Before the commencement of the field work, consent from the children, parents, teachers and the preschool management was obtained. The purpose of the study, the procedure, the tools and devices to be used during field work were explained to the children, teachers and parents. An information letter with introductory information, coupled with consent forms, were prepared and signed by the participants before the "field work" began. Children's willingness (for me to join and follow the group) was sought verbally (asking their permission orally) and through their parents too. All confidentiality issues and the possibility of withdrawing at any point was explained and made clear to all involved though no one opted to withdraw during the process. Moreover, the children's comfort on a daily basis has been closely monitored. The study also adheres to the ethical rules for research in the humanities and the social sciences adopted by the Swedish Research Council.

However, this study is not limited by the aforementioned conventional humanist ethics, which describes human's responsibility as expressed through language. Post-human ethics includes non-human entities when considering "who matters and what counts" and when considering research practice (Taylor and Hughes, 2016). In posthuman thinking, ethics is contextual and entangled, framed from the dynamic relationalities of becoming of which we are part in the research process rather than as the traditional right response to an

"exteriorized other" (Scantlebury and Milne, 2019). Ethics are not separate elements of human actions but are situated/entangled and emergent. Given the posthuman condition of ethics into account, I have remained vigilant for any unforeseen risk or ethical issues/dilemmas (on humans/more-than-human involved) that might emerge in different dimensions of the study. Yet, such ethical issue did not arise during the fieldwork.

In summary, this dissertation employs both conventional interpretative, descriptive methodologies (systematic literature review and curricular content analysis) and an emergent form of post-qualitative inquiry (data assemblage). This shift in methodological approach was necessitated by the nature of the key question that each study ended up posing. The next chapter presents the summary of the findings in the four articles constituting this dissertation.

Chapter Five: Summary of Findings

This thesis focuses on Early Childhood Education (ECE) in relation to sustainability. The thesis investigates post-anthropocentric possibilities of environmental sustainability within early childhood education. To this end, four different studies are used. This chapter presents the findings of each of the studies.

The first paper of this dissertation broadly traces the conceptualisation of Early Childhood Education for Sustainability (ECEfS) from its historical beginnings, through policy, pedagogy and research perspectives. Intrigued by contemporary posthumanist and new-materialist thinking, I pose fundamental questions about the underpinning ontological, epistemological and ethical starting points with the aim of inviting a rethinking of the notion of sustainability within early childhood education in general and in ECEfS in particular. By employing concepts borrowed from posthumanism, I problematize the human-centric tendency of present dominant forms of ECEfS, and its environment- and nature-focused predecessors. This tendency or bias prevents the agentic characteristics of the non-human world from entering ECEfS. In an effort to challenge and intervene in the prevailing anthropocentric notion of sustainability, I challenge the existing dominant child-centric discourses and call for the ECEfS field to consider the ontological, epistemological and ethical shifts that are provoked by a posthuman perspective.

Employing content-analysis as the key method, the second published article examines the manifestation of sustainability in the prevailing curriculum within five countries: Australia, England, Norway, Sweden and the USA. The analysis focused on four aspects of the curriculum: sustainability presence, views of the child, human-environment relationship, and philosophical and theoretical underpinnings of ideas expressed regarding sustainability. Critical inquiry with a posthumanist backdrop served as a guide for cross-national dialogue among the authors from the five countries. The results indicate that ideas about sustainability were more implicitly present than explicitly stated in most of the curriculum. It was not evident that children were viewed as world citizens with agency to help foster sustainability. With respect to human-environment

relationships, the framework from Australia expressed greater reciprocity and entanglement, while other frameworks were more anthropocentric, despite the variation among curricula. All five frameworks embodied a socio-cultural, human development approach with respect to the philosophical and theoretical underpinnings. The study suggests the need to consider alternative frameworks that offer broader and more inclusive worldviews about sustainability.

The third article of this dissertation shows how a materialist understanding of weather (and by implication climate) in early childhood education offers possibilities to move beyond anthropocentric and linguistic representations of weather towards more relational ones to provide a potential basis for sustainable living. This study highlights the importance of being attuned to and to learn to be affected by the vital materiality of weather as a way of knowing elucidates our enmeshed, embodied and embedded relationship with weather and climate. It is speculated that this way of knowing might provide a way into heightened ecological sensitivity and intimate attunement to climate. Drawing on weather-generated empirical data, the research demonstrates how humans, both young and old, are moved by the weather which calls for a relational epistemology that urges us to notice and engage with the vitality of weather. In the end the research suggests that child-weather assemblage thinking provides a possible way for pedagogically addressing children's entanglement with the weather. Such thinking and rethinking might pave the way for how weather pedagogy, as an exemplary relational pedagogy, could be enacted from a materialistic characteristics point of view.

Using species extinction as a critical sustainability challenge, Article IV explores the pedagogical possibilities of engaging young children in the potentially cataclysmic death of the honey bee. Drawing ideas from a post-qualitative inquiry, this study is empirically anchored in a narrative that emerges from a staged theatrical performance of child-bee assemblage that enacts the collective agency of 'bee-ness'. By enabling possibilities of 'becoming-with the bees', the performance lends itself to triggering response-abilities and the forming of relationships which enable a concomitant emotional affective response to the death of bees. Thus, the performance creates a temporal space that yields possibilities for children to de-territorialize and 'become-with' the bees, that is; to identify themselves with them, with their intertwined fates and consequences. The study suggests alternative directions for environmental sustainability pedagogy in early childhood education that represent a shift from

loving, caring and preserving nature as an object outside ourselves, towards becoming nature, seeing humans as part of nature.

Informed by affect, Articles III and IV provide a way to attend to children's dynamic encounters between bodies, ideas, performances, materiality and forces, and other species, which characterize the children's engagement in sustainability issues such as weather and climate, and species extinction. As the children encountered the weather and the bee theatre, there was a change in their talk, action and engagement with the weather and the bees, which led to the emergence of different on-going responses. The affective dynamics operating in these contacts inscribe and transform the assemblage (child-weather assemblage and the child-bee assemblage) into a process of embodied repeated responses and engagements and response-abilities, through which feelings of joy and concern, as well as actions were created.

Chapter Six: Discussion

Informed and inspired by the research path travelled over a period of four and half years, this dissertation has made knowledge contributions in the following domains: rethinking of sustainability, education, the child and the nature of inquiry in Early Childhood Education for Sustainability.

6.1. 'Becoming Sustainable'

The anthropocentric approach to sustainability, despite, normally unintentionally, ultimately reiterating the human-environment binary, has for a long time produced useful knowledge. However, as we are entering a stage in the planet's history wherein we are obliged, as a matter of urgency and perhaps survival, to change the way we live, it is imperative to opt for alternative ways of being and knowing. We need to learn to recognize that we humans are a part of nature and nature is a part of us. Failure to do this jeopardizes our existence as well as that of other species. In this endeavor, education has a central role to play in the pursuit of new and alternative ways of theorizing and conceptualizing sustainability. I refer to the search for these alternative ways of knowing as 'becoming sustainable'.

'Becoming Sustainable' is a term that debunks the conventional understanding of sustainability as a "definite", known and pre-defined notion. As observed in Articles I and II, the current premises of sustainability education in general and ECEfS in particular, mainly draw on a humanist framework (i.e. capacitating and empowering humans) to cope and deal with sustainability challenges - i.e. to become environmental stewards who can take care of and sustain "nature". This approach, however, has several drawbacks.

To begin with, the conventional understanding of sustainability is limited by the idea of sustaining the current status quo, which implicitly conveys the idea of preserving what prevails rather than changing for better. Additionally, it is a one-sided discourse that unintentionally reiterates the human-environment binary, one that sustainability is, arguably, meant to transgress. Such an understanding of sustainability also has an inward-looking approach that centres on humans, and tends to ignore relationality by having a persistent bias

towards linear and causal thinking. As a result, it lacks the complexity to capture humans' entanglement and connection to the wider world, and the need to be tuned in with nature.

Likewise, the current ethos of sustainability in ECE pursues a normative ontological direction which is aimed at empowering agency and building certain predefined moral values in children. Such an ethos is not in line with the ontological, epistemological and ethical underpinnings that a post-anthropocentric framework introduces. Post-anthropocentric thinking calls for ontological and epistemological multiplicity and an ethics of "response-ability" (Haraway, 2016) and relational ethics. This begs the question: how productive and adequate is it to use the term sustainability and to what extent does it serve its purpose?

This conceptual fluidity in turn brings about a philosophical and scientific challenge to the conceptualization of sustainability in general and within ECEfS in particular. While challenging conventional understanding of sustainability as a "definite" state of affairs, Reinertsen (2017) reconceptualized sustainability as "processes of thinking/feeling that are pluralistic, nourishing, and restorative, all in all, as continuing processes of change that imply authentic, positive, or healthy contemporary becomings nomadically created and recreated over time" (p.242).

In the same vein, in my experimental inquiry with the weather and bees, I take a non-anthropocentric stance while drawing on ideas from posthumanist thinking. Article III and Article IV show how different modes of thinking (assemblage thinking and "becoming-with"), open up possibilities to challenge and reconceptualise our (humans') place and position in the world. The reconceptualization of the human and other beings, and viewing their relations as assemblages and becomings, can help us rethink the way we approach the non-human world and actual beings in the environment. In articles III and IV, sustainability is viewed as an "enactment of various assemblages of data, content, action...etc." (p.242). This in turn calls for concomitant changes in our approach and our very conception of sustainability as both a notion and practice.

This ultimately implies a shift from the conception of sustainability as something we can do by ourselves as a human species, towards what we need to do in order to become with others (e.g. other species and forces), forming what Deleuze and Guattari (1987) refer to as life-affirming assemblages. Doing so will require an expansion of the conceptualization of sustainability to include

the formation of spontaneous and emergent life-affirming assemblages. There is a need to re-examine our place in the world and our relationship with the more-than-human world and its vibrancy.

Attending to the vibrancy of the more-than-human world highlights the need to work within a new ecology, which Bennet (2010) refers to as the political ecology of forces and things that open up possibilities for becoming sustainable. When taking this position seriously, research on sustainability, perhaps especially, in the context of education, learning and capacity-building, could benefit from paying attention to the vibrancy of the non-human aspect of the world. Doing so opens up alternative ways of knowing such as affective and embodied ways of knowing which can help us move beyond humanist, cognitive and anthropocentric ontologies. Such an understanding offers the possibility to rethink and expand the notion of sustainability. Put differently, it becomes possible to move from sustainability as a discourse to sustainability as emergent property of entanglement in vibrant matter, forces, affects, encounters and relationships, which concomitantly leads us to the question: what might 'becoming sustainable' really mean for ECE?

As we are trying to rethink living in times of acute catastrophic climate change, loss of biodiversity and environmental disasters, such a creative rethinking of the concepts of sustainability and environmental issues are imperative for alternative knowledge (re)generation. Accordingly, as indicated in Article III, climate change can be addressed through embodied and affective engagements with the vibrancy of the weather. As weather and climate are two interlinked phenomena, the discussion on weather extends itself to how this might be extrapolated to the wider global challenge of runaway climate change. Climate is understood as a form of long-term weather that changes slowly and manifests itself over a longer time period. Given its subtle and inconceivable nature, it is difficult to have mastery and control over climate change. Yet, the now and present weather can be embodied and sensed as indicated in the vignettes in Article III.

In times when extreme weather events are increasing as a result of climate change, embodied and affective attunement to weather could very well lead to attunement to climate change. Thus, attuning to the vitality of weather and understanding the fragility, permeability, vulnerability and porosity of our bodies as affected by the force of the elements has the potential to lead to ecological sensitivity and possibly caring about climate change. The latter is

often considered as a slow and remote process, and hence an inconceivable and abstract phenomenon.

Therefore, drawing on the weather-generated empirical vignettes in Article III and becoming-with the bees in Article IV, this dissertation calls also for a different sustainability ethos; rather than viewing sustainability as a “definite” state of affairs that we can learn about as a pre-defined entity, it might better be understood as a generative concept that is beyond social, human and cognitive affairs. Generative conceptualisation of sustainability may include: sustainability as forming life-affirming assemblages; sustainability as becomings and response-abilities; sustainability as being affected rather than as something that can be mastered and controlled; sustainability as entanglement, interconnection and relationship with the environment/the more-than-human world; and sustainability as a sense of belonging to nature or a particular environment.

Put differently, borrowing the term from Deleuze and Guattari, I argue for the need to deterritorialize our conceptualisation of sustainability. In doing so, knowing for sustainability could alternatively be viewed as an iterative process of deterritorialization wherein humans/children become-with nature (bees in particular) and experience oneself as nature-not separate from it. Hence, such deterritorializing processes could be understood as one component (of many) contributing to a new/alternative conceptualisation of sustainability in ECEfS. Deterritorialization refers to a movement by which something escapes or departs from a given territory/context to another, and produces something new/new relations (Deleuze and Guattari, 1987, p508).

Yet despite the potential of these generative and emergent understandings of sustainability, it should be noted that there is an underlying normative aspect embedded within the notion of sustainability per se. This is the assumption that it is worthwhile that we humans survive on this planet in a good way, which makes us feel responsible and accountable towards other species and future generations. As a result, we are obliged to attend to and deal with the problems rather than passing on a damaged world to a future generation. However, our ability and intelligence do not allow us to know everything, yet we are responsible to play a critical role. The post-anthropocentric stance that I take in this dissertation is not intended to deny human agency, but to challenge the excessive emphasis it currently receives and to offer the possibility of learning alongside other agents and forces. In line with this post-anthropocentric perspective, Cielemecka & Daigle (2019) argue that we need to embrace “an inclusive posthuman approach to sustainability that decenters the human, re-

positions it in its ecosystem and, while remaining attentive to difference, fosters the thriving of all instances of life”(p.6).

6.2. The Unfolding Relational and Affective Child

As indicated in Articles I and II, ECEfS mainly draws on a humanist framework to promote children’s agency. Drawing on posthuman concepts such as assemblage, distributed agency and becoming-with, the third knowledge contribution area challenges the idea of producing a rational, ethical and agentic child, and explores possibilities for the unfolding relational and affective child and its implication for sustainability. From a post-anthropocentric perspective, the child is not a fixed autonomous and self-privileged subject, but rather situated within an agentic and assemblage world in which he/she becomes-with and is affected by multiple actors, forces and entities. Pedagogically, this moves ECEfS from the agentic child to diverse ways of coming to knowing such as: affective learning, embodied learning, learning with and becoming-with others. The agentic relational child emerges from entanglement, interaction and intra-actions.

Shifting from orthodoxies of child agency towards notions of a more distributed agency, where agency is shared with non-human materialities and other species, opens up possibilities for fundamentally rethinking children’s relationship with the world. This entails the requirement to liberate ECEfS from its confinement and celebration of the tenet of the agentic child towards an entangled, relational and affective subject who is constantly co-constituted together with non-human agentic forces.

In an effort to discuss this shift, I borrow Braidotti’s new-materialist understanding of the relational human subject, which suggests a non-anthropocentric subject position. As she points out: “Human subjectivity in this complex field of forces has to be re-defined as an expanded relational self, engendered by the cumulative effect of social, planetary and technological factors. The relational capacity of the post-anthropocentric subject is not confined within our species, but it includes non-anthropomorphic elements: the nonhuman, vital force of life...” (Braidotti, 2016, p.22).

Braidotti’s (2016) idea of human subjectivity as an expanded relational self urges us to rethink how subjectivity has been enacted in environmental education in general and within ECEfS in particular. Adapting a posthumanist

concept of subjectivity transcends a focus on the individual by moving towards the notion of a collective and connected affective assemblage of humans as well as other species, bodies and materialities.

Thus, rather than starting with the notion of a predefined agentic child subject, assemblage thinking has helped in recognizing the ontological multiplicity that challenges anthropocentric subjectivity. As can be seen in the empirical part of Article III and IV, subjectivity is co-constituted with the human children, the teachers, the researcher, the force of weather and the bees. Likewise, agency is shared among these co-existing subjects (children, adults/teachers, researcher, weather and bees) within an assemblage. This entails that there is not just a learning child but affective children alongside whom teachers and other agents also learn, interact and become-with. Thus, teachers need to pay attention to and engage with the children's affective relationship with the natural world as this might bring in something that might otherwise be overlooked.

Parallel with agency, ethics is another aspect that requires rethinking. Post-anthropocentric thinking challenges the idea of educating the rational and ethical child who knows the ethical principles and is capable of making rational ethical choices. Instead it calls for entangled and relational ethical practices, where vulnerability and suffering are shared in a collective manner. Such ethics call for an entangled subjectivity which "opens up possibilities for a shared pain and mortality and learning what that living and thinking teaches" (Haraway, 2008, p.83). The theatre in Article IV illustrates how such an ethics can take shape when the children are urged to share the pain of the bees. As portrayed in the theatre and by the response from the children, ethics takes on performative dimensions. The children perform the bees in their play, art work and outdoor activities. In doing so, ethics is articulated through children's touch (of the dead bee), hands-on activities (arts and crafts) and bodily movement (dance, music, theatre).

Relational ethics cultivate sensitivity towards the other and generate what Haraway (2008) refers to as "response-ability" (p.71). Such ethics challenge the notion of caring at a distance and help imagination to be articulated and experienced. Consequently, relational ethics urge us to be open and receptive to the suffering of others (e.g. the bees). Thus, ECE should not confine itself to educating children with abstract ethical principles, but instead open up possibilities for such response-abilities: not simply loving and caring from a distance. Therefore, ECEfS need to challenge the dominant and longstanding

orthodoxy narratives of the autonomous, moral and relational child and introduce the affective child which is not widely discussed in ECEfS research and pedagogy.

To be sure, this dissertation is not abandoning the idea of the rational and ethical child but rather challenges it by highlighting its limitations and by calling for an enrichment of that perspective by embracing and connecting with other actors and forces. In doing so, relational ethics opens up other possibilities for reflexive thinking, which allows us to recognize, mirror and confront our relationship with other species and forces.

6.3. Rethinking Education

Parallel to reconceptualizing the notion of sustainability and the notion of the child, there is a need to develop alternative ways of looking at education by embracing perspectives that have been absent in sustainability discussions. This entails examining the ontology, epistemology and axiology of educational thought underpinning sustainability education. As indicated in previous studies, sustainability education in general, and ECEfS in particular, mostly focus on building cognition, skills, attitudes and empowerment of children (Hadzigeorgious et.al 2011; Engdahl & Rabusicova, 2010; Caiman and Lundegård, 2014). Such an approach is confined to a conventional way of knowing and unintentionally overlooks alternative ways of knowing such as affective and embodied ways.

This calls for education and perhaps for ECEfS in particular, to enrich and broaden its context by recognizing that human beings are multiple and already enmeshed, embodied and affective, with other species and other forces within an assemblage. Yet in conventional ECEfS discourse, we often talk about learning to be and learning to care. Becoming with and learning to be affected are not well developed notions within ECEfS. However, to learn is also to 'become-with', to 'learn with' and to 'learn to be affected by' others. Viewed as such, sustainability education at large and learning/knowing for sustainability is not just a cognitive process to know, control and master the world, but it also embraces how one can deterritorializes (Deleuze and Guattari, 1987) and becomes-with non-human others.

Likewise, to teach for sustainability is not just to transfer predefined knowledge, but is rather a continuous search for generative ways of becoming. Teachers are not just hegemonic knowing agents, but rather they become-with

the children. Teachers are not meant to simply focus on children, but learn together with the children consciously trying to avoid dichotomies.

Hence, ECE should not solely focus upon the children, but rather explore what the shift, from individual child to assemblage and from being to becoming, might contribute to ECEfS pedagogies. From this vantage point, ECE serves as an emergent process that allows for the child to unfold and draws out relationality by permitting ways of being and becoming that lead to more sustainable ways of living as a continuous search. This entails the need to explore emerging notions of relational pedagogies (Ceder, 2015; Murriss 2017) for sustainability education.

An important dimension of enacting relational pedagogies in ECE is to have a more open view of subjectivity. Rethinking subjectivity, rather than aiming to teach any specific knowledge and skills that are deemed necessary for finding sustainability solutions, calls for repositioning the child and generating the knowledge and skills required to understand the expanded relational self. The human subject at large, and children in particular are multiple and pedagogies should be viewed as such. Thus, there is not just one idealized cognitively learning human subject but a range of subjects (humans and non-humans) and other agents in entangled relationships of emergent learning.

A subsequent question is whether any existing curriculum currently allows for such subjectivity to emerge in everyday learning spaces in the first place. Non-human agents are manifested in a non-linear and unprecedented manner requiring an emergent, living curriculum instead of a structured and predefined one. Teachers need to remain attuned to the emergent and non-intentional characteristics of sustainability activities and potential events (Reinertsen, 2017).

For instance, as observed in the case of Somerville and Green (2015), who refer to place as an agentic entity, there is demand for a curriculum of place and space rather than one confined to disciplines which, by default, draw boundaries between human (the learning subject) and non-humans (object to be learnt). Such a reconfiguration would, of course, require a deconstruction and reconfiguration of existing curriculum frameworks and pedagogical practices, and thus challenge established ways of being, and instead open up the ECE curriculum to new and generative possibilities.

Parallel to repositioning curricula, a pedagogical reorientation appears necessary as well. Moving towards a more relational pedagogy - or a pedagogy of entanglement - implies recognizing and embracing the agentic characteristics of non-humans as well as our inevitable embeddedness in a web of connections

and continuously evolving relations. While borrowing the term pedagogy of entanglement from Gannon (2016) and Letts and Sandlin (2017), I highlight its relevance and potential for rethinking sustainability pedagogy in early childhood education. Enacting a pedagogy of entanglement calls for a rethinking of our understandings of time and space in sustainability pedagogy. From this perspective, sustainability cannot always be considered as something that can be predetermined, predefined and 'taught', but rather as an emergent phenomenon of becoming with and relating to the aim of continuity of life in all its richness.

Recognizing and enacting the agency of non-humans requires teachers to have a key role by altering the pedagogical conditions. How teachers think about children, themselves and sustainability per se, and what conditions they can create or are able to find in the everyday pedagogical environment, is critical. If teachers are not in tune with the agentic qualities of the non-human world (e.g. materialities, other forces, animals, places), they might unintentionally "delearn" and "denature" children or keep things (i.e. assemblages and entanglements) from being recognized at best, or from happening at worst. If teachers are able to disrupt existing ontological and epistemological assumptions, new possibilities emerge for "rewriting children" with the natural world and sowing the seeds of entanglement before they become ingrained with the anthropocentric worldview they will likely encounter in their later schooling. Thus, the way we shape curriculum and pedagogy, and the kind of knowledge teachers appreciate, plays an integral role.

Assemblage thinking, which highlights children's relational entanglements, has been identified as an important pedagogical tool to open up and recognize possibilities for rethinking children's mundane and seemingly trivial everyday encounters with the non-human world in and around preschool settings. By acknowledging these entanglements and expanding children's possibilities to be entangled with all that is around us, early childhood educators can provide an approach into a more connected way of being in the world. Doing this requires teachers to rethink and organize their activities as emergent and relational, so that all actors (humans and non-humans) are coming into play within an assemblage, without being constrained by predefined subject areas and prescribed goals. By acknowledging and foregrounding non-human agency, early childhood educators might be able to turn the pedagogical gaze towards relationality, reciprocity and entanglements of humans (children) and non-humans.

Traditionally, the pedagogy within early childhood education for sustainability (ECEfS) has taken a certain path which includes: nurturing love and care for nature and the need to preserve it; building agency; focusing on science and action-oriented practices. However, these approaches do not transgress or go beyond anthropocentrism. Teachers need to reflect on and ask important questions, such as: what kind of knowledge has the power to influence us (e.g. researchers and educators), and hence the children that we are educating?

Doing so calls for a transformative pedagogy that directly calls on teachers to elicit and reflect on the premises and assumptions underlying their pedagogical activities. A key point here is to possibly move away from viewing children as individual agents and autonomous learners or what Taylor (2017) refers to as environmental stewards. Instead, it is important to recognize ontological multiplicities—the different ways of being and relating with others—to allow children to think and learn with the non-human world, a world that they are inherently entangled with and one they constantly encounter in their everyday life.

In particular, this is important in early years of education, where socio-cultural and developmental pedagogy, which seek to promote a conscious meaning-making process, has remained dominant. Arguably, children see and are still open and able to see themselves as integral to this world, and are therefore better positioned to developing a symbiotic relationship of “becoming-with” the world. Manning and Massumi (2014) even argued that young children already know affect. Ironically most adults seem to have lost this affective and relational capacity to a large degree as a result of the education they received. Perhaps adults could learn from how children relate to the natural environment. Early childhood education is a uniquely positioned field as it allows us to see curriculum and learning in a holistic way rather than breaking it down into different domains and subjects, which can lay a foundation for a lifelong relational curriculum.

6.4. Rethinking Approach to Inquiry in ECEfS

The fourth knowledge contribution aspect involves the very process and practice of research (i.e. nature of inquiry) within Early Childhood Education for Sustainability. Sustainability challenges are complex and wicked and hence require a rethinking of our epistemological assumptions and a search for a more

complex and rigorous methodological engagement. By and large, earlier research orientation within ECEfS can be viewed as researching: about children, for children and with children. In this dissertation, I introduce the idea of researching with non-human forces and other species or what is commonly referred to as the more-than-human world.

While promoting the idea of researching with the more-than-human world, I argue that research within ECEfS can become richer when it does not confine itself to the humanist framework, by recognizing and utilizing non-humans as knowledge-creating actors/entities. This might help us engage with the vibrancy of the non-human aspect of the world and will allow ourselves to be affected by and work within this new ecology, which Bennett (2010) refers to as the political ecology of things and beings. Attuning and engaging with the vibrancy of the more-than-human world requires experimentation and methodological freedom. ECEfS researchers could utilize various thinking territories around them, and experimental approaches like post-qualitative inquiry opens up such possibilities. Doing so requires a rethinking and deterritorialization (Deleuze and Guattari, 1987) of the very process of research and consider the researcher as affective being entangled in the work that he/she explores.

In this dissertation, I have attempted to show how post-qualitative inquiry could serve as a possible alternative approach for methodological creativity and hence a possible way towards sustainability. However, the implications of a post-qualitative inquiry approach for our conceptualization and research of sustainability (which in its core seeks to sustain and preserve) and sustainable development (which is to sustain continuous change) needs to be further explored with more examples. Our role and position as researchers, what is to be researched, and the ontological and epistemological fine line between the two needs to be thoroughly examined and elucidated with more empirical studies.

Yet, it should be noted that post-qualitative inquiry and its accompanying ontological turn is not yet well established in ECEfS research. Therefore, empirical investigation of post-anthropocentric approach brings about challenges, which may include: institutional structures, research cultures and scientific challenges. This again necessitates the need for more research that demonstrates the potential of this approach.

Chapter Seven: The pursuit of multiple ways of knowing for sustainability: suggested ways forward

I bring this dissertation to an end by opening up a conversation and making suggestions that pave the way towards multiple ways of knowing for sustainability. I begin this conversation by interrogating the broader notion of science at large and research practices within ECEfS in particular. At the heart of hegemonic scholarship practices within ECEfS lie inherent separations of: the adult researcher from the researched child; the living from the non-living; theory from practice; and the human (children and adults) world from the material world. Within this tradition, both research and practice in ECEfS are stuck in a paradigm where binary thinking perpetuates the aforementioned separations. By contrast, in a posthuman line of thinking, the human world is inevitably entangled with the non-human world. As stated by Powell & Somerville (2018, p. 2), we are living in a world with “ever-changing becoming” where human and non-humans are intricately intermingled.

The adoption of a relational ontology, which refutes dualisms, has been identified as a mechanism to become and remain attuned and engaged with matter and the non-human (Bozalek & Zemblyas, 2016). Such an ontology leads to a more relational way of looking at humans and the environment on the one hand and at theory and practice in sustainability research at large, and within ECEfS in particular, on the other. Such a relational ontology paves the way for the possibility to see our interconnectedness without falling into the trap of binary thinking. Enacting such an ontology requires creative thinking which allows us to challenge paradigms that perpetuate boundaries. Affective, embodied and intuitive ways of knowing are examples indicated in Articles III and IV of this dissertation that could help overcome binaries and show a path to relational and sustainable ways of being.

Accordingly, teachers need to enact curriculum for children to know and act in relation to non-human others, i.e. other species and material forces. Knowing for sustainability should not just be conceived of as having the knowledge, the ‘right’ behaviour or the required ethical values, but also, and, indeed, foremost

be viewed as the ability to discern non-human vitalities (Bennett, 2010) and to attune to affect. This requires teachers to be creative and organize activities as emergent and relational.

One possible approach is to create or employ life affirming stories and narrations (like the bee theatre) for pedagogical purposes. As indicated in the empirical examples in Articles III and IV, the narratives and vignettes of stories of children and their childhoods allow adults to think with children and their assemblages with the non-human world serving as a bridge across other ways of knowing.

Additionally, there is also a need to interrogate the overemphasized notion of agency in ECEfS. Pointing out the limits of human agency, Cielemecka & Daigle (2019) highlighted that “we have been powerless since there have been so many more agents than the mere human agent and since the agentic capacities of other beings have often surpassed our own very limited powers and thereby have impacted us in ways we have not suspected”(p.2). Alaimo (2016) also pointed out that the Anthropocene is urging us to “rethink agency in terms of interconnected entanglements rather than as a unilateral ‘authoring’ of actions” (p.156). Existing knowledge in ECE largely focuses on what children are able to do without embracing the agentic characteristics of the non-humans. Both in research and practice within ECEfS, the agentic power mainly rests within the human (the child and the adult), and essentially inhibiting our engagement and attunement to humans’ entanglement and connectedness with other species and non-human forces.

This human-centric understanding of agency has in turn led to humans’ “absurdity” in believing that they can solve, represent, control and master the material world, which unintentionally obscures our enmeshed connectedness with it. Despite being inadequate, and at times even inaccurate, human representations (often linguistic) simply heighten the separation. Hence, shifting the gaze from human’s ability to control nature to attunement to nature creates alternative learning spaces where children can *learn-with* and *affected by* non-human agents.

Moreover, complex environmental problems such as climate change and loss of biodiversity are presently and urgently demanding a re-orientation of science that recognizes multiple other ways of knowing that can help us recognize our relations and connections with nature and the wider world. Within this vein, environmental sustainability and, more specifically, education for environmental sustainability in ECE, can be conceived as a continuous

quest for finding ways to live in tune with the material world and with other species. This quest implies the need to combine different ways of being and ways of knowing with a plurality of sciences and scientific practices.

An endeavour to go beyond empirical analytical science brings about the need to recognize ontological and epistemological multiplicities that permit creative and generative engagement with the problems. To this end, ECEfS can benefit from complementing a childhood studies lens with a new materialist and post-human lens. Given the freedom it offers to experiment, post-qualitative inquiry has a potential to generate alternative and creative ways of knowing for sustainability.

Besides, I argue for a rethinking of practice within ECEfS. Often, in education at large and ECE in particular, practice emanates from human representation that invites and cultivates binary thinking (Scantlebury & Milne, 2020). An approach to challenge binary thinking and to open up possibilities for a more relational ontology is not to confine oneself with representing the world or to have a solution-oriented approach.

Without being confined to representation and its application, practice can have more performative characteristics while we become-with (as in the case of becoming-with the bees in Article IV) and affected by (e.g. as affected by the weather in Article III) the non-human others. This entails that practice could come out of performance, i.e. practice could be considered as an emergent phenomenon. Hence, drawing on St. Pierre’s (2018) refusal on the demand of application, I argue that practice within ECEfS is not necessarily guided by a model to be applied, but it could also be a happening or an event that can be created and performed with the children. To this end, post-anthropocentric concepts such as assemblage and becoming-with serve as a tool.

Again, as we do not have definite solutions for contemporary Anthropocene predicaments, we should not necessarily think of teaching children how to come up with solutions. Rather, there needs to be a mechanism to engage young children and ourselves to remain curious with the problems, such as climate crises and mass extinction, without seeking for definite solutions. Haraway’s (2008) notion of ‘staying with the trouble’ reminds us the level of the destruction that we inherit and hold in our hands and the need to stay attuned to our contact zone of more-than-human relations.

It should be understood that we are not handing over certain answers and definite methods to our children on how to deal with these ecological challenges. Therefore, as an alternative pedagogical approach, ECEfS could

work on engendering relationality and life-giving processes (e.g. pollination in the bee paper) that can help children and us to stay curious with the questions without necessarily moving to solutions. This is in line with Haraway's (2016) notion of the art of staying with the trouble, which urges humans to be mindful of our entangled relations with "nature" i.e. other species and the non-human forces.

Finally, I emphasize that the aforementioned ontological and epistemological rethinking has a potential to make non-human agents intelligible. It does so by opening up spaces of attunement, which makes it obvious how human life at large and children's lives in particular are intricately connected with other species and non-human forces. When conceived of as such, ECEfS opens up alternative ways of knowing for sustainability.

However, it should be noted that this study not only indicates the limits of mainstream ways of conceptualizing sustainability, but also supplements them and offers different ways of conceptualizing and enacting sustainability. Hence, the post-anthropocentric approach is not presented as a panacea for solving the current ecological problems, rather it strives to decentre the human and see its relationality and entanglement with the non-human others. Although posthuman theories help identify and challenge our human-centric characteristics, they fall short in addressing the highly resilient power inequalities and dominant structures that make transitioning towards a more relational and emancipatory conceptualization and, indeed, enactment of ECEfS difficult. This certainly implies the need for more studies, not just of ECEfS pedagogy and practice but also of ECEfS governance and policy.

Summary in Swedish

Denna avhandling fokuserar förskola i relation till hållbarhet. Denna relation har i sin tur historisk precedens genom kopplingen mellan förskola och natur och miljö. Erkännandet av kopplingen mellan undervisning om miljö och undervisning av barn/förskola började med föresatsen att grunden för livslånga föreställningar och värden för miljövänligt agerande läggs i de tidiga levnadsåren (Carson 1965; Tilbury 1994; Wilson 1992). Sedan dess har flera angreppssätt använts för att involvera och engagera barn i miljö- och hållbarhetsfrågor. Några av dessa omfattar: det kunskapsbaserade angreppssättet (Tilbury et al. 2005); det immersiva inlärningssättet som influerats av Jean Jacques Rousseaus klassiska arbete som förespråkar barns lärande i naturen (Rousseau 1979); den politiska dimensionen av miljöundervisning som tagit intryck av Paulo Freires kritiska teori; och mera nyligen, känslan av delaktighet, barns agens och deras förmåga att kritiskt engagera sig i miljö- och hållbarhetsfrågor (Ärlemalm-Hagsér and Davis 2014; Caiman & Lundegård 2014; Davis and Elliot 2014).

Trots att de fyra nämnda angreppssätten har haft en positiv inverkan på miljöundervisningen i flera decennier, har de inte utmanat det ontologiska antagandet som skiljer barnet från den icke-mänskliga naturen. De ontologiska och de besläktade epistemologiska premisserna hos dessa angreppssätt vilar till stor del på mänsklig agens och subjektivitet (dvs. betonar det avsiktliga, medvetna och lärande barnet som subjekt), och har en tendens att förbise andra levande varelsers, icke-levande materia och krafters agensegenskaper. Föreliggande avhandling undersöker alternativa sätt att conceptualisera förskolepedagogik, sätt som betonar människans/barnens intrasslade relation till den mer-än-mänskliga naturen.

Syfte

Syftet med avhandlingen är tvådelat. För det första utforskar den hur föreställningen om hållbarhet conceptualiseras inom förskolepedagogisk forskning. För det andra utforskar avhandlingen "post- antropocentriska" möjligheter för miljörelaterad hållbarhet i förskolans undervisning.

Forskningsfrågor

I ett försök att uppnå syftet ovan, strävar studien efter att besvara följande nyckelfrågor:

- Hur förstås och conceptualiseras föreställningen om hållbarhet inom förskolans undervisning?
- Hur konkretiseras och artikuleras hållbarhet i förskolans läroplan?
- Hur kan ”post-antropocentriska” analyser generera alternativa sätt att conceptualisera hållbarhet?
- Vilka lärandearenor kan uppkomma i och genom ”post-antropocentriska” analyser av hållbarhet i kontexten förskolepedagogik?

Teori och metodologi

Begreppsligt vilar denna studie på tankegångar från posthumanistisk teoribildning. Studien fäster uppmärksamheten på frånvaron av posthumanistiskt tänkande (Haraway, 2008, 2016) och dess inordnade föreställning om nymaterialistiska perspektiv (Bennett, 2010) inom förskola och hållbarhet. Denna frånvaro kan i grunden göra det svårt att förverkliga en pedagogik som tillåter barn att se sin (männskliga) värld och den mer-än-männskliga världen som intrasslade och sammanflätade. Posthumanismen kritiserar antropocentrisk humanism och öppnar kunskapsproduktionen för andra arter och den mer-än-männskliga världen. Därmed kräver den en omprövning av subjektivitet och agens. Posthumanismen ser agens som distribuerad (Bennett, 2010) och subjektivitet som en ”icke-enhetlig” entitet (Olsson, 2009), inte något som är inneboende i individen, utan som uppkommer i och genom relationer och sammankopplingar mellan mänskliga och icke-männskliga entiteter.

Metodavsnittet är indelat i två olika delar: en tolkande hermeneutisk del och en post-kvalitativ del. Systematisk litteraturstudie och läroplansanalys används som metod i den hermeneutiska delen av avhandlingen. Den systematiska översikten sammanfattar i korthet innehållet i tillgängliga forskningsöversikter, internationella forskningssammanställningar, policydokument, enskilda artiklar och bokkapitel inom fältet. Nyckeltermerna som: yngre barn och hållbarhet; förskola och miljöundervisning; förskola och lärande för hållbar utveckling användes för att hitta forskning i fyra olika databaser: Scopus, ERIC, Web of Science och Google Scholar. Läroplansanalysen undersökte hur föreställningar om hållbarhet integrerats i styrdokument för förskolan i Australien, England,

Norge, Sverige och USA. Analyserna baserades på kritisk teori och internationell dialog och fokuserade på fyra aspekter av styrdokumenten: förekomsten av begreppet hållbarhet, synen på barnet, förhållandet människa-miljö och den filosofiska/teoretiska underbyggnaden av formulerade föreställningar om hållbarhet. Post-kvalitativ forskning betonar vikten av teori och vidhåller att forskare behöver bli engagerade i tänkande med teori och ägna mer tid åt att läsa teori än att styras av en rigid metodologi som tillämpas av praktiska skäl (St. Pierre, 2015). Post-kvalitativa forskare hävdar att begrepp skapar möjligheter till och tänkande med data i motsats till insamling av befintliga data (Lather, 2012; Lather & St. Pierre, 2013). Med stöd av idéer från postkvalitativt tankesätt, används Nordströms (2015) begrepp dataansamling (assemblage), vilket tillåter en sammankoppling av data från möten med det mer-än-männskliga. Som Nordström påpekar (2015), ”Dataansamling är en dynamisk onto-epistemologisk enhet vars grundlinjer öppnar upp för nya idéer att tänka om data och vad denna data kan göra och bli” (p.166).

De olika studier som har använts för att besvara de fyra forskningsfrågorna har publicerats i fyra artiklar och presenteras kort nedan.

Artikel I: Utmanande och expanderande föreställningar om hållbarhet inom förskolepedagogik

Den första artikeln i denna sammanläggningsavhandling utforskar i vid bemärkelse föreställningar om hållbarhet inom förskolan, från forskningsfältets historiska uppkomst och framåt, via policy-, läroplans-, och forskningsperspektiv. Inspirerad av samtida posthumanism och nymaterialistiska tankesätt, granskas existerande föreställningar om hållbarhet inom förskolepedagogik i allmänhet och inom förskolans hållbarhetspedagogik i synnerhet. Med begrepp lånade från posthumanismen problematiseras den människocentrerade tendensen inom hållbarhetspedagogik i förskolan och dess miljö- och naturfokuserade föregångare. Detta görs genom en analys av ontologiska, epistemologiska och etiska utgångspunkter inom förskolepedagogik. Den människocentrerade tendensen eller ensidigheten kan hindra den icke-männskliga världens agensegenskaper från att framträda i förskola och hållbarhet. I ett försök att utvidga befintliga föreställningar om hållbarhet, utmanar jag den rådande dominerande barncentrerade diskursen och uppfordrar fältet förskola och hållbarhet att beakta de ontologiska,

epistemologiska och etiska förändringar som genereras av det posthumanistiska perspektivet.

Artikel II: En kritisk analys av begrepp förknippade med hållbarhet i läroplaner för förskolan

Genom att använda innehållsanalys som nyckelmetod, undersöker den andra publicerade artikeln uttryck för hållbarhet i fem länders nationella läroplaner för förskolan: Australien, England, Norge, Sverige och USA. Analyserna fokuserar fyra aspekter av hållbarhet i läroplanerna: närvaro av hållbarhet, synsätt på barn, förhållandet människa och miljö, och filosofiska och teoretiska förstärkningar av uttryckta idéer om hållbarhet. Kritisk forskning med en posthumanistisk grund fungerar som vägledning för en internationell dialog mellan författarna från de fem länderna. Resultaten tyder på att föreställningar om hållbarhet är mer implicit närvarande än explicit uttryckta i läroplanerna. Det framgår inte att barn betraktas som världsmedborgare med agens att hjälpa till att utveckla hållbarhet. När det gäller förhållandet människa och miljö, uttryckte ramverket från Australien större reciprocitet, medan andra ramverk var mer antropocentriska, trots variationen i läroplanerna. Alla fem ramverk gav uttryck för ett sociokulturellt, människocentrerat perspektiv på utveckling. Studien visar på möjligheterna med att beakta alternativa ramverk som erbjuder vidare och mer inkluderande världsbilder av hållbarhet.

Artikel III: Lärande med vitala materialiteter: undervisning om väder i förskolan

Den tredje artikeln i denna sammanläggningsavhandling visar hur en materialistisk förståelse av väder (och implicit av klimat) i förskoleundervisning erbjuder möjligheter att gå bortom antropocentriska och lingvistiska representationer av väder mot mer relationella representationer för att bidra till en potentiell grund för ett hållbart liv. Denna studie lyfter särskilt fram betydelsen av att vara i samklang med och påverkad av vädrets nödvändiga materialitet som ett sätt att nå kunskap. Ett sådant epistemologiskt förhållningssätt skiljer sig från det empirisk-analytiska vetenskapliga sättet att nå kunskap, vilket strävar efter att kunna förutsäga och kontrollera vädret. Medan det vetenskapliga förhållningssättet hänför vädret till yttre orsaker och vidmakthåller den mänskliga/icke-mänskliga separationen, belyser det epistemologiska vårt invecklade, förkroppsligade och inbäddade förhållande till väder och klimat, vilket kan möjliggöra en väg till ökad ekologisk känslighet och

anpassning till klimatet. Med stöd av vädergenererade empiriska data, visar forskningen hur människor, unga som gamla, påverkas av vädret vilket påkallar behovet av en relationell epistemologi som uppmanar oss att uppmärksamma och engagera oss i vädrets kraft. Till sist tyder forskningen på att barn-väderfigurationer (assemblages) möjliggör ett sätt att tänka om barns förhållande till vädret. Ett sådant tänkande och omprövande kan bereda väg för hur väderpedagogik, som exempel på relationell pedagogik, kan iscensättas med nymaterialistiskt perspektiv.

Artikel IV: "Tillblivelse med bin": affekt och responsförmåga med döende bin i förskoleundervisning

Genom artutrotning som en kritisk hållbarhetsutmaning, utforskar artikel IV de pedagogiska möjligheterna att engagera förskolebarn i den potentiellt katastrofala bi-döden. Understödd av idéer från postkvalitativ forskning är denna studie empiriskt förankrad i ett narrativ som uppstår i en barn-bi-figuration. Det iscensatta teaterliknande framträdandet förkroppsligar den kollektiva agensen av att vara ett bi. Genom att tillåta möjliggörande av tillblivelse med bin, inbjuder framställningen till en emotionell, affektiv respons på binas död. Följaktligen skapar iscensättandet ett temporalt utrymme som genererar potential för barnen att av-territorialiseras och "bli till med" bina, det vill säga; identifiera sig med dem och med deras sammanflätade öden och konsekvenser. Studien föreslår alternativa riktningar för miljö- och hållbarhetsundervisning i förskolan som representerar en förskjutning från tillgivenhet till, omhändertagande och bevarande av naturen som ett objekt utanför oss själva, till att bli natur, människan som del av naturen.

Med stöd av affektbegreppet tillhandahåller artikel III och IV sätt att uppmärksamma barns dynamiska möten mellan kroppar, idéer, iscensättningar, materialitet, krafter, och andra arter, vilket kännetecknar barnens engagemang i hållbarhetsfrågor som väder och klimat, och artutrotning som uttrycks genom binas död. När barnen mötte vädret och biteatern, förändrades deras tal, handling och engagemang i vädret och bina, vilket ledde till olika responser. Den affektiva dynamiken som verkade i dessa möten formade och transformerade figurationen (barn-väderfigurationen och barn-bifigurationen) till en process av förkroppsligade, upprepade responser och engagemang och "svaranden-an", genom vilka såväl glädjekänslor och oro som handlingar av förkroppsligad intensitet skapades.

Kunskapsbidrag

Denna avhandling ger fyra kunskapsbidrag. Den första kunskapsbidragande aspekten efterlyser ett annorlunda hållbarhetssetos. Därmed förespråkas en utvidgad föreställning om hållbarhet snarare än att betrakta det som något som människor arbetar i riktning mot. Hållbarhet kan då förstås bortom sociala, mänskliga och kognitiva angelägenheter. Det finns ett behov av multiplicitet och en mer generativ förståelse av hållbarhet som kan innefatta: hållbarhet som formande av livsbejakande figurationer (assemblage); hållbarhet som tillblivelser och ”svaranden-an”; hållbarhet som att bli påverkad snarare än något som kan bemästras och kontrolleras; hållbarhet som sammanflätning, sammankoppling och förhållande till miljön/den mer-än-mänskliga världen; och hållbarhet som en känsla av tillhörighet med naturen eller en viss miljö. Dessutom kan hållbarhet betraktas som en iterativ process av avterritorialisering och återterritorialisering inom vilken barnen erfar sig själva som natur och inte som skilda från den.

Ytterst implicerar detta en förändring från konceptualiseringen av hållbarhet som något som vi kan göra för oss själva, till vad vi behöver göra för att bli till med andra (dvs. andra arter och krafter), och bilda vad Deleuze och Guattari (1987) hänvisar till som livsbejakande figurationer. Därmed krävs en utvidgning av konceptualiseringen av hållbarhet så att den omfattar bildandet av spontana och uppkommande livsbejakande figurationer. Det finns ett behov av att ompröva vår plats i världen och vårt förhållande till den mer-än-mänskliga världen och dess livskraft.

Den andra kunskapsbidragande aspekten gäller att undervisning (i synnerhet i relation till förskola och hållbarhet) behöver berika och vidga sin kontext genom att medge att hela människan redan är intrasslad, förkroppsligad och affektiv, med andra arter och andra krafter inom en figuration (assemblage). Likväl talar vi ofta i konventionell förskola-och-hållbarhetsdiskurs om att lära oss att vara och att lära oss att vårda. Tillblivelse med och att lära sig att bli påverkad är inte välutvecklade föreställningar inom förskola och hållbarhet. Emellertid är att lära också att bli till, att 'lära med' och att 'lära att bli påverkad av', inom en figuration. Betraktat på det viset blir lärande inte enbart en kognitiv process att kontrollera och bemästra världen, utan det omfattar också hur man åter-territorialiserar eller av-territorialiserar (Deleuze and Guattari, 1987) och hur man blir till med andra. På samma sätt bör inte undervisning för hållbarhet enbart ses som överföring av förutbestämda kunskaper, utan snarare ett

pågående sökande efter generativa sätt att bli till. Lärare är inte enbart hegemoniska agenter, utan de blir snarare till med barnen. Lärare ska inte bara fokusera på barnen, utan snarare lära sig tillsammans med barnen och medvetet försöka undvika dikotomier.

Med stöd av posthumanistiska begrepp som figurationstänkande, distribuerad agens och tillblivelse, utmanar det tredje kunskapsbidragsområdet idén om skapandet av det rationella, etiska och agensfyllda barnet, och utforskar möjligheter av öppnande för det relationella barnet, och dess betydelse för hållbarhet. Ur ett post-antropocentriskt perspektiv är barnet inte ett förutbestämt autonomt och själv-privilegerat subjekt, utan snarare situerat inom en värld i agens och figuration i vilken han/hon blir till och påverkas av multipla aktörer och krafter. Pedagogiskt sett flyttas förskola och hållbarhet från det agentiska barnet till flera olika sätt att nå kunskap: affektivt lärande, förkroppsligat lärande och lärande med andra. Det agentiska relationella barnet är symbiotiskt och framträder ur sammanflätningar och interaktion/intra-aktioner.

Den fjärde kunskapsbidragsaspekten berör forskningspraktik (forskningens karaktär) inom förskola och hållbarhet. I stort sett kan tidigare forskningsriktningar inom förskola och hållbarhet anses bedriva forskning om barn, för barn och med barn. I denna avhandling för jag fram idén om att forska med den mer-än-mänskliga världen. På samma gång vill jag föra fram att forskning inom förskola och hållbarhet kan bli mer inkluderande när den inte begränsar sig till det humanistiska ramverket, genom att tillskriva betydelse till och utnyttja icke-mänskliga entiteter som en kunskapsskapande arena. Detta kan hjälpa oss att engagera oss i livskraften hos den icke-mänskliga aspekten av världen och tillåta oss att bli påverkade av och arbeta i en ny ekologi vilket Bennett (2010) hänvisar till som den politiska ekologin om ting och varande. Att anpassa sig till och engagera sig i den mer-än-mänskliga världens livskraft kräver experimenterande och metodologisk frihet. Forskare inom förskola och hållbarhet skulle kunna utnyttja olika tanketerritorier som finns i deras närhet, och ansatser som postkvalitativ forskning öppnar för sådana möjligheter.

I denna avhandling har jag utforskat post-antropocentriska möjligheter av miljömässig hållbarhet inom förskolepedagogik. I denna process har postkvalitativ forskning tjänat som en möjlig ansats till metodologisk kreativitet och därmed en möjlig väg till hållbarhet. Emellertid behöver implikationerna av en postkvalitativ forskningsansats utforskas ytterligare med avseende på begreppsbyggnad och hållbarhetsforskning (som i grunden strävar efter att

upprätthålla och bevara) och hållbar utveckling (som innebär att upprätthålla ständig förändring). Vår roll och position som forskare, forskningsobjektet, och den ontologiska och epistemologiska snäva linjen mellan de två, behöver undersökas grundligt och klargöras med fler empiriska studier.

Dock ska tilläggas att postkvalitativ forskning och dess medföljande ontologiska vändning ännu inte är etablerad inom förskolepedagogisk forskning. Följaktligen kommer ytterligare studier med ett postantropocentriskt angreppssätt föra med sig förändringar, vilka kan omfatta: institutionell förändring, forskningskulturell förändring och vetenskaplig förändring. Återigen nödvändiggör detta behovet av mer forskning som visar ansatsens möjligheter.

Likväl ska det framhållas att denna studie inte bara vittnar om begränsningarna av gängse sätt att conceptualisera hållbarhet, utan även kompletterar dem och erbjuder andra sätt att tänka om och praktisera hållbarhet. Det postantropocentriska angreppssättet presenteras därför inte som en universallösning till de aktuella ekologiska utmaningarna. Snarare hjälper det oss att decentralisera människan och se hennes intrasslade relationer med det icke-mänskliga.

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APPENDICES

Part A

Article I

Weldemariam, K. (2017). Challenging and expanding the notion of sustainability within early childhood education: Perspectives from post-humanism and/or new materialism. In O. Franck & C. Osbeck (Eds.), *Ethical literacies and education for sustainable development: Young people, subjectivity and democratic participation* (pp. 105-126): Palgrave Macmillan

Article II

Weldemariam, K., Boyd, D., Hirst, N., Sageidet, B. M., Browder, J. K., Grogan, L., Hughes F.,(2017). A critical analysis of concepts associated with sustainability in early childhood curriculum frameworks across five national contexts. *International Journal of Early Childhood*. 49(3), 333-351.

Article III

Kassahun Weldemariam (2020). Learning with Vital Materialities: Weather Assemblage Pedagogies in Early Childhood Education. *Environmental Education Research*-Submitted.

Article IV

Weldemariam, K. (2019). 'Becoming-with bees': generating affect and responsibilities with the dying bees in early childhood education. *Discourse: Studies in the Cultural Politics of Education*, DOI: 10.1080/01596306.2019.1607402

Part B

Teachers' Consent Form

Kassahun Weldemariam; Gothenburg University, Faculty of Education

To: Teachers' at

Subject: Research Consent Form

Dear Teachers,

My name is Kassahun Weldemariam and I am a PhD student at the University of Gothenburg within the Faculty of Education. While writing this letter, I would like to give you a bit of information about my study and also kindly ask your permission so that you and the children in your group can participate in my project.

The project is aimed at exploring different ways of engaging with sustainability/environmental/ecological issues in early childhood education. Broadly, I am interested in children's relationship with animals, materials, places or what is referred as the non-human world. I will be narrowing down the focus along the way based on children's everyday experience and spontaneous encounters emerging around the preschool setting.

I will be using video recording, audio recording, taking pictures and field notes as a tool for my field work. All the data obtained will be kept anonymous and will be held with utmost confidentiality, and will solely be used for this research purpose. The names of the children, teachers or any other personal information will not be disclosed to anyone at all.

The project begins in December 2016 and will last up to end of June 2017. I will be meeting you and the children 2-3 times a week for a couple of hours each day.

For any unforeseen circumstances, you and the children are free to withdraw from the study at any stage. At the end of the study, I will be pleased to write a report and share the findings with you and the parents.

Should you have any questions regarding the project, I can be contacted by telephone 0729638183 or e-mail kassahun.weldemariam@gu.se

Thus, may I kindly ask you to sign this letter as a confirmation for your willingness and permission to take part in the project.

Teacher's Name:

Date..... Signature

Warm Regards,

Kassahun Weldemariam

Parents' Consent Form

Kassahun Weldemariam; Gothenburg University, Faculty of Education

Subject: Research Consent Form

Dear parents,

My name is Kassahun Weldemariam and I am a PhD student at the University of Gothenburg within the Faculty of Education. While writing this letter, I would like to give you a bit of information about my study and also kindly ask your permission so that your child can participate in my project.

The project is aimed at exploring different ways of engaging with sustainability/environmental/ecological issues in early childhood education. Broadly, I am interested in children's relationship with animals, materials, places or what is referred as the non-human world. I will be narrowing down the focus along the way based on children's everyday experience and spontaneous encounters emerging around the preschool setting.

I will be using video recording, audio recording, taking pictures and field notes as a tool for my field work. All the data obtained will be kept anonymous and will be held with utmost confidentiality, and will solely be used for this research purpose. The names of the children or any other personal information will not be disclosed to anyone at all.

The project begins in December 2016 and will last up to end of June 2017. I will be meeting the group 2-3 times a week for a couple of hours each day.

For any unforeseen circumstances, your child is free to withdraw from the study at any stage. At the end of the study, I will be pleased to write a report and share the findings with you.

Should you have any questions regarding the project, I can be contacted by telephone 0729638183 or e-mail: kassahun.weldemariam@gu.se

Thus, may I kindly ask you to sign this letter as a confirmation for your willingness and permission that your child can take part in the project.

Parent's Name: Child's Name:.....

Date..... Signature

Warm Regards,
Kassahun Weldemariam

School Research Consent Paper

Kassahun Weldemariam; Gothenburg University, Faculty of Education

To: Principal at the.....

Subject: Research Consent Form

Dear,

While writing this letter, I would like to kindly ask your permission to conduct my project atpreschool in Gothenburg. The project is aimed at exploring different ways of engaging with sustainability/environmental/ecological issues in early childhood education. During the project, I will be meeting and following a group 2-3 times a week for a couple of hours each day. The project begins in December 2016 and may last up to 6 month.

I will be using Cameras to video and audio record and also take pictures. All the data obtained will be kept anonymous and will be held with utmost confidentiality. The name of the school, the names of the children and teachers or any other information about the school will not be disclosed to anyone at all. For any unforeseen circumstances, the school, the children and the teachers are free to withdraw from the study at any stage.

I look forward to collaborating with the children and teachers. Should you have any question pertaining to the project, you can reach me with my contact details below.

Should you have any question, I can be reached at: kassahun.weldemariam@gu.se or telephone: 0729638183

At the end of the study, I will be pleased to write a report and share the findings with you and the school community.

Thus, I would like to kindly ask you to sign this letter as an official approval and permission to the commencement of the project.

School principal: Name and Signature: -----

Warm Regards,
Kassahun Weldemariam

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Challenging and Expanding the Notion of Sustainability Within Early Childhood Education: Perspectives from Post- humanism and/or New Materialism

Kassahun Weldemariam

INTRODUCTION

Drawing on post-humanism and/or new materialism as a theoretical framework, this chapter challenges the notion of sustainability within education in general (the way it is understood, described and discussed) and within early childhood education for sustainability (ECEfS) in particular (Davis and Elliott 2014). To offer an understanding of sustainability within existing bodies of knowledge, the chapter focuses on various aspects of the sustainability journey in early childhood education (ECE), including historical beginnings, policy discourses, curricular design, pedagogical practices and research approaches within ECEfS.

The chapter begins with an overview of the historical trends and associated macrolevel/international dialogues pertaining to sustainability. This is followed by a section that describes curricular representation and pedagogical practices, and reviews prior research on sustainability within the field of ECE as well as the underpinning ideas. The subsequent section provides an introduction to post-humanism/new materialism as a theoretical

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© The Author(s) 2017
O. Franck, C. Osbeck (eds.), *Ethical Literacies and Education for
Sustainable Development*, DOI 10.1007/978-3-319-49010-6_7

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framework and how these theories provide stimulus for rethinking the ontological, epistemological and ethical conditions underpinning sustainability education. The next section critically discusses and challenges the prevailing notion of sustainability through the lens of post-humanism/new materialism and attempts to elucidate its potential for addressing, challenging and expanding the notion of sustainability. I conclude with a proposed way forward for ECEfS.

HISTORICAL BEGINNINGS IN SUSTAINABILITY EDUCATION AND ITS UNDERPINNING POLICY DISCOURSES

Despite the existence of diverse views about the origin of the term “sustainability”, its genesis and history are often associated with nature conservation education, nature study and environmental education in the 1960s (Wals 2012; Somerville 2015). Nature conservation education broadly emphasizes educating citizens to understand, appreciate, connect with and protect nature. Building on nature conservation education, the overall purpose of environmental education has been to address the integration of environmental issues into formal education, with a view to influencing citizens’ environmental behaviour and enabling them to live in conscious recognition of the earth’s carrying capacity (Wals 2012).

The recognition of the link between environmental issues and ECE dates back to the 1990s. According to Tilbury (1994) and Palmer (1995), as cited in Davis and Elliott (2014), it is the recognition of the unique affordances of children’s curiosity that has led to the identification of ECS as a foundation for lifelong learning and the development of pro-environmental values and attitudes (Davis and Elliott 2014). The movements associated with the United Nations Convention on the Rights of the Child (UNCRC) and UNESCO’s (2005) Decade of Education for Sustainable Development (DESD) are other significant events that played an important role in promoting children as social agents with rights to participate in matters relevant to them—including environmental issues.

However, despite this recognition and movement, the notion of sustainability had not been overtly incorporated into ECE policy frameworks and pedagogical practices until relatively recently. UNESCO’s first official report on the subject, *The Contribution of Early Childhood Education for a Sustainable Society* (Pramling Samuelson and Kaga 2008), was an initiative to explicitly address sustainability within ECE. This report contributed to

an increased interest in the concept of sustainability within early childhood pedagogy, curricula and research. Building on the work of UNESCO, the World Organisation for Early Childhood Education (OMEP) made a plea for the expansion of the field by highlighting the link between ECE and sustainability (Siraj-Blatchford et al. 2010).

Likewise, by indicating the intergenerational nature of sustainability, the Brundtland Report (1987) has also played a significant role in, and has emphasized the need for, lifelong engagement and commitment, which implies the need to practise the skills of sustainability in terms of social justice and equity. This has led to the inclusion of sustainability and its accompanying dispositions (care, ethical responsibility and empathy) as a foundation for lifelong learning in early years education.

CURRICULAR, PEDAGOGICAL AND RESEARCH APPROACHES WITHIN EARLY CHILDHOOD EDUCATION FOR SUSTAINABILITY

Although there are commonalities across nations, different curricular frameworks are designed on the basis of different philosophies, theoretical underpinnings, beliefs and values. Most early childhood curricular frameworks have been designed based on philosophies such as child-centredness, socio-constructivist learning theories, activity-based learning, experiences and situations, and immersion and interaction with “nature” and the physical environment (Vygotsky 1986; Lave and Wenger 1991; Piaget 1997). Drawing on these philosophical underpinnings, various early childhood scholars across the world have explored different curricular and pedagogical approaches that are intended to transform ECE practices relating to sustainability.

One main approach has been the focus on in-service teachers, with the aim of enhancing their participation and ability to critically reflect on, and play a leading role in, children’s engagement with sustainability issues within ECE settings (Årlemalm-Hagsér 2014; Engdahl and Årlemalm-Hagsér 2014; Ji and Stuhmcke 2014; Mackey 2014; Phillip 2014; Young and Cutter-Mackenzie 2014). Others (O’Gorman 2014; Sundberg and Ottander 2014; Gilbert et al. 2014) argue for the need to strengthen preservice teacher education by emphasizing critical reflection ability within the training programme.

Another popular pedagogical/curricular approach to sustainability is the project approach, which involves a deeper and topic-based exploration of sustainability as a mechanism to engage children with pertinent issues.

Through the project, children are encouraged to engage with different aspects of sustainability and solve local problems within their community, while learning about sustainable practices in the process (Engdahl and Årlemalm-Hagsér 2014; Ji and Stuhmcke 2014).

Additionally, outdoor education, nature-based studies and place-based pedagogy are approaches that are promoted for the opportunities they provide in creating a comprehensive context for connecting children with nature (Miller 2014; Mackey 2014; Engdahl and Årlemalm-Hagsér 2014; Barratt et al. 2014; Chawla and Rivkin 2014; Sundberg and Ottander 2014; Gilbert et al. 2014). It is believed that such a context lays the foundation for children's understanding of, engagement with and enactment of sustainability.

Researchers have also emphasized the importance of home/school partnership, children's community experience and active participation as citizens (Barratt et al. 2014; Chawla and Rivkin 2014; Engdahl and Årlemalm-Hagsér 2014; Ji and Stuhmcke 2014; Mackey 2014; Phillip 2014; Young and Cutter-Mackenzie 2014). They indicate the need for those involved in ECE to facilitate and organize such opportunities for children.

Other recurring pedagogical approaches and related discourses include addressing sustainability as learning content and identifying specific behaviours; values or attitudes; environmental learning; education in, for and about the environment; advocacy and children's rights (Engdahl and Rabusicova 2011); teachers' pedagogical competence and implementation of education for sustainable development (ESD), with a shift from literacy to action (Hedefalk et al. 2014); and play-based pedagogy for environmentalizing early childhood curricula (Edwards and Cutter-Mackenzie 2011). Phillip (2014), on the other hand, has employed storytelling as a pedagogical tool for engaging children with sustainability.

Throughout the aforementioned curricular and pedagogical approaches, a recurring dominant discourse is the perception of the child as an active agent and critical problem-solver who is visible and able to actively engage and make decisions. The notion of agency has also been evident in international discourses, as indicated by the UN Millennium Summit, which described children as central actors and critical agents of change, who have infinite capacities for activism to create a better world (UN 2015).

Regarding theoretical orientations of previous studies within ECEfS, positivist, interpretivist, critical-theory and rights-based approaches have been identified as the most widely used research paradigms (Somerville

and Williams 2015). Studies that employ a positivist approach (Kahrman-Öztürk et al. 2012; Hadzigeorgious et al. 2011) tend to quantify children's attitudes, beliefs, perception and achievement in environmental education and outdoor learning spaces through pre- and post-test knowledge.

In particular, scholars who employ the interpretative paradigm are mainly situated within the dominant theoretical discourses of "connection to nature" and "children's rights" (Gambino et al. 2009). Emanating from the legacy of Rousseau, studies that are situated within the "connection to nature" discourse are mainly related to "green" environmental issues and children's alienation from nature is their main concern; consequently, they advocate the need to reconnect children to nature (Taylor 2013).

On the other hand, scholars such as O'Gorman and Davis (2012) employ a critical perspective that is intended to bring about change through the participation and involvement of children in research and practical activities. They examined children's and teachers' responses to the use of an ecological footprint calculator as a sustainability pedagogical tool. Likewise, Årlemalm-Hagsér (2013) employed critical theory and ecofeminist perspectives to examine preschool children's agency and meaning-making as integral to sustainability pedagogies. Her study indicated the potential of preschool as a transformative arena for the expression of different political and pragmatic agendas.

In order to briefly overview the current and prevailing research discourses within ECEfS, I have attempted to summarize the content of the available research reviews, international research collections and individual articles in the field from 1996 to 2015, to offer a fairly comprehensive and representative picture of the main discourses on the subject. In so doing, I present the key terms: childhood and sustainability; early childhood and environmental education; early childhood; and ESD. As part of my research I consulted articles, books and book chapters and policy reports within and beyond different databases: Scopus, ERIC, Web of Science and Google Scholar. Despite the effort to present a reasonably comprehensive coverage of the current and leading ideas on sustainability within early childhood studies, I acknowledge that there are "missing voices" due to the limited scope and nature of the chapter.

Table 1 summarizes key research reviews and international research collections, highlighting the themes they address. The individual articles (most of which are also embraced within the list of reviews in table 1) are used and cited throughout the chapter. To indicate how the discourse has evolved over time, the reviews are presented in chronological order, from the oldest to the most recent.

Table 1 Thematic summary of review articles and international research collections within ECEfS

<i>Journal articles/book</i>	<i>Themes addressed</i>
Barratt Hacking, et al. (2007). Engaging children: Research issues around participation and environmental learning. <i>Environmental Education Research</i> , 13(14), 529–544	Engagement of children as environmental stakeholders, environmental learning, outdoor activity and children's well-being
Davis, J. (2009). Revealing the research 'hole' of early childhood education for sustainability: A preliminary survey of the literature. <i>Environmental Education Research</i> , 15(2), 227–241	Children's relationship with nature (education in the environment) and the understanding of environmental topics (education about the environment) is the focus Lack of research work on children as agents of change (education for environment) Time frame addressed: 1996–2007
Davis, J., & Elliott, S. (2014). <i>Research in early childhood education for sustainability: International perspectives and provocation</i> . London: Routledge	Young children's actual and potential capabilities as agents of change for sustainability Participatory, socio-constructionist and systemic approaches towards social transformation Children as social agents, critical thinkers and problem-solvers who are able to act in collaboration with the community Explicit focus on ESD
Hedefalk, M. et al. (2014). Education for sustainable development in early childhood education: A review of the research literature. <i>Environmental Education Research (Journal Article)</i> , 21(7), 1–16	ESD is described in two different ways: (1) education about, in and for the environment (2) as an approach to education including economic, social and environment pillars Teachers' understandings of ESD and how it can be implemented, curricular integration and pedagogical adaptation A shift from literacy to action-oriented education (i.e. children as competent actors) Time frame addressed: 1996–2013
Somerville, M., & Williams, C. (2015). Sustainability education in early childhood: An updated review of research in the field. <i>Contemporary Issues in Early Childhood</i> , 16(2), 102–117	Critical analysis and categorization of earlier research based on theoretical and methodological orientations, and identification of three main theoretical orientations: connection to nature, children's rights and the post-humanist framework

As can be seen from the table, central and recurring themes within ECEfS research include environmental awareness; understanding and active engagement with the environment; environmental and outdoor learning; participatory learning; relationship with nature; ESD as content-based learning; action-oriented practices; and children's agency. These areas tend to emphasize knowledge-building and behavioural change for a sustainable future, that is, they are human/child-centred and rely on the cognitive and meaning-making processes of the autonomous and learning child. Building on Somerville and Williams's (2015) recommendation on the potential of the post-humanist approach for addressing sustainability within ECEfS, I attempt to deconstruct and expand the aforementioned notion of sustainability from a post-humanist/new materialist perspective which embraces the agency of the non-human world.

POST-HUMANISM AND/OR NEW MATERIALISM AS A THEORETICAL FRAMEWORK

Post-humanism and new materialism are contemporary philosophical movements/theoretical frameworks that significantly overlap with one another, and there is no definitive distinction between them. Different scholars define and describe them in different ways. Some scholars (Braidotti 2013; Lenz-Taguchi 2014; Taylor and Hughes 2015) consider new materialism as a field that comes under the broader post-humanism line of thinking, while others (DeLanda 2008; Dolphijn and van der Tuin 2012) tend to treat new materialism as its own field of study. This chapter is not concerned with the debate about the similarities and differences between the two fields. Rather, it draws on their significant commonality and how they can help us to rethink sustainability in ECE.

In a broader sense, the post-humanism framework departs from humanism and accepts the humanistic premise of critiquing transcendent explanations of human existence, but it redefines the human as a part of (not separate from) the natural world, such that human nature is a multispecies and entangled event, that is we humans live in a "common world" with others and we are made up of our intra-actions with nonhumans (Latour 2004; Barad 2007; Mickey 2007, 2016; Haraway 2008; Braidotti 2013; Taylor 2013). New materialism accepts the materialistic premise of critiquing idealistic explanations of self and world and replacing them with materialistic explanations, but it redefines matter in process-relational and active/agential terms in contrast to classical and modern views of matter

as substantial and passive (Bennet, 2010; DeLanda 2008; Lenz-Taguchi 2010; Mickey 2010; Dolphijn and van der Tuin 2012).

Post-humanism and new materialism challenge the long-standing idea of looking at the human subject as an exceptional and political agent, and states that such privileging of the individual human subject is problematic, especially when confronted with those political problems that seem tied to, and around, the subject's very identity and anthropocentric actions (Poe 2011; Braidotti 2013). Both approaches promote the notion of humanity as embedded within a more-than-human network context—not alone as a sole agentic force in the world—and argue that disregarding the agency of the more-than-human in today's Anthropocene era means that humanity remains stuck in its own myth of exceptionalism, at the political cost of the continued human dominance over the environment and other entities (DeLanda 2008; Poe 2011; McKenzie and Bieler 2016). In this way, both frameworks problematize anthropocentric thinking, which considers humans as the central concern and the sole bearer of agency, and instead recognize distributed agency among humans and more-than-human others (Deleuze and Guattari 1987; Latour 2004, 2005). The term "Anthropocene" denotes the current geological age during which human activity has been the dominant influence on the climate and the environment. Using the idea of the Anthropocene, these frameworks reconsider the relationship between the human and the physical/material world by re-imagining a new paradigm, which repositions humans from the perspective of their embeddedness in interdependent socio-ecological systems (Malone et al. (2017); Somerville 2015).

The two frameworks present different modes of being and knowing, wherein both human and more-than-human aspects of the world are positioned in a "flat" ontology without any centre and hierarchy (Deleuze and Guattari 1987). Their epistemology is concerned with non-human experience as a site of knowledge (Taylor and Hughes 2015) and with ethical conditions that take into account a broader and interconnected notion of life, embracing the non-human/more-than-human world and other forms of life (Wolfe 2010). According to Taylor and Hughes (2015), "thinking posthuman ethics begins by re-thinking interdependence, by including nonhumans in an ethics of care, by understanding the human always and only in-relation-to nonhumans who are no longer 'others' but are, intimately and always, ourselves as the body multiple" (p.15). Parallel to this, Taylor (2013) raises intergenerational and interspecies justice, inheritance and responsibility as fundamental ethical considerations of sustainability in the contemporary anthropocentric era.

EARLY CHILDHOOD EDUCATION FOR SUSTAINABILITY THROUGH THE LENS OF POST-HUMANISM/NEW MATERIALISM

As briefly described at the beginning of this chapter, the historical development of ECEfS aimed at building a foundational knowledge with children so that they demonstrate care, ethics and empathy towards "nature" and the environment. From a post-humanism/new materialism perspective, such an approach tends to be human-centric as it focuses on the need to cultivate human knowledge, skills and attitudes towards environmental stewardship, that is, human-oriented education for environmental sustainability (Taylor 2013, 2017).

This human-centric aspect also featured in the Brundtland Report (1987), which is a landmark policy document that has led to the inclusion of sustainability skills such as lifelong engagement and commitment in early years education. In the report, sustainable development is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (1987, p. 16). Even though the document provides a basis for today's developed and complex understandings of sustainability and sustainable development, this definition has anthropocentric features as it is mainly concerned with enabling one to fulfil the needs of the present "human" generation without compromising the possibilities of future "human" generations. The definition tends to imply separation between humans and the physical world by putting humans at the centre and emphasizing the finite resources of the environment, with an intergenerational focus and intergenerational equity aspect. Owing to its anthropocentric nature, the notion of sustainable development, as described in the Brundtland Report, tends to focus more on how to develop and sustain the fulfilment of human needs rather than how to sustain the biosphere per se, which is a prerequisite for sustainable development.

As a lead organization in relation to matters such as sustainable development, UNESCO has been the driving force in shaping policies pertaining to sustainability education in general and ECEfS in particular. However, sustainability, as articulated by UNESCO, tends to be limited by human-centric views that emphasize not only the ways in which humans damage the environment, but the ways in which humans need to become environmental stewards. As pointed out by Taylor (2013, 2017), there is a need

to perceive the human–environment relationship beyond stewardship. The notion of outdoor education as stated in Section IV of Agenda 21 of the UN (1992) is an instance of UNESCO’s human-centred discourse. This document perceives and depicts humans as either villains or heroes and considers agency as an exclusively human attribute. This view tends to neglect the agency of the more-than-human world. Challenging such a notion from a post-humanism/new materialism perspective raises “an important issue” within the environmental education and sustainability discourse, that is, it heavily relies on human exceptionalism while we humans have much to learn from and with other species and the non-human world.

Hence, from a post-humanist/new materialist perspective, the human-centric way of ontological positioning tends to be a reductionist approach as it promotes the nature/environment/earth as something to be controlled, saved or mastered, by human actors. Post-humanist approaches to environmental relations tend to emphasize the mutually constitutive and entangled relationships between humans (as just one species among many) within a common world (Latour 2004; Taylor 2013). Since this approach problematizes anthropocentric thinking, it can serve as an important theoretical tool to allow us to rethink human relationships with the environment and the physical world. This way of understanding focuses on agency as something that comes out of relationships and assemblages (including human and more-than-human) and not just as a human attribute (Latour 2004, 2005).

Thus thinking in terms of post-humanism/new materialism within ECEfS helps to reveal the limits of the “dominant” conceptions of the human–environment relationship within the history and policy documents pertaining to ECEfS. I argue that these conceptions have widened the gap between humans and the physical world, and that post-humanism/new materialism allows a rethinking of our being and humans’ relationship with the environment. The historical foundations and UNESCO policy documents mentioned earlier have a political power and shape our understanding of the notion of sustainability in early childhood and beyond, and hence it is worth examining the way in which they depict the human–environment relationship, which in turn helps us to revisit our ontologies, epistemologies and educational practices.

Curricular and pedagogical approaches within ECEfS were addressed earlier in this chapter. As highlighted previously, the recurring curricular

and pedagogical themes within ECEfS include the outdoors as a learning environment; teacher training and competence; place-based pedagogy; the project approach; storytelling; children’s rights and community participation; advocacy; relationships and interactions with nature; the recognition of the child’s uniqueness; the notion of agency; and the value of partnerships between home and the early years settings. The post-humanism/new materialism perspective challenges such approaches and extends the discourse beyond children’s agency, to explore what can be learnt by repositioning humans in a flat ontology where agency is produced as a constituent element of human and non-human entities.

As pointed out by McKenzie and Bieler (2016, p. XIII), ever since the term “sustainability” was first conceptualized and mentioned in relation to pedagogy, there has been a “persistent humanism” which has led to the concept and pertinent discourse being viewed and discussed mainly from a human-centric perspective. While highlighting the persistent humanism, McKenzie and Bieler (2016) have stressed the need to rethink pedagogy in ways that embrace the emerging material conditions of the Anthropocene, and to see beyond the binaries of human and more-than-human entities. Nevertheless, the dominant discourse in sustainability pedagogy within ECEfS has been oriented towards educating the human/the child towards environmental stewardship, care and sympathy. In such a conceptualization, humans/children are seen as the protagonists in the phenomenon, and this perspective has led the notion of sustainability to centre mainly on the human, marginalizing the more-than-human constituents in the discourse.

Thus nurturing children with regard to environmental stewardship has been promoted in relation to curricular and pedagogical endeavours within ECEfS. Looking at it from post-humanism and/new materialism perspective, the notion of stewardship unintentionally entails “otherness” by describing the environment as something to be controlled, saved or mastered by human actors (Taylor 2013, 2017). This way of understanding the environment does not conform to the essence of post-humanism/new materialism, which stresses the mutually constitutive and entangled relationship between humans and the environment. Perhaps, as Reinertsen (2016) points out, it is worth shifting from stewardship to partnership since the latter has a potential to provoke consciousness about humans’/children’s entanglement and their interconnections with the worlds—worldliness, as Haraway () calls it—in which they play out.

Hence, post-humanism/new materialism promotes pedagogy beyond the limits of developmentally appropriate practices and beyond the socialization of the individual child, and calls for early childhood pedagogy not to be confined by children's individual agency (Lenz Taguchi 2010; Blaise 2013; Taylor 2013). The approach instead calls for a relational child who is in constant entanglement with the heterogeneous non-human and more-than-human others, and argues that agency and individualism are not sufficient determinants of early childhood policy, curricula and pedagogy. As indicated by Lenz-Taguchi (2010), intra-active pedagogy can be a good tool to think with, as it highlights the intra-active relationships among living organisms and the materiality of the environment. Thus, early years educational structures and the learning environment of which the child becomes a part need to be designed in such a way that they can play an important role in strengthening children's relationship/connection to the more-than-human world.

The post-humanist/new materialist approach to curricula and pedagogy perceives children as living within an entangled common world where one cannot make a distinction between humans and more-than-human others. In this regard, post-humanism attempts to redefine/reposition the child in a common world (Taylor 2013) where he or she is entangled, related or connected to the physical world, the immediate environment and the place (Duhn 2012) that he/she shares with the more-than-human others in the immediate neighbourhoods, which can provide a rich pedagogical context.

Hence we (early childhood educators and researchers) need to reflect on our pedagogies and examine how we perceive children's relationship/entanglement with the world beyond humans and how that is manifested in everyday pedagogies in preschool settings. We need to question whether we are unintentionally being reductionist in our approach because we live a human-centric life and whether this might lead us to a disconnection from the world in which we live? I argue that this ontological standpoint promoted by post-humanism/new materialism has much to offer in terms of innovative ways of dealing with sustainability challenges to disrupt hegemonic/human-centric approaches and instead designing a pedagogical space that invites children to see the world in a wholly interrelated manner.

Moreover, unlike other educational levels, ECE typically has relatively open and flexible curricula, which allows the opportunity to design a learning environment that cultivates a holistic and relational world view, where humans and non-humans are living in entanglement, and hence educators can take advantage of this unique opportunity. In addition, children

are imbued with curiosity and are open to new/different perspectives which paves the way to working with young children before they adopt an anthropocentric perspective and start to create boundaries which lead to false binary assumptions, such as human versus non-human and nature versus culture. I strongly argue that in a field like sustainability, where anthropocentrism is a significant challenge, post-humanism and new materialism align well with the ethos of sustainability and offer opportunities to rethink and redesign a pedagogical space that consciously recognizes the inevitable interdependence between human and non-human actors.

Parallel to curriculum and pedagogical issues, as thematically summarized in Table 1, earlier research inquiry within ECEfS tends to be human/child-centred. Further, to understand the underpinning ontological and epistemological beliefs and assumptions within ECEfS research, it is important to reflect on the theoretical/philosophical and methodological approaches/frameworks employed by prior research in the field. As described earlier, positivist, interpretivist, critical-theory and rights-based approaches have been identified as the most common theoretical approaches in the field, and they tend to address human characteristics, focusing on the child, its agency and relationship with nature. This again confirms that the research orientation in the field has been inherently human-centred and further strengthens the need for different, alternative and broader theoretical orientations. Besides theories, there is also a need for broader methodological perspectives that can overcome the methodological individualism that underlies many of the approaches to sustainability in early childhood, aiming towards more inclusive and alternative ways of understanding that are typically absent in ECEfS discourses.

However, this does not mean that there are no early childhood studies that attempt to use theories that explore issues beyond the human child. A review by Somerville and Williams (2015) highlighted a few studies that employed a post-human perspective. Among these are Duhn (2012) on pedagogy and place; Ritchie (2013) on sustainability and relationality; and Bone (2013) and Timmerman and Ostertag (2011) on animals and the environment. Joining these already existing initiatives, and following on from the recommendation by Somerville and Williams (2015) of the potential of post-humanism for researching planetary sustainability, I argue for the greater use of this perspective as an important theoretical/philosophical tool for rethinking methodologies and methods when addressing research, policy, pedagogy and curricular endeavours within ECEfS.

Concurrent with the argument presented here, several scholars have reacted to the dominant human exceptionalism view and have called for a change of perspectives and practices in dealing with sustainability challenges. Reinertsen (2016) points out that we should not be tied up with human action, but rather we should examine human and more-than-human relational assemblages of affecting and being affected. This urges us to rethink, reconstruct and deconstruct the notion of sustainability and its underlying discourse. Reinertsen (2016) states that it is time for us (humans) to open our eyes and ears to watch and listen to all the stories that non-humans are telling us. Likewise, Gibson et al. (2015) indicated that to reverse or change damaging human-centric behaviours, we first need to change our way of thinking and our ontological standpoint. They argue that if we are to see ourselves as part of the environment, not separate from it, and to reframe the environment in ethical terms, we must be able to learn from what is already happening in the world.

Arguing for a different ethical standpoint, Wals (2007) highlights that “we need nothing short of a new global ethic—an ethic which espouses attitudes and behaviour for individuals and societies which are consonant with humanity’s place within the biosphere; which recognises and sensitively responds to the complex and ever-changing relationships between humanity and nature and between people” (p. 35). Likewise, Somerville (2015), while calling for an ontological move, points out the power of discipline and recommends a new disciplinary area called “ecological education”. These are important proposals, indicating the need to create alternative knowledges and understandings towards a “sustainable” world. Building on these scholars’ work, I emphasize the potential of the post-humanism/new materialism perspective as an important theoretical approach for challenging, reconstructing, deconstructing and expanding the notion of sustainability within ECE. The ECEfS field should not be inextricably tied to a human-centred, cognitive, meaning-making process while dealing with sustainability. Rather, the field must open up possibilities for new ways of being and becoming, to create “new” or alternative knowledge trajectories.

Although their work is not directly related to sustainability, early childhood researchers such as Lee (2002), Prout (2005) and Olsson (2009) have utilized the post-human perspective and offered outstanding scholarship in educational research. Scholars within ECEfS (Duhn 2012; Ritchie 2013; Somerville 2015) have also addressed the more-than-human world in different ways. Somerville and Green (2015) addressed sustainability in relation to place, while Duhn (2012) and Ritchie (2013) have dealt

with indigenous and placed-based practices in Australia and New Zealand, respectively. These important contributions are signals indicating the emergence of this field within ECE in general and within ECEfS in particular. Building on the foundations laid by these scholars, this chapter has attempted to indicate how the post-humanism/new materialism perspective presents a comprehensive context which can offer alternative ways of looking at sustainability within ECEfS.

SOME CONCLUDING REMARKS

This chapter has traced the idea of ECEfS from its historical roots, and through international dialogue, curricular frameworks, pedagogical practices and research perspectives. Arising from the literature reviewed here, two major features of ECEfS have been identified which shed light on the dominant discourse and characteristics of the field. The first is its deep-rooted and inherent human-centric/child-centric characteristic and its strong reliance on children’s agency. The second is its emphasis on the environmental aspect of sustainability and its deterministic approach, which is aimed at nurturing stewardship, care and sympathy in young children. Drawing on the post-humanism/new materialism framework, I have attempted to deconstruct, reconstruct and expand the notion of sustainability so that it can be viewed beyond anthropocentric limitations, which could possibly lead to different/alternative forms of subjectivity and agency. In doing so, I pose fundamental questions about the ontological, epistemological and ethical starting points and suggest a rethinking of the idea of sustainability within ECEfS.

The relatively open nature of ECE makes it a field that is well situated to adapt to post-humanism and new materialism approaches since these perspectives allow us to see learning in a holistic and relational way without reducing it to binaries and hierarchies. These theories help us to have a unified world view which emphasizes humans’ entangled relationship with the more-than-human world instead of breaking down learning into particular domains and dichotomies. Apart from relying on children’s agency, I argue that post humanism and/new-materialism framework have the potential to create a comprehensive context for conceiving a broader, complex and interconnected world (inhabited by human and non-humans) which could help us understand “sustainability” from a relational perspective.

Hence, ECE should not be content with the notion of children's agency and their cognitive ability to actively participate in issues pertaining to sustainability. The notion of children's agency is undoubtedly important but its adequacy for creating condition for understanding and engaging in a range of complex issues such as those related to sustainability has to be further examined. Thus I argue that employing these contemporary ways of thinking (post-humanism/new materialism) offers a broader perspective and leads to different ways of stretching boundaries and generating alternative discourses within ECEfS which can help us to understand children together with the non-human world that they are entangled with.

Finally, as a human reader, you might wonder about the inevitability of being human and the challenge to decentre oneself and pay attention to non-human/more-than-human others. Post-humanism and new materialism are not aimed at the victory of non-humans over humans. In the context of this chapter, they can instead be understood as remedial efforts to redress today's anthropocentric conditions (which contributes for "our" unsustainable life) by decentring humans sufficiently to recognize other, hitherto neglected and marginalized, more-than-human actors and their entangled relationship with humans, and the significance embedded in the relationship.

THE WAY FORWARD

Following the call for the rethinking of human relations with the environment and the more-than-human world by Taylor (2013); Reinertsen, (2016); Gibson et al. (2015) and Somerville (2015), I have attempted to elucidate how posthumanist/new materialist perspectives can help us to critically question assumptions at play within ECEfS and stretch the notion of sustainability itself by disrupting the deep-rooted dominant child-centric narrative.

Although early childhood researchers such as Lee (2002), Prout (2005), Taylor (2013), Rautio and Jokinen (2015), Lenz-Taguchi (2010), Blaise (2013) and Pacini-Ketchabaw & Nxumalo (2015) employ posthumanism and/new-materialism approaches for researching various aspects of children's life, they have not been well utilised for addressing sustainability challenges and hence more empirical studies are needed to indicate how these approaches can be implemented within ECEfS research and pedagogical activities. Thus, early childhood researchers and educators working on sustainability are encouraged to employ these theories as a tool to reinvestigate

and how they plays out in the lifeworld of children and the way to embrace them within sustainability pedagogy in preschool settings.

Instead of providing answers to all the queries mentioned earlier, this chapter attempts to raise provocative questions that challenge contemporary (anthropocentric) understandings of sustainability. How do these different ontological, epistemological and ethical understandings shape "our" understanding and inform practices within the field of sustainability education in general and ECEfS in particular? What is actually being sustained in "sustainability" education? Who does the sustaining? Are human actors sufficient to deal with the challenge? Do we need other actors beyond human? How do posthumanism and/new materialism "redefine" the child and offer alternative view? Reflecting on these questions has a potential to generate different ways of looking at and dealing with sustainability challenges within ECEfS and beyond.

Moreover, early childhood researchers and educators need to closely examine policy discourses, curricular documents, pedagogical philosophies and research orientations that might unintentionally depict false dichotomies such as human-nonhuman, subject-object, nature-culture and the like. Given their potential to move the field of sustainability, it is worth inquiring how empirical research within ECEfS can be conducted within a posthumanist/new materialist research paradigm. To this effect, this chapter is an effort to deconstruct and then build different/alternative meanings for contemporary notions of sustainability.

These contemporary approaches offer alternative world views, and provide different methodological approaches and innovative analytical frameworks that can help us to see the complex interconnectedness in the world we live, and that in turn would create a comprehensive context to deal with sustainability challenges in early childhood education and beyond.

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**International Journal of Early
Childhood**
Journal of OMEP: l'Organisation
Mondiale pour l'Education Prescolaire


ISSN 0020-7187
Volume 49
Number 3

IJEC (2017) 49:333-351
DOI 10.1007/s13158-017-0202-8



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A Critical Analysis of Concepts Associated with Sustainability in Early Childhood Curriculum Frameworks Across Five National Contexts

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Published online: 14 September 2017
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Abstract Curriculum frameworks have an important role in providing guidance to early childhood practitioners on how to integrate knowledge about sustainability into their practice. This article examines how ideas about sustainability are integrated in the early childhood curricula for Australia, England, Norway, Sweden and the USA. The analyses were guided by critical inquiry and a cross-national dialogue and focused on four aspects of the curricula: sustainability presence, views of the child, human–environment relationship and philosophical/theoretical underpinnings on ideas expressed about sustainability. Ideas about sustainability were more implicitly present than explicitly stated in most curricula. It was not evident that

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children were viewed as world citizens with agency to help foster sustainability. With respect to human–environmental relationship, the framework from Australia expressed greater reciprocity and entanglement, while other frameworks were more anthropocentric despite the variation among curricula. All five frameworks embodied a sociocultural, human development approach with respect to the philosophical and theoretical underpinnings. There is a need to consider alternative frameworks that offer broader and more inclusive worldviews about sustainability that includes embracing human, non-human and other species within an assemblage of common worlds.

Keywords Anthropocentric · Curriculum theory · Early childhood education · Sustainability · Education for sustainability · Child agency

Résumé Les programmes d'études jouent un rôle important dans l'orientation des praticiens de la petite enfance sur la manière d'intégrer les connaissances sur la durabilité dans leur pratique. Cet article examine comment les idées sur la durabilité sont intégrées dans les programmes préscolaires en Australie, Angleterre, Norvège, Suède et aux États-Unis. Les analyses ont été guidées par une enquête critique et un dialogue transnational, et axées sur quatre aspects des programmes: la présence de la durabilité, les perspectives de l'enfant, les relations entre l'humain et l'environnement et les fondements philosophiques/théoriques soutenant les idées exprimées sur la durabilité. Les idées sur la durabilité sont plus implicitement présentes qu'explicitement énoncées dans la plupart des programmes. Il n'est pas évident que les enfants sont considérés comme des citoyens du monde ayant la capacité d'agir pour favoriser la durabilité. En ce qui concerne les relations entre l'humain et l'environnement, le programme de l'Australie exprime plus de réciprocité et d'interrelation tandis que les autres sont plus anthropocentriques. Les cinq programmes incluent tous une approche socioculturelle du développement humain comme fondements philosophiques et théoriques. Il est nécessaire d'envisager des programmes alternatifs qui offrent des visions du monde plus larges et plus inclusives sur la durabilité, et qui comprennent l'inclusion des espèces humaine, non humaines et autres à l'intérieur d'un ensemble de mondes communs.

Resumen Los marcos curriculares tienen un papel importante en la provisión de orientación a los profesionales de la primera infancia sobre cómo integrar el conocimiento sobre la sostenibilidad en su práctica. Este artículo examina cómo las ideas sobre sostenibilidad se integran en los planes de estudio de la primera infancia para Australia, Inglaterra, Noruega, Suecia y los Estados Unidos. Los análisis fueron

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guiados por una investigación crítica y un diálogo transnacional y se centraron en cuatro aspectos de los currículos: presencia de sostenibilidad, puntos de vista del niño, relación hombre-ambiente y fundamentos filosóficos/teóricos de las ideas expresadas sobre sostenibilidad. Las ideas sobre la sostenibilidad estaban más implícitamente presentes que las que se indicaban explícitamente en la mayoría de los planes de estudio. No era evidente que los niños fueran vistos como ciudadanos del mundo con la agencia para ayudar a fomentar la sostenibilidad. Con respecto a la relación humano-ambiental, el marco de Australia expresó mayor reciprocidad y enredo, mientras que otros marcos eran más antropocéntricos. Los cinco marcos incorporaron un enfoque sociocultural, de desarrollo humano con respecto a los fundamentos filosóficos y teóricos. Hay una necesidad de considerar los marcos alternativos que ofrecen visiones de mundo más amplias y más inclusivas sobre la sostenibilidad, que incluye abrazar a las especies humanas, no humanas y otras, dentro de un conjunto de mundos comunes.

Introduction

Although there is no agreed definition on what sustainability is, it can broadly be described as a discipline that requires major efforts to ensure the well-being of people and planet now and the future. Education for sustainable development (ESD) refers to reorienting educational practices towards the same end (UNESCO 2005). Since sustainability has increasingly been flagged as an important issue within early childhood education, it is opportune to investigate the ways in which sustainability is conceptualised in current early education curricular documents. The purpose of this article is to compare five national early childhood curricula (Australia, England, Norway, Sweden and USA) with respect to four characteristics of the curricula that reflect sustainability concepts: (1) presence of sustainability; (2) views of the child; (3) human–environment relationships; and (4) philosophical and theoretical underpinnings. These four characteristics emerged from a cross-cultural dialogue among the authors who come from different, albeit mainly “Western”, parts of the world but who share a concern about the future of the Earth and a belief that children are critical for creating a more sustainable world now and in the future.

The relevance of sustainability to early childhood education and the need to engage young children with a sustainability ethos early in life has been well documented (Centre for Environment and Sustainability 2009; Davis 2009; Davis and Elliott 2014; Pramling Samuelsson and Kaga 2008). This literature has contributed to an increased focus on sustainability within early childhood pedagogy, curriculum and research which, in turn, led to the emergence of the early childhood education for sustainability (ECEfS) field. Over the past decade, ECEfS discourses have evolved over time, and also have returned over time, to include nature conservation education, nature study and environmental education; relationship with nature; environmental stewardship; education about and for the environment; teachers' understanding and implementation of sustainability practices; and children's rights and the contemporary notion of children as change agents and

critical thinkers (Barratt Hacking et al. 2007; Davis 2009; Davis and Elliott 2014; Hedefalk et al. 2014; Somerville and Williams 2015).

Although there is substantial conceptual and policy-related research, there is less research on how sustainability is actually represented in curricula. This paper contributes to such curriculum research with a focus on the early childhood curriculum in five “Western” countries and located on three different continents: Australia, England, Norway, Sweden and USA. This selection was pragmatic since the authors are, in one way or another, connected to one of these countries and are familiar with both early childhood education and ESD. The curricula of interest are briefly described below.

Australia

The Early Years Learning Framework is an outcomes-based curriculum framework (EYLF) that forms part of Australia’s National Quality Framework which encapsulates the legislation, regulations, quality standards and approved curriculum frameworks for all early childhood provisions in Australia (DEEWR 2009). While the EYLF is the national curriculum framework, some Australian states may choose to use their own curriculum if it has been approved by the Australian Children’s Education and Care Quality Authority (ACECQA) which manages accreditation processes and registration of early childhood services. The aim of the curriculum is to “extend and enrich children’s play based learning from birth to 5 years and through the transition to school” (DEEWR 2009, p. 5).

England

The newly revised Early Years Foundation Stage (DfE 2017) is a mandatory framework for all early years providers in England. The framework sets the standards that all early years providers must meet. It outlines learning outcomes and developmental goals and highlights the promotion of children’s “school readiness” through its teaching and learning approaches to provide a strong foundation “for good future progress through school and life” (p. 5).

Norway

The newly revised Norwegian National Curriculum for kindergartens (Ministry of Education and Research 2017) is a regulatory framework, established by law, governing the purpose, fundamental values, content and tasks of kindergartens. It also gives basic guidelines for activities with the children. The new curriculum is implemented from August 2017 (Ministry of Education and Research 2017).

Sweden

The Swedish National Curriculum for the Preschool (Lpfö 1998, 2016) is a regulatory national curriculum that formulates fundamental values, directive learning goals and content together with specific responsibilities for staff and the

head of the preschool. Without being prescriptive, the curriculum highlights general goals that each centre should strive to achieve. Documentation, evaluation and development of the quality of the preschool are also stated without dictating in what specific ways these practices should be done (Skolverket 2016). Sweden is currently undergoing a curriculum review, and a revised version is expected to be enacted from autumn of 2018.

USA

In the USA, the Head Start Early Learning Outcomes Framework (Office of Head Start 2015) is not a mandated or compulsory framework. However, it has been widely used to inform curricula. It describes how children progress across key areas of learning and development and specifies learning outcomes in these areas. The intent of the document is to support early childhood professionals’ understanding of how to provide meaningful, appropriate learning opportunities to children and engage families in the learning process (p. 2).

Significance of the Current Study

Only a few studies have specifically and exclusively examined how sustainability has been integrated and addressed in early years’ curricula. A study by Årlemalm-Hagsér and Davis (2014) compared Sweden and Australia’s early years national curricula in the light of four curricular aspects: inclusion of concepts of sustainability; recognition of human place in nature and environmental stewardship; critical thinking for sustainability; and reference to children as active agents and citizens participating for change. A central finding was that the two curricular documents did not portray children as active and agentic citizens who were able to participate and express their voices on public and global issues such as sustainability.

The study by Årlemalm-Hagsér and Davis’ (2014) forms the basis for this paper as it provided a template for organising and analysing the selected curricula. Using Årlemalm-Hagsér and Davis’ article as a spring board, this study takes a different path and provides more depth of analysis. For instance, while the previous study was mainly focused on the explicit inclusion of sustainability concepts, our interest is to elicit and pinpoint both the explicit and implicitly embedded concepts. Likewise, Årlemalm-Hagsér and Davis considered the extent to which human’s place in nature and environmental stewardship is recognised, while our focus is on the curricular manifestations of human–environment/nature–culture entanglement. We focus on “entanglement” as it comes from a critical stance towards anthropocentrism which also problematises and challenges the notion of stewardship (Taylor 2017).

The notion of entanglement calls for an ontological prerequisite in which human and the environment are inevitably intertwined and cannot be viewed separately (Barad 2007; Taylor 2013). Based on Årlemalm-Hagsér and Davis’ work, this study seeks to broaden the scope with different perspectives to help move sustainability in early childhood education beyond anthropocentrism by adding some new aspects of

analyses (theoretical underpinnings and the human–environment entanglement) and modifying those previously addressed by Årlemalm-Hagser and Davis (2014).

Methodology

The methodology in this study is a content analysis based on collaborative inquiry. The investigation was undertaken by members of an international network of early childhood education researchers, Transnational Dialogues (TND) in ECEfS research. It was anticipated that such an international collaboration would “demystify and democratize the process of constructing knowledge” (Bray et al. 2000, p. 19). This collaboration emerged from a TND meeting in June 2015 at Stavanger University, Norway, to discuss emerging issues surrounding ECEfS. A research theme that developed during the meetings focused on the presence of sustainability within early years’ curricula frameworks. After the meeting, the TND participants continued to explore and broaden this theme by collecting data within a table using a collaborative file-hosting service (Drop Box). The table and the ensuing bodies of text were scripted through an online word processor (Google docs). This community of practice (Lave and Wenger 1991) was further enhanced by face-to-face meetings in Boston, USA, in September 2016.

The primary investigation of the early years’ curricula was conducted by each author–researcher from their home country, drawing on local knowledge and experience, thus enhancing the grounding of the investigation. In addition, the researchers shared the “coding frame” (Silverman 2011, p. 65) during the data collection and analysis processes through completion of an evolving “running” table with the commonly identified four curricular aspects of sustainability. An inductive thematic analysis was employed during the research process (Guest et al. 2012) focused on the four coding themes identified. As the process developed, the interplay between individual and group reflection was conducted through dialogues (Bray et al. 2000) which sometimes led to a rethinking of our own knowledge and understanding of our “home” curriculum frameworks. In structuring our analytical framework, adopted from Årlemalm-Hagser and Davis (2014), the four aspects of the curriculum discussed are described below.

Theme 1: Presence of Sustainability

In order to insure teachers’ implementation of sustainability, Elliott and McCrea (2015) pointed out the need to demystify sustainability within curriculum policy. The focus aspect was to trace languages addressing sustainability either explicitly or implicitly. The authors believed that proper manifestation and implementation of sustainability in the early years settings required it to be stated in an explicit and straightforward manner. However, if this was not the case, the authors sought implicit languages/indirect representations of sustainability.

We focused on the commonly used, but increasingly challenged, pillars of sustainability: environment, social–cultural and economic aspects while bearing in mind the intertwined nature and a holistic view of sustainability. Explicit language

refers to the literal usage of the word “sustainability”, while implicit language refers to the use of indirect/associated concepts (e.g. environmental education, nature-based education, ecological approach, biodiversity, social diversity, solidarity, saving, reusing, recycling).

Theme 2: View of the Child

The notion of children as change agents with the capacity to actively participate in complex matters (such as sustainability) has been well documented in ECEfS research (Davis and Elliott 2014; Davis 2015) and in the sociology of childhood studies (Vandenbroeck and Bie 2006). Our interest on this aspect is due to the intricately intertwined nature of sustainability challenges in children’s lives. Growing up in the Anthropocene and anticipated to have a longer time to live than adults, today’s young children are and will be disproportionately affected by human beings’ unsustainable lifestyles (Corcoran and Osano 2009). As indicated by Malone (2004), children have a special interest in sustainability since they are the current and future contributors and decision-makers.

This scenario positions the child among the major actors and stakeholders in the endeavour towards a sustainable society. Hence, ensuring the recognition of children as active change agents within curriculum and policy documents is an inevitable aspect in the endeavour towards engaging children with sustainability issues. Here, our investigation focuses on curriculum “utterances” referring to the child. However, we are not solely focusing on the agency of the human child; rather we are also attentive to the agency of the more-than-human world and the intricate relationality between the two.

Theme 3: Human–Environment Relationships

The interconnection between human and the physical environment or “nature” and culture is a discussion that has endured as a topic for debate within sustainability and environmental education. As many people have described this, predominantly in the Western context, nature and culture have often been considered as separate and distinct entities (Haraway 2008). Haraway problematises the divergence of modern culture from “nature” and introduced the term “nature–culture” as a way of signifying the inseparability and entanglement of the natural and the cultural against the ontological split assumed in many modern traditions. Our interest in this aspect is to look for and examine curriculum “utterances” referring to human–environment/nature–culture relationships which are a less discussed area within ECEfS. In an effort to learn how children are viewed and taught about their relationship with the environment, we draw on this aspect and critically examine how the curricular documents represent/construct the environment around the child and children’s interconnections with it.

Theme 4: Philosophical and Theoretical Underpinnings

Although none of the five curricula explicitly spelled out its underpinning theory or philosophy, these were inter-subjectively interpreted by drawing on our own

familiarity and work experience with the frameworks and by reaching agreement within the author team. Theories and philosophical assumptions are critical as they are decisive in determining the worldview, the values and the ontological and the epistemological underpinnings embedded in curriculum. This has a direct influence on how children are prepared to engage with contingent issues (such as sustainability) in today's precarious times. Scholars such as Gibson et al. (2015) and Malone et al. (2017) argue that humans need to know more and know differently which has brought about the necessity to reimagine our view on learning for sustainability and how the very notion of sustainability itself is constructed.

Through the exploration of the theories and philosophies behind each curriculum, the authors hope for alternative understandings of ontological and epistemological underpinnings to emerge. Moreover, the relatively open, less structured characteristics of early childhood curricula would allow such rethinking and reimagining which might lead us to alternative ontologies. Hence, it was with this intention of exploring alternative ways of being and knowing that we sought to investigate the theoretical and philosophical basis of the five frameworks.

Theoretical Framework and Analytical Approach

As a theoretical framework, critical inquiry and post-humanism perspectives are employed. Critical inquiry is used as it allowed the opportunity to engage in relevant and context-related, critical thinking.

The authors followed the main stages of critical inquiry: reading the curricula, reconstructing the main arguments related to sustainability and responding to the claims (Boylan 2009). Critical inquiry is a dialectical process involving the comparative weighing of a variety of positions and arguments, while argumentation is seen as a way of arriving at reasoned judgements on complex issues (Battersby and Bailin 2011). Six aspects of critical inquiry described by Battersby and Bailin are relevant here. First, the dialectical context, and the current and historical debate around an issue to be able to appreciate the depth of the insights involved in the issue. Second, an understanding of the current state of practice and of the beliefs surrounding an issue. This may reveal what is significant or contentious about an issue. Third, an understanding of the intellectual, political, historical and social contexts in which an issue is embedded can help us in understanding and interpreting arguments and can reveal assumptions, underlying arguments and positions. Fourth, the knowledge of the relevant disciplinary context. Fifth, information about the sources of an argument, and finally, awareness of one's own beliefs and biases. Adopting these procedures, the authors examined and compared concepts associated with sustainability as embedded in the contents of the curricula.

Coupled with critical inquiry, post-humanism and its critique on anthropocentric humanism has been used. Post-human concepts such as entanglement, assemblage, common world, shared and distributed/relational agency (Barad 2007; Latour 2005; Taylor 2013, 2017) are adopted in order to challenge the dominant sociocultural, child-centric and cognitive-based learning. Post-humanism challenges child-centred developmental environmental pedagogies and calls for pedagogies that bring

attention to children's entanglements within multiple human and more-than-human relations (Taylor 2013, 2017).

While analysing the curricula contents and features, we used the following procedure. First each author began by thoroughly scrutinising his or her country's curriculum. This was followed by successive discussion among the author team which resulted in the identification of the four curricular aspects on which to focus and guide the comparative analysis. Once the aspects were identified, each author re-examined his or her respective curriculum contents in the light of the four aspects and shared the results with other authors followed by collaboration to compile the whole body of the article. For a meaningful exemplification and elucidation of curricular characteristics, various excerpts are quoted in the findings section.

Findings

An overview of the findings is presented in Table 1 followed by discussion of each analytic aspect.

Presence of Sustainability

We have learnt that there are differences in the visibility of the term, sustainability, across the documents despite the presence of some common characteristics. As indicated in Table 1, there were very few explicit references to sustainability in some of the curricula; therefore, the authors sought to locate the implicit indicators of sustainability. Australia and Norway are the two countries addressing sustainability in a more explicit manner. The new Norwegian curriculum has stated that "the kindergarten has to promote democracy, diversity, mutual respect, equality, sustainable development, life skills and health" (p. 7) and it also states "The kindergarten has an important task to promote values, attitudes and practices for more sustainable societies ... the kindergarten shall contribute to give children an understanding that [any] actions have consequences in future" (Ministry of Education and Research 2017, pp. 10–11).

Likewise, the Australian curriculum states: "the service takes an active role in caring for its environment and contributes to a sustainable future.... sustainable practices are embedded in service operations... educators play role to facilitate and embed sustainability in all routines and practices" (DEEWR 2009, p. 74).

Although the Swedish curriculum does not explicitly highlight sustainability, there were some similarities with Norwegian curriculum which resonates with earlier findings (Alvestad and Samuelsson 1999). Both curricula share common features of a strong nature-oriented outdoor education tradition and an ecological approach, which evolved from the 1960s in connection with the public awareness of indigenous people's (Sami) culture (Sageidet 2014). Australia also recognises the potential of the culture of its Aboriginal indigenous people and indicates that indigenous perspectives can promote understanding of the interconnectedness of nature and culture (DEEWR 2009).

Table 1 An overview of findings on the four content themes explored in the five national curricula

Country, curriculum title and promulgated year	Curricular aspects			
	Sustainability presence	View on the child	Human–environment relationship	Philosophical/theoretical underpinning
<i>Australia</i> Belonging Being and Becoming (DEEWR 2009)	Explicit: embedded in daily routines and practices; environmental responsiveness; connection to the natural world; environmental responsibility, care/respect for environment and contribution to a sustainable future. Yet, conceptually vague and implementation is unclear	Active learners; critical thinkers and problem solvers but not applied directly to sustainability issues; agency confined to children's social world; seen as needing to develop skills to be active future citizens; have rights; sense of belonging to groups and communities	Interconnection between human, other species and the physical world, and hence care, respect and appreciation for natural environment	Predominantly sociocultural theory
<i>England</i> Early Years Foundation Stage (DfE 2017).	Not explicit. Understanding the world through natural play: physical environment, plants, and animals. Intergenerational link through family and community; relationship and sensitivity to others; equal opportunity	The child is "supported", must "listen attentively" "respond" and "follow instructions"	Make sense of the world: the physical world/ environmental view	Constructionist—Piagetian with a goal-orientated philosophy. Positive relationships and enabling environments. Sets standards to promote "school readiness" (EYFS, DfE 2017: 5)
<i>Norway</i> National Framework Plan for the Content and Tasks of Kindergartens (Ministry of Education and Research 2017)	Explicit: one of the basic values, initial understanding of sustainability; respect and care for nature; outdoor activity, social competence, democracy, equality, food production, consumption, learning about the UN and Rights of the child: and acknowledgement of indigenous (Sami) practices	Unique individual with own needs, able to express their views. Focus on adult's role for children's democratic participation	Respect, love, care for nature. Learn about plants, animals, biodiversity and natural phenomena. Understanding interrelations in nature and human-nature relationship, responsibility for natural environment in the kindergarten's everyday life	Sociocultural learning theories. More process than goal oriented. Christian and humanistic values, learning through everyday events that occur in social interaction, play and structured activities

Table 1 continued

Country, curriculum title and promulgated year	Curricular aspects			
	Sustainability presence	View on the child	Human–environment relationship	Philosophical/theoretical underpinning
<i>Sweden</i> Curriculum for the Pre-School, Lpfö 98 (Skolverket 2016)	Explicit in a supporting document, but not quite explicit in the curriculum. Strong emphasis on environmental issues, nature-based/outdoor education. Ecological approach with positive present and future trust and children as part of the natural cycle. Fundamental values include: democracy, participation, respect, equality, justice, diversity, empathy and world citizenship	Competent, active, responsible, agentic, able to influence the pedagogical environment and beyond. Can influence everyday routine, learning and preschool environment	Children as part of nature and its cycle; how people, nature and society influence/connect each other; conservation and caring attitude towards nature	Sociocultural; experience oriented; goal oriented; activity/project approach
<i>USA</i> Head Start Early Learning Outcomes Framework: Birth to Five (HSELOF 2015).	Not explicit. Themes addressed include: inclusive and collaborative approach, sense of belonging to family and community, reusing/recycling	Every child is unique and can succeed with adults' help. The child is not viewed as active citizen. The child is influenced by the environment. No mentioning of agency at all	Experience in nature: e.g. collecting pinecones in the fall	Constructivist—Piaget's discrete developmental stages and Vygotsky's sociocultural approach

Despite the absence of the term sustainability in the Swedish curriculum, its supporting government documents have highlighted it as follows: "A major challenge is to educate future generations to understand and act on the principle of sustainable development ... preschool is a natural starting point for this work because interests, values and skills are formed during the early years" (Swedish Ministry of Education and Research 2010, pp. 14–15). The upcoming new 2018 version of the Swedish curriculum will explicitly highlight global question and sustainability (Utbildningsdepartementet 2017).

Sustainability was not explicitly mentioned in the framework for the USA or England; hence, we will discuss the implicit connections to sustainability. We acknowledge the implicit references were derived from personal interpretations based on a "home" perspective, personal awareness of the topic, philosophy

associated with early childhood education and discussion among co-authors. In most of the curricula, the visibility of environmental sustainability within the written language was more pronounced than social-cultural and economic aspects (Table 1). This may partially explain why practitioners tend to view sustainability only in terms of environmental or “green” issues (Hill et al. 2005).

The Australian, Norwegian and Swedish curricula acknowledge the importance of outdoor learning environments by having a mandatory requirement to connect children to their natural environment and to contribute to a sustainable future (Table 1). Yet, outdoor education is not adequately acknowledged in either the USA or the English curriculum. The English framework suggests a tacit reference to understanding the physical world and intergenerational relationships with people and communities, and reference to the outdoors has been reduced to daily access to the outdoors and making sense of the physical world (DfE 2017). In both England and the USA, there is, however, a growing international awareness of the value of the outdoors in the early years in promoting a more holistic development of children (Knight 2013; Schein 2014; Sobel 2015).

It was noted that democracy, freedom, rights, care for others, creating world citizens, empathy, responsibility and conflict management were fundamental values in the Swedish curriculum (Table 1). Likewise, the Norwegian framework is anchored in the fundamental values of respect, diversity, equity and solidarity (Table 1). Within the Australian framework, there is a focus on the rights of the child and his/her agency, with guiding principles reflecting respectful and reciprocal relationships, reflective practice, partnerships, equity and diversity (DEEWR 2009). The English framework has guiding principles designed to “shape” practice. These principles recognise the uniqueness of each child, emphasising positive relationships in enabling environments (DfE 2017). However, there is no reference to the voice of the child or explicit mention of democracy; rather, it employs language such as “equality of opportunity and anti-discriminatory practice” (DfE 2017, p. 5). The USA framework also makes no explicit reference to democracy. Instead it uses a language of “inclusion” and “collaboration” and “sense of identity and belonging with family and other community members” as features of good practice (Office of Head Start 2015, p. 3).

Examining the language of sustainability has allowed us to see the extent to which sustainability has been explicitly and implicitly embraced together with the beliefs and values embedded in the curriculum. We find that the absence of adequate coverage of sustainability concepts in these national frameworks could be a concern for meaningful engagement with sustainability in preschool settings.

View of the Child

There is well-documented research evidence on children’s agency and their competence to take part in matters that concern them, in general, and their active engagement in sustainability, in particular (Berthelsen and Brownlee 2005; Smith 2007; Årlemalm-Hagser and Davis 2014; Davis and Elliott 2014). However, there has not been enough research on how curriculum documents construct the role of children in relation to sustainability issues and the sustainability competence that

children ought to obtain. The five curricula examined have portrayed different images of the child which may impact on children’s participatory roles both locally and globally.

The Swedish curriculum identifies children’s active and democratic influence when participating in planning their learning, preschool routine and the preschool environment at large (Table 1). Although children’s agency in some cases appears to be limited at the individual and school level, the curriculum broadly portrayed children as world citizens who are encouraged to be active change agents for today’s and the future world. The Australian curriculum also identifies children’s agency and describes them as active learners who are able to influence their own learning (Table 1). However, the agency appeared to be confined to their social and relational world (immediate environment, individual life, family and preschool setting) rather than a broader role as an active citizen influencing broader environmental and global issues. Both findings resonate with an earlier comparative study (Årlemalm-Hagser and Davis 2014) which identified the portrayal of children in the Australian and Swedish curriculum documents as active agents of learning in relation to the environment rather than active political agents of change in relation to sustainability practices. In this study, the authors propose the need for a more critical lens in developing children’s agency and a greater focus on affirmative education for sustainability alongside transformative education for sustainability.

The Norwegian curriculum presents children as unique beings with their own needs who are able to express their views on matters affecting them (Table 1). The adults’ role to rear children to actively participate in a democratic society is also highlighted. In the English framework, the child is described in a passive way: the child is “supported”, must “listen attentively”, “respond” and “follow instructions” (DfE 2017). Likewise, in the USA the child is viewed as a unique person who is able to succeed with “adults” help. The child is not perceived as an active citizen, and rather more emphasis is made on how the child is influenced by the environment rather than how they can influence *the* environment (Office of Head Start 2015).

Here, the authors argue that recognising children’s agency at the individual and school level is not sufficient. Children have to be considered as political, environmental, social and economic agents who are able to act and contribute towards sustainability endeavours. Hence, curriculum documents should portray the child not only as a capable, competent and inquiring child but also a child with political agency who is able to alter the world through participation as an active and fully fledged citizen with a great deal to invest in their future. The authors also suggest that curriculum documents should not just recognise children’s agency, but rather should indicate how their agency can be enacted. As indicated by Biesta and Tedder (2007), how children achieve agency is more important than just recognising their possession of it.

Moreover, drawing on contemporary post-human thinking, authors problematise the notion of agency and argue that agency is not just a human (conscious and intentional) attribute but rather a relational matter that collectively emerges within the relationship between human and more-than-human others—land/place, animals

and materials. We argue that inter-relational agency Ritchie (2014) and distributed agency Latour (2005) offer different perspectives in understanding and addressing sustainability issues. Yet, how to embrace and manifest such relational, entangled and distributed agency within curricula remains another important area of inquiry.

Human–Environment Relationships

The five frameworks portray the human–environment relationship in more or less similar ways. As one of its learning and development goals, the Swedish curriculum highlighted “the need to develop children’s interest and understanding of the different cycles in nature, the interconnection among people, nature and society and the need to ‘conserve and care’ for nature” (Skolverket 2016, p. 10). Similarly, the Norwegian framework stated that “Sustainable development ...is a prerequisite to take care of the life on earth as we know it”, and children shall “learn to take care of their own, each other and nature” (Ministry of Education and Research 2017, p. 10). Likewise, while highlighting children’s sense of belonging, the Australian curriculum pointed out children’s “interdependence with others” and the need to encourage children to “explore relationships with other living and non-living things and observe, notice and respond to change” (DEEWR 2009, p. 29). On the other hand, the English curriculum indicated the need for children “to make sense of the physical world”, and the USA curriculum indicated the need for “children’s experience in nature” (Table 1).

Although three of the five frameworks (Sweden, Norway and Australia) mention human–environment interconnections, they appear to fall short of recognising the reciprocity of the relationship that acknowledges the agency of the environment and our inherited relationship with it (Ritchie 2013). The way the frameworks set the learning goals and guide activities appear to be anthropocentric and mainly rely on human agency, and human exceptionalism (McKenzie and Bieler 2016). However, the Australian curriculum has a strong emphasis on human’s intertwined relationship with the environment, living and non-living things.

A prevailing commonality observed across most of the curricula was the tendency to consider the environment as a backdrop or a substrate for humans/children to act upon: to be loved, to care for, to save, to conserve, to steward, to sympathise for, to respect, to experience and to appreciate. Although there is nothing inherently wrong with these approaches, the notion of environmental stewardship, a dominant discourse in environmental education, appears to present the human as a saviour of the environment and present the environment as a backdrop awaiting to be cared for and tamed by humans, and hence, it does not capture the complexity, entanglement and reciprocity of the relationship (Taylor 2017). It could well be that such anthropocentric human–environment relationships are a contributing factor in today’s widely acknowledged Anthropocene era (i.e. a geological age that denote human impact on climate and the environment), which requires a rethinking of human–nature partnership/nature–culture binary in the Western context (Gibson et al. 2015).

Drawing on post-humanism and new materialism perspectives, some early childhood education scholars (Malone et al. 2017; Taylor 2013, 2017) have called

for the human–environment entanglement and challenged the anthropocentric and often romanticised notions of children’s nature experiences in the dominant Western-centric thinking within the environmental and sustainability education discourse. Particularly, a common world pedagogy (Taylor 2013) that attunes to children’s relations with the more-than-human others in their local common world, should be considered within ECEfS where humans and more-than-humans (e.g. environment, land/place, animals, plants and materials) are considered within an assemblage.

Policy documents such as curriculum frameworks play an integral role here by portraying the inevitable intertwining of human and the environment, and the nature–culture entanglement which can set the tone for adjusting pedagogy and every day early childhood education practices accordingly. Curriculum documents should instead be able to portray the “messy” interconnection of children/childhoods and the environment/the world in which they play out. This helps in designing a pedagogy that goes beyond the developmental, autonomous and learning child who is always expected and made to learn about and care for the environment, and instead shift to a pedagogy that aims for children and their inevitable entanglement with the more-than-human world and recognise that humans are not the only worthy contributors to and makers of the world.

Philosophical and Theoretical Underpinnings

Given the complex and contested concept of sustainability, it is no surprise that there is no agreement about which theoretical assumptions can best inform and guide sustainability-oriented pedagogies (Somerville and Williams 2015). This controversy has added an impetus and provoked scholars to challenge traditional early years’ learning models and indicates the need for new forms of learning and understanding the world differently, which opens up alternative ways of knowing and dealing with sustainability challenges (Ärlemalm-Hagser and Davis 2014; Gibson et al. 2015; Malone et al. 2017). In particular, Davis (2014, p. 33) suggests the need to “rethink the socio-constructivist frameworks that underpin early childhood education internationally” which would lead to a “shift to critical, transformative early education”. Her suggestion of an eco-sociocultural approach is based on the premise that any change to “programmes and pedagogies” should “support sustainable societies” by engaging with critical theory, often postulated as essential to support critical and reflective pedagogy (2014, p. 33).

As indicated in Table 1, the five curricula are predominantly based on child-centred sociocultural, social constructivist and Piagetian developmentalism learning theories, relating children’s learning to activities, experiences and situations, and interactions with their physical environments (Lave and Wenger 1991; Piaget 1997, Vygotsky 1986). These dominant theoretical orientations emphasise children’s social worlds, cognitive processes and human interactions. They tend to give centrality to the human autonomous child. The agency of non-humans and their relations with the child are not well considered. Although recognising children’s agency is a vital necessity, such theoretical orientations might unwillingly/

unintentionally leave humans to remain in the habitual anthropocentric ways of learning and looking at the world and hence reinforce anthropocentrism.

This scenario urges us to question and reflect on the extent to which the dominant anthropocentric perspectives are helpful in engaging children in sustainability issues. As a result, authors question if there is a need to know sustainability differently (e.g. affectively and bodily) and create an alternative sustainability ethos, which brings about the need to seek and explore theories that can help to utilise the potential that lies beyond the human, the cognitive and the social world. In this study, post-humanism and new materialism were revealed as missing perspectives in ECEfS, essentially making it difficult for children to see that their (human) world and the more-than-human world are inevitably entangled and interconnected.

As an effort to counteract anthropocentric approaches, authors suggest ECEfS to consider post-humanism and new materialism theories (Somerville 2016; Taylor 2017). These theories allow us to see the world beyond the human child and lean towards a more inclusive, holistic, unified and ultimately “sustainable” world in which humans are not exceptional beings, but one part of the larger assemblage who co-inhabit the planet together with more-than-human others. Due to the relatively open nature of early years curriculum, we argue that early childhood is a well-situated field for re-ontologising our world view and understanding of knowledge towards addressing sustainability beyond anthropocentric limitations. Hence, we assert that a thorough and extensive investigation of the theoretical and philosophical underpinnings of curricula would lead to deeper understanding and different constructs of sustainability itself.

The Way Forward

This article highlights the differences and similarities among the five national early childhood curricula frameworks. The authors used a continuum-based approach to summarise the findings. It should be noted that positioning the countries along continua is by no means precise, but rather a way to better understand the position of each national curriculum on the four aspects examined in this paper.

With respect to the *presence of sustainability*, the frameworks from Australia, Norway and somehow Sweden contained more explicit sustainability language, whereas the languages from England and USA were implicit. Regarding *views of the child*, Sweden’s framework came closest to positioning the child as a world citizen. Australia and Norway, located in the middle of the continuum, viewed the child as an active and agentic individual. England and the USA viewed the child in a more passive manner. As for *human–environmental relationship*, the framework from Australia expressed reciprocity and entanglement which is proposed as being related to the need to acknowledge indigenous practices. The other frameworks, especially England and USA, were more anthropocentric. Regarding *philosophical/theoretical underpinnings*, all five frameworks embodied a sociocultural, human development approach to curricula (Fig. 1).

To conclude, curriculum frameworks play an integral role in offering early childhood practitioners the guidance and support to develop their knowledge and

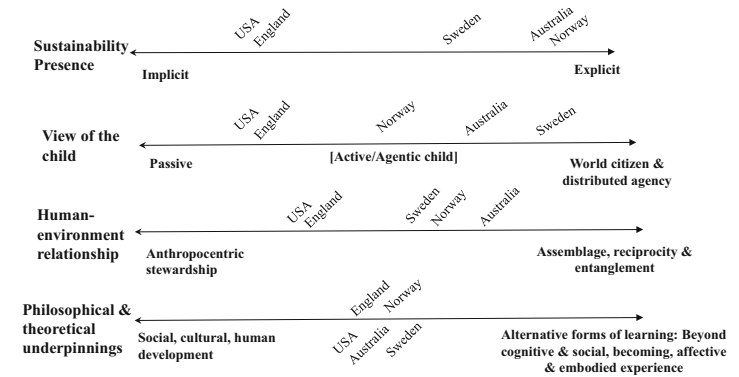


Fig. 1 Positioning of countries on continua representing the four content themes explored in the analyses for five national early childhood curricular frameworks

understanding of issues related to sustainability. To this effect, a robust representation and integration of sustainability within the curriculum is necessary. Based on the discussion and analysis of the curricula and bearing in mind the different sociopolitical contexts in which each national curriculum framework has been developed, a deeper understanding of the limitations and possibilities for reorienting early years’ curricula towards sustainability has been presented.

As a provocation for further study, we ask: “What might an early childhood education curriculum, that manifest explicit language of sustainability, views children as world citizens and portrays a unified world view with entangled human and more-than-human others, look like?”

Since all the curricula contexts addressed in this contribution are “Western”, authors suggest that an investigation of sustainability and its associated concepts within early years’ frameworks from non-Western nations is required in order to understand their cultural and political contexts. Such an investigation would pave the way for a more global path of understanding of sustainability in ECEfS. Particularly, transnational collaborative studies that resonate with the recently launched United Nations agenda, *Transforming Our World: the 2030 Agenda for Sustainable Development* (UN 2015), are important. The Agenda 2030 declares that global partnerships are essential in moving our world towards a global “sustainable” path. Hence, comparative endeavours among nations foster better understandings of how sustainability is expressed in a culturally relevant and localised manner and global understanding of the principles and curricular guidance required.

Acknowledgements We are grateful for the enormous contribution by Donna Berthelsen (IIEC editor) and guest editors Sue Elliot and Eva Arlemalm-Hagser. We are also thankful to Hannah Wesselby and Felix Kwabena Donkor for translating the abstract into French and Spanish.

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Environmental
Education Research



Learning with Vital Materialities: Weather Assemblage Pedagogies in Early Childhood Education

Journal:	<i>Environmental Education Research</i>
Manuscript ID:	CEER-2020-0008
Manuscript Type:	Original Article
Keywords:	Actant, Agency, Assemblage, Vital Materiality, Weather

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Learning with Vital Materialities: Weather Assemblage Pedagogies in Early Childhood Education

Abstract

Early Childhood Education in general and Early Childhood Education for Sustainability in particular dominantly rely on an ontological framework that is aimed at prioritising children's agency. By attuning to the everyday ways in which children are moved by the weather within a multitude of weather assemblages, this paper indicates how 'learning' could be achieved when bodies come in relation with and are able to be affected by other bodies. The paper draws ideas from post-qualitative research orientation that highlights weather-generated data to elucidate how the weather acts on and come into relation with humans and non-human bodies. The paper contends that noticing and engaging with the vitality of weather offers possibilities for creating affects which potentially leads to an attunement to ecological sensibility. Notions such as 'vital materiality' and 'lively assemblages' are discussed as a possibility to go beyond an anthropocentric understanding of the weather, which could pave the way towards a more relational ontology as a basis for emphasizing human's "inter and intradependence" with non-human nature, and hence, arguably, sustainable living.

Key words: Actant, Agency, Assemblage, Vital Materiality, Weather

Introduction

The recognition of the link between environmental education and early childhood education (ECE) began with the belief that the foundation for life-long attitudes and values for pro environmental behavior are laid during earliest years of life (Carson 1965; Tilbury 1994; Wilson 1992). Ever since, several approaches have been employed to involve and engage children with environmental and sustainability issues. Some of these include: the knowledge-based approach (Tilbury et al. 2005); the immersive learning approach influenced by Jean-Jacques Rousseau's classical work which promotes children's learning in "nature" (Rousseau 1979); the political dimension of environmental education influenced by Paulo Freire's critical theory; and more recently, the notion of participation, children's agency and their ability to experience and critically engage with environmental and sustainability issues (Arlemalm-Hagser and Davis 2014; Caiman and Lundegård 2014; Davis and Elliot 2014). Although the aforementioned four approaches have positively impacted environmental education for multiple decades, they have not challenged the essentialist ontological assumption that separates the

child from the non-human nature. The ontological and epistemological premises of these approaches solely rely on human agency and subjectivity (i.e. emphasize the intentional, conscious and learning child subject), and disregard the agentic characteristics of non-living matter and forces.

In this paper, I seek to challenge this ontological separation by noticing the agentic power of the weather and how it affects other agentic human and non-human bodies within an assemblage. I use Bennett's notion of vitality and lively assemblages (Bennett 2010) to refute this separation and relocate the power of the weather within mobile sets of relations. The paper explores the idea that early childhood pedagogy can benefit from recognizing and engaging with the vitality and agentic characteristics of the weather. In doing so, I explore ECEfS (Early Childhood Education for Sustainability) pedagogies that might emerge when we recognize and shift the focus from the individual human child cognitively learning 'about' the weather from a distance, to learning to be affected by the weather within lively weather-child assemblages.

I locate my study within new materialist (Bennett 2010) thinking and recent studies on weather and children. In particular, the study builds on two contemporary early childhood studies (Rooney 2018a; 2018b) that highlight the significance of children's relationships with the weather and its significance for environmental pedagogy. This paper draws on ideas from post-qualitative thought, particularly (Nordstrom's 2015) concept of data assemblage, which allows the de-centering of the human child as an object of inquiry. Doing this has helped me recognize and attune to the agentic characteristics of the weather as it comes in relation with humans and non-human bodies and creates affects within an assemblage. Drawing on weather-generated data (i.e. the affects created/induced by the weather), I indicate how weathering forces interact with other vital bodies in lively weathering-child assemblages in a Swedish preschool. The particular group I focused on consists of sixteen children and three teachers who granted me their consent to join/follow them, take notes and record different encounters. Children's consent was obtained both through parents' signature on consent letter as well as children's own willingness to let me join the group.

The article is organized as follows. In the first section, I offer a brief overview of previous studies and approaches to weather within ECE. In the second section, I conceptualise weather as a vital force/lively actant that constantly come into relation with bodies forming an assemblage and creating affect. This section also outlines the key concepts I use and connects weather with (Bennett's 2010) notion of vitality and lively assemblages. The third section

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presents ideas from post-qualitative inquiry and the concept of data assemblage (Nordstrom 2015), which indicates how weather generated data emanated from a mundane bodily encounter with the weather. The subsequent section offers weather encounter vignettes with their description and analysis. In the conclusion, I suggest the need to utilize the untapped pedagogical possibilities in shifting from learning about the weather, as something external and separate to us, to learning with lively weather-child assemblages.

Approaches to weather within ECE

Weather has been approached in various ways in early childhood education. For instance, relationships among various meteorological conditions, affective states and behavior in young children (Lagacé-Séguin and d'Entremont 2005), outdoor play space and the weather (Ergler, Kearns and Witten 2013), weather and how it shapes preschool pedagogical routine (Hatcher and Squibb 2010), children's understanding and misconception of the weather and physical science (Henriques 2002) and learning weather as part of understanding natural science (Inan, Trundle, and Kantor 2010). Apart from these research orientations, a widely employed practical approach is to address weather through structured pedagogical activities.

The aforementioned approaches consider weather as either a condition for different activities or as something external that we can learn about, i.e. as part of natural science. None of these studies highlight the entanglement of weather and children. Notable exceptions are Rooney's (2018a; 2018b) two key articles on weather, which have laid the conceptual foundation and served as a springboard for this paper. By drawing on (Ingold's 2010) conceptualisation of 'weather-worlds', (Rooney 2018a) highlighted human-weather entanglement and how children learn with the weather and the pedagogical significance of child-weather relations. She argued that children's affective and sensory encounters with the weather have the potential to offer new insights and a pedagogical basis for addressing climate change in early childhood education without being limited by anthropocentrism (Rooney 2018a). While emphasizing the need to build connection with places, she argued for a new possibilities for environmental education that pays attention to more-than-human encounter (Rooney 2018a). However, as Rooney (2018a) points out, the weather in ECE is generally approached in a limited and reductionist manner.

In her second article, Rooney (2018b) employs a walking ethnographic methodology and explores the various ways children engage with the weather and the potential of such engagement for revealing wider human-weather entanglement. Drawing on empirical cases of child-weather entanglement, the study shows how attending to the diverse range of more-than-human lifetimes and scales that the children encountered, offers alternative modes of responding/attentiveness to the environment (Rooney 2018b). She argues that by paying attention to the elemental effects of weather, through bodily and affective encounters, a foundation can be created for open attentiveness in responding to human-induced climate change now and into the future (Rooney 2018b).

Rooney's work is situated within Ingold's (2010) conceptualisation of a 'weather-worlds' framework and highlights weather as an inevitable part of children's entangled relations with the wider environment. Taking Rooney's work further, I take an ontological departure and highlight the agentic characteristics of the weather and particularly its relations with other human and non-human bodies within assemblage thinking. In doing so, I draw on Bennett's theorisation of vital materiality and focus on the ways in which its agency (weather as an actant) is manifested within the encountered child-weather assemblages. This leads to a reconceptualization of weather assemblage pedagogy and the learning spaces it creates by serving as a catalyst for bodies to be affected differently by other bodies. While Rooney emphasized the pedagogical significance of learning with the weather, I expand this concept and empirically explore possibilities for the "learning" that might happen when bodies become affiliated with/affected by more bodies than they were before.

Re-conceptualising weather as assemblage

Despite being an everyday topic that we use continuously (at home, work, traveling or at a bus station), weather is an under-theorised and underdefined term. Gibson (1979) as cited in (Ingold 2007, 532) describes it as "the atmospheric medium is subject to certain kinds of changes that we call weather". In a broader sense, weather refers to the wider planetary system of dynamic, interactive elements and atmospheric forces that constantly shape and reshape the surface of the earth and its inhabitants. As it is a ubiquitous force, we are always both with the weather and in the weather; it surrounds us and we are nested in it. Being a dynamic phenomenon, it constantly changes its pattern and manifests itself in a multitude of elemental characteristics such as rain, thunder, storm, heat, wind etc. Given its active, lively and agentic characteristics and its inevitable presence in every sphere of life, it is essential to be ecologically sensitized and attuned to the scale, significance and force of weather and the process of weathering.

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Weathering, having a time element, is a term that refers to the active, agentic and lively characteristics of the weather as it brings about physical changes.

Despite Rooney's (2018) work that highlights human-weather entanglement, how to understand and engage with the vibrancy of weather and how to learn to be affected by it is a less explored/theorized subject in the school context at large, and in ECE in particular. Scholars in other fields have highlighted weather as a phenomenon that is entangled with every sphere of life and humans' everyday activity. Neimanis and Walker (2014) argue that weather is not just 'a thing' but an experience: something we intimately 'do' daily, as an embodied experience. Ingold (2011, 115) indicates that humans are not related to the bigger climate in a "closed objective form" but rather through their "common immersion" in the generative fluxes of the weather-world. Moreover, a situated place study by Gannon (2016) elucidates humans' enmeshed relationship with other matter and forces indicating that affective attunement to everyday weather has potential for building a sense of place in our local neighborhood. Gannon's work particularly influences my thinking about the affective aspects of weather.

Thinking through Bennett's notion of vitality materiality, I consider weather as vital force, a lively actant, which is everywhere, all the time. Bennett offers a critique of the traditional understanding of matter which considers non-living matter as passive and lifeless entities that simply await and receive action and direction from agentic and rational humans (Bennett 2010). Vitality refers to "the capacity of things-water, storms, land, flora, fauna, and the elementals in all their permutations to impede or block the will and designs of humans and to act as agents with forces, intentionalities, propensities or tendencies of their own" (Bennett 2010, 2). Thus, Bennett argues that non-living materials are vital and lively and have the power to act, create affect/effect, alter the course of events, and hence make a difference in the world. While characterizing the vitality and agency of non-living matter, she borrows and builds on Latour's notion of an actant within an assemblage, i.e. a non-human actor.

Bennett points out that vital materiality isn't within each separate actant, but is a relational "swarm of vitalities at play" (2010, 32). The agency is distributed and it swarms, or intensifies when bodies, forces, materialities come together in an assemblage. Bennett explains that all actants within the swarm are agentic with their own unique efficacy, trajectory and causality. Efficacy refers to "the creativity of agency, to a capacity to make something new appear or occur" (ibid. 31). "A body's efficacy or agency always depends on the collaboration, cooperation, or interactive interferences of many bodies and forces" (ibid, 21). Trajectory refers

to an agent's "directionality or movement away from somewhere even if the toward-which it moves is obscure or even absent" (ibid. 32), and causality refers to the "contingent coming together of a set of elements" and bodies (ibid. 34).

Drawing on Deleuze and Guattari and Latour's notion of assemblage, Bennett introduces the notion of "agency of the assemblage" (ibid, 20), which sees agency beyond the moral human subject and highlight its distributive nature across a swarm of simultaneous actants and vital materialities. Hence, Bennett's notion of agency "does not posit a moral subject as the root cause of an effect" (ibid, 31), but rather a collection of actants and bodies within lively assemblage. She defines an assemblage as "an ad hoc grouping of diverse elements, of vibrant materials of all sorts" which helps us to understand agency "as a confederation of human and nonhuman elements" and bodies (ibid, 23). She argues that we humans are in an inextricable enmeshment with these web of forces that she describes as an assemblage.

Bennett argues that assemblages are constituted of affective bodies, which she describes as "associative bodies within an assemblage which are continuously affecting and being affected by other bodies while entering a relationship, an assemblage" (ibid, 21). As highlighted by her, "the more kinds of bodies with which a body can affiliate, the better. As the body is more capable of being affected in many ways and of affecting external bodies...so the mind is more capable of thinking. Therefore, bodies enhance their power in or as a heterogeneous assemblage" (ibid, 23). The notion of affective bodies has informed me to look into the affect created within weathering-child assemblage and the thinking it might provoke.

As indicated above, scholars approached weather differently. Neimanis and Walker (2014) highlighted humans' embodied experiences and relationships with the weather while Ingold (2011) and Gannon (2016) respectively highlighted the affective and emplaced relationship with the weather. Thinking through the intersection between the weather and Bennett's notion of vitality and lively assemblages has helped me to extend and reconceptualize the ongoing child-weather relationships at the preschool. In doing so, I see weather as a constitutive vital force acting within human-non human assemblage (Bennett 2010). This conceptualisation allows me to see child-weather relationships beyond the limits of only ever thinking about the agentic child, but rather enmeshed within lively assemblages of agentic forces and bodies. Besides, Bennett has reminded us that whether we recognize/experience it or not, the force of matter (e.g. weather) exists, and can and does thwart human intentional agency.

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Data Assemblage

Drawing on ideas from post-qualitative thought, I use Nordstrom's (2015) concept of data-assemblage which allows me to assemble data from different weather encounters and weather-generated vignettes. As pointed out by Nordstrom (2015), "Data assemblage is a dynamic onto-epistemological entity in which the constitutive lines open up new ideas of thinking about data in a study and what that data can do and become" (p.166). One way of carrying out a post-qualitative inquiry, as indicated by St. Pierre (2018, 9) is to "begin with the fortuitousness of the encounter (not with method) that guarantees the necessity of what it forces us to think". My inquiry began with the data that emerged from my random bodily encounter with a rain shower in a stormy morning which elicits and lends itself to the emergence of multiple other forms of encounters and data.

While walking from the tram station to the preschool, I was encountered, caught, and confronted by the rain, which drenched me quickly. I wanted shelter but I was already late to join the preschool group. Having forgotten my umbrella, there was no alternative other than exposing myself to the brisk wind and the slanted rain that was trickling down my face. My hands were cold and my backpack was soaked. I lingered in the moment and needed more time to try to dry myself off before joining the group (Field Note, March 2017).

The aforementioned physical encounter with the weather becomes a pivotal point and agentially changed/ influenced me, and eventually the research process as well. The weather continued pulling my attention which agentially formed the research project.

The same morning, the topic of weather came up in the conversation among the children and the teachers in connection to an electricity problem in the preschool. During the conversation, Sofia (one of the 15 children in the group) was describing her encounter with the storm, the wind and the rain as she was walking to the preschool with her mother (see the story in the vignette below). I followed Sophia and shared the story of my own physical encounter with the weather. The topic of weather had continued to linger in my mind while nudging me to recall my previous engagement with the weather. My readings on weather (Rooney 2018a; Naiman and Walker 2014; Howard 2013; and Ingold 2011) and the weather workshop I attended added an impetus. I was also drawn to the morning calendar routine which I did not pay due attention to and passed by during several visits to the preschool. These all emerging lines of thoughts agentially influenced me and I began to be attuned to and write/record different discursively and materially (bodily encounter) manifested weather vignettes. Things continued to pile up and different forms of materially and discursively generated weather events enter the data

assemblage. The assembled data formed a dynamic line of thought offering varieties of data (Nordstrom 2015).

Hence, attending to my own physical encounter with rain on a stormy morning rhizomatically elicited different weather encounters which led me to think of “data as an assemblage” (Nordstrom 2015, p.167) of different forces: some human (children, teachers and myself) and some non-human (different elements of weather, slide/metal, flashcards, weather charts...etc.) which will be shown in the vignettes below. The vignettes presented below are narrative snapshots of the weather-child assemblages. The different vignettes are analyzed and discussed in light of the aforementioned (Bennett 2010) core concepts such as material vitality, ‘lively assemblage’, ‘distributed agents’, ‘swarms of vitalities’, ‘efficacy’, ‘trajectory’ and ‘causality’.

Vignette One: The Storm

The rain and wind that I encountered on the stormy morning came up in the conversation among the children and the teacher. That day was not a typical day for the preschool. The electricity went off for a couple of hours and, as a result, the children had to come in from outdoor play for an early lunch so that they could eat the delivered food while it was still warm. Some children started asking why the electricity went off. This question led to a whole-class discussion on what made the electricity go off. The teacher put the question back to the children and they started to speculate. Sofia made a connection between the storm/thunder and the electricity:

“I think it is the thunder that makes it go off. Me and my mummy were walking to school and we saw a storm. I was scared, my mum said it is thunder, it was super loud and there was lightning! Then we started running because it was windy and rainy. It was super cold and I got wet. Then we saw the rainbow.” Daniel, who came to school in his father’s car, joined the conversation and said: *“I was sitting inside daddy’s car. I didn’t hear the thunder and didn’t see the light, but my dad saw lightning. I was only a little bit wet when I come out of the car and walked to the school.”* Entering the conversation, and making associations with the vacation he had just taken, Max said: *“I don’t like the thunder because it didn’t let me go on the plane. So, we told the thunder to stop. Then, when the thunder listened to us and stopped, we could go. So, the wind and the thunder make me feel sad (Field Note, March 2017).*

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The contingent contact (Bennett 2010) among the actants: the preschool, the storm, human bodies (children and parents) and the electricity, brings about a power outage in the preschool. Within this assemblage, agency is distributed. The storm disables the electricity, and the absence of electricity brings about a change in lunch time. The storm “impede[s] or block[s] the will and design of humans and acted as agents” (Bennett 2010, 2). While exercising its power, the storm messes with human ‘control’ (Bennett 2010) and disrupts the school routine, instead creating an alternative pathway for the day, i.e. eating lunch well before the school’s normal time. However, this effect is not a mere effect of the storm, but occurs in connection with the other actants, the electricity, the school and human bodies (Bennett 2010).

The storm made a big impact on the children. Its potency captivated them and triggered a lively conversation among the children and the teacher. The encounter made Sofia notice the agency of the storm and she associated it with the blackout. She figured out that the storm, which she attributed to the sound of thunder, can actually turn off the electricity and influence what is happening at the preschool, i.e. can thwart human control. As the trajectory (Bennett 2010) of the assemblage brings in time in a non-linear way, the children started to remember the different things they did in the past.

Moreover, the storm enlisted various affects in the children and adults, i.e. being scared, frightened in Sofia and sadness in Max. While being enveloped in the storm, Sophia had a multisensorial engagement with the wind, rain, thunder and lightning. As her narrative account brings her body into the assemblage, she indicates that she was walking, running, feeling scared, cold and getting wet, which highlights the bodily relationship with the different atmospheric elements. The capacity and power of her body are affected both in a decreasing (as she got soaked in the rain) and increasing (as she is urged to run) manner. Hence, the stormy morning and its whirlwind vitality makes Sofia feel, act and move differently.

Shaping its own unique trajectory (Bennett 2010), the agentic weather alters the movement of Daniel and his father. The weather had already formed a precondition for Daniel and his father to go to school by car so that they can mitigate the cold, rainy and stormy day. This indicates how the agentic power of the weather has made humans creative modifiers of their environment through how we move and travel.

The recounted storm experiences affected Max’s trip and created a feeling of sadness. The storm caused Max to make the connection with the agency of the storm and his life beyond

preschool (e.g. vacation). Max recognised the power of the storm in preventing him from flying, but still held onto faith in human will to control it by re-establishing the supremacy of human agency. Daniel and Max's case illustrates the weather's agency and its ontological and epistemological implication for weather pedagogy, i.e. the need to learn how to be affected by the weather and the need to remain attuned to the affects it creates in/with us.

Vignette Two: The Hot Slide

It was a warm day in May and the children were playing in the playground behind the preschool.... Some children wanted to use the slide, but the metal had become so hot from the sun, that they could not actually sit on it. The children were amazed and started shouting to friends to come and feel the metal. Captivated by the scenario, I felt the metal and it was indeed very hot. Noah knew and commented that it was the sun that heated the metal. The children began to come up with ideas on how they could still use the slide despite its hotness. Noah took off his fleece and wrapped it around his bottom so that he would actually come down the slide without being burnt by the heat. Tom was sliding on his shoes instead of sitting on his bottom, and other children continued doing the same as they came down the slide (Field Note, May 2017).

The interactive interference among the three affective bodies (Bennett 2010, 21): the children, the metal and the heat, are collectively coming together in their porosity producing different affects and effects. While exercising its agency and efficacy (Bennett 2010), the sun heated the metal which resulted in preventing the children from using the slide and forced them to creatively think of alternatives. The power of the sun thwarted humans' design (Bennett 2010) and impeded the children's will to go down the slide. This challenge caused by the heat prompted the children to problem-solve, which in turn provoked sensory response by the children, who adjusted their bodies differently in order to accommodate the heat.

The children are being affected within the material assemblage. A "swarm of vitalities" (Bennett 2010, 32) from the sun, the slide, the children's bodies, the shoes and the fleece come together with their porosity (Malone 2018) and create a different outcome. As the children's bodies and the hot slide came into contact, a blockage caused by the radiation of vitalities (Bennett, 2010) arising from the slide was experienced. The slide was "heated" by the heat and as a result refused to be "slid" down by the children, which implies that agency is shared and co-constituted by all the actors: the child, the heat and the slide. The efficacy of the hot metal creates a space for creativity by forcing the children to think of an alternative and remain resilient and come up with "strategies" that would allow them to deal with the obstacle and go

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down the slide without being burnt. Hence, the heat, in collaboration with other affiliated bodies (the slide, the shoes, the children's bodies and the fleece) has urged the mind to be creative.

As weather is a dynamic phenomenon that shifts in different time/space assemblage, the interacting bodies could have been produced differently if the children were all on the same slide in January during winter. Different affective bodies could have entered and existed in the assemblage. The children would have wanted different clothes and shoes, and the slide might have been frozen instead of being hot. So, in the above vignette, rather than the agentic child having an encounter with the heat and forming a relationship with it, or instead of perceiving the heat as the object of the conversation that can be experienced, assemblage thinking allows children to engage with it as an actant with its own thing power and agency. If the educators had recognized the agency of the weather, this point of encounter could possibly be expanded for pedagogical purposes and utilized as a teaching and "learning" moment in an explicit manner. Yet, the implicit "learning" and the affects produced are already in place albeit not being intentionally done by the teacher.

Vignette Three: The sun-tanned girl

Sara (a white Nordic girl) just came back to preschool from vacation in Spain and was sharing her experience with her friends. The change (tan) in her face has captured her friends' attention, and they commented on her "new" appearance. Tom said: "You look like Natasha." Natasha is an Indian girl with "colored" skin. John wondered and asked: "Why are you like that?" pointing towards Sara's face. Sara explained that she and her family got tanned since it was too warm in Spain. She also said "it was sunny all the time and the sun makes "ouchy" in my eyes" (Field Note, May 2017).

As Sara's body and the mediterranean sun simultaneously come together in the encounter, an effect and affect is produced. Sara's body was burnt by the sun and her skin color was changed and remained imprinted and marked on the body which indicates the agency of the sun. The physicality of it extends the sensory mode into visual recognition of the sun's agency. The vitalities arising from the sun also produced an affect by causing pain in Sara's eye. These affect and effect are clear indicators of the material manifestation of the sun and the porousness and vulnerability of Sara's body. It is the interaction of Sara's body with the sun that transforms the flesh and creates a new appearance which produced her in a different way in composition with some of the other children who are noticing the transformative effect of suntan.

Even though the children notice the change in Sara's skin colour, they do not automatically associate it with the sun. John's question 'Why are you like that?' implies he is baffled and did

not make the connection between the sun and her browner face. For John, who was not in Spain, and didn't experience the sun's heat, this assemblage has a greater efficacy (Bennett 2010) than a more general apprehension of the sun's vital force. John and Tom do not have a clear visual recognition of the sun's agency when they look at Sara's burnt face. Thus, they interpret it differently until Sara explains and brings the sun into their consciousness.

However, the sun not only changes Sara's skin colour, but also renders her identity as a Nordic white girl ambiguous. She has become more like an Indian girl. Hence, this weather-child assemblage elucidated racialized discourse indicating skin pigmentation (due to melanin production) as a cultural signifier not just a bodily change. The agency of the racialised discourses captivated John and Tom and even tend to obscure their understanding of the sun's agency.

The assemblage triggers new production of knowledge through the discussion about the sunburn. It is the joint vital characteristics of Sara's skin and the sun that bring about the tanned face which captured the children's attention and became the topic of discussion among the children. When John asks why Sara's face changes, she makes the connection with the sun. So, there is a point of learning that is happening in the space that was opened up as a result of the potency of the sun and the potency of racialised discourses. It is the intersection of both vitalities (one material and one discursive) that is potent. Besides, as (Bennett 2010) points out, it is the 'interference' between different bodies and forces that brings about the efficacy.

Although the preschool in focus incorporates weather activities in its structured curriculum, the agency of the weather-child assemblage, as described in the three vignettes above, is not being used for pedagogical purposes. The vignettes elucidate the distributed agency within weather-child assemblages and how children are always learning in their interaction with the elements. However, it is not evident that the educators are attuned to assemblage thinking and notions of generative distributed agency. Thus, there is a risk that this kind of learning remains unnoticed. Instead, there is child-centered focus on the formal and deliberate pedagogy. One notable weather pedagogy at the preschool is during the so-called "calendar time," described in the vignette below.

Vignette Four: The Weather Calendar Routine: Regulated Weather Encounter

The group nominated Jack as "the weather person" for the day. The teacher asked him to go to the window and see what the weather looks like outside. Jack walked to the window and looked outside. He came back to the circle and told the group that it was rainy and windy. Jack picked the "rainy" and "windy" flash

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cards and put them up on the weather chart. Sara said it was a bit foggy and insisted on adding the "foggy" flash card. However, the children and the teacher discussed as a group and agreed not to add the foggy flashcard. The group sang the "what is the weather like today" song as a group. They continued to talk about what kind of clothes they need and where to go and play outside. (Field Note, March 2017).

The calendar routine is a major part of the daily morning pedagogical routine, where teachers and children sit in a circle and carry out a range of activities which include: making observations about the weather; teaching children about science of weather by classifying and recording it; discussing the daily weather; and singing and reading about the weather and the seasons in general. While the calendar time activity takes place inside, "the weather" is located outside and they learn about it and actively construct their meaning (cognition) from a distance. The children have to look through the window to see 'the weather'. The activity is done with the help of a Weather Chart (see Figure 1 below) and different flash cards representing different types of weather. As indicated in Figure 1 below, two flash cards: "rainy" and "windy" were chosen to represent the weather on that particular Tuesday. It was not always easy for the class to agree on the classification representing the day's weather. That Tuesday, Sara insisted on adding the "foggy" flashcard in addition to the "windy" and "rainy" cards indicated. However, it was what the majority of children agreed on, as reconciled by the teacher, that was put on the chart.

Insert figure here

Fig. 1. The Weekly Weather Chart

The activity imposes order on the weather as an elemental force that is beyond our control (Bennett, 2010) and gives a sense of mastery over it by knowing it from a distance. It also externalises the weather and thus perpetuates the false nature/culture divide by implying that weather is something happening 'out there'. However, there is no outside to weather as it is a massive force that we are inevitably nested in. The children are having direct bodily experiences with the elements, albeit mediated through human structures and technologies (i.e. indoor/shelter and heating). However, what is emphasized is not the inside weather but rather what is 'out there'. The fact that the activity takes place in a purpose-built and protected indoor environment is in itself an indication of our desires to control it by mediating its effects on our bodies, but that mediation, in itself, is evidence that we are always operating within some form of human-weathering assemblage - direct or mediated.

Despite the anthropocentric gaze of the calendar routine, the discursive force of the linguistic signifiers are still vibrant actants within the assemblage. The “reconciled” and recorded weather is a determinant factor when it comes to what kind of clothes to put on, where and when to go outside and what sort of outdoor activity to think of and plan for the remaining day, which implies that the weather is an agentic and determinant factor shaping the course of the day. There was an occasion when, due to a rainy morning, a plan to go to the forest was replaced by a plan involving a playground as the forest was assumed to be a “bad/muddy/dirty” place if it rains. Here, the effect of rain made the surface of the earth/the soil in the forest “inconvenient” for outdoor activity. Following the change of outdoor plan, a teacher commented, “*We will hopefully have ‘nice’ weather tomorrow and go to the forest*”. The fact that they cannot go to the forest or have to stay ‘inside’ because the weather outside is ‘bad’, means that they are having an encounter with the agency of the weather. Hence, the weather is inhibiting/altering the group’s course of action. Thus, the weather’s agentic power is enacted in the geographies of the event as the children stay indoors and chart the weather because it powerfully affects the adults’ decisions to keep them ‘inside’ and thus warm and dry.

In cases where children wonder about the weather or the kind of clothes they need to put on, the adults direct them to look at the weather chart that is set up in the morning. At times, teachers and children also check and measure the weather condition on devices such as smartphones and iPads to see the forecast and also to compare with previous days. These measurements are performed due to the need to manage the weather by modifying our behaviour, and to possibly mitigate its agential effects by putting on extra clothes, staying inside, wearing thicker clothes or having heating/cooling etc.

As such, the calendar routine is rather typical of what goes on in most educational setting: being inside is the default and so normalized that the weather becomes invisible. It attempts to induct children into scientific method of observation, classification and recording, and thereby ‘knowing about’ and ‘managing’ the weather from a distance. However, these attempts to (scientifically) manage and predict the weather are another sign of humans’ tendency to succumb to weather’s massive power. The “scientific” and educational approach, e.g. the calendar routine, relies on language and linguistic modifiers (such as rainy, sunny, windy...etc.) which limits the way we relate with and understand the weather. This approach unintentionally forces us to reduce, categorize and disentangle from the beginning. Although the calendar routine appears to be highly regulated and controlled, the weather is still agentic and urges the

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preschool group to think and act differently, i.e. the weather is ultimately beyond human control though it can be meteorologically predicted.

Lively assemblage pedagogies: a possible way forward

Although early childhood curricula and educators do not regularly recognise the aforementioned child-weather events, children are always already learning within the lively weather assemblage. More formalized pedagogies tend to externalise weather, and implicitly assume that we can separate ourselves from the neglected or unnoticed assemblage by introducing the children to classifying, recording and, in a sense, controlling weather.

Likewise, the wider climate science today is based in seemingly detached, disembodied and neutral meteorological observations that attempt to master and control climate (Strengers and Miller 2017, Verlie 2017), which is inherently anthropocentric and positions human as stewards and fixers of the problem. However, we humans are an active part of the phenomenon itself as there is no outside to weather and climate. By excessively emitting carbons, humans are affecting climate and weather by making the former hotter and the latter more erratic and extreme in many parts of the world. Yet, we can’t ultimately control it-apart from some technological effort to seemingly protect ourselves from climate shifts and extreme weather events, which may have some beneficial effect. Nevertheless, the weather is always with us and we humans need to learn to echo and attune with the agentic power of the weather rather than attempt to control it.

What the children are learning in the calendar pedagogy can be seen as an extension of conventional empirical analytical climate science which conveys the message that we humans can know and even predict the weather from a distance because we are smart and in control. In times when extreme weather events are increasing as a result of climate change, attunement to the vitality of weather might lead to attunement to climate change. Thus, attuning to the vitality of weather and understanding the fragility, permeability and vulnerability of our bodies as affected by the force of the elements has the potential to lead to ecological sensitivity and possibly caring about climate change.

Looking at the learning spaces created in the storm, slide and sunburn vignettes, it is important to consider changing our mindset from controlling/managing weather to remaining attuned to its vibrancy and learning with the lively weather-child assemblage. A pedagogy based upon a shift towards learning with weather-child assemblages (of human and non-human bodies) might

pave the way towards a wider ecological awareness of humans as one amongst other lively vitalities.

Doing this requires teachers within the Early Childhood Education for Sustainability (ECEfS) field to rethink and organize their activities as emergent and relational so that all actors (humans and non-humans bodies) are coming into play within an assemblage without being constrained by predefined subject areas and prescribed goals. Teachers need to realize that knowledge is not necessarily the exclusive domain of human subjects, and work with considerable openness to cultivate their own and the children's "ability to discern nonhuman vitality" (Bennett 2010: 14), as this opens up spaces for a different way of knowing and being in the world that is more relational. If teachers notice, and foreground material vitality, such as the weather, they could turn the pedagogical gaze towards the ways in which the weather world that we are living in is constantly affecting and impacting our bodies and our surroundings.

For instance, returning to the hot slide vignette above, what would happen if the teacher was there, having that "experience" or affect with the slide and purposely introducing a metacognitive perspective to the event? In that case, it is not only the children who get to know the sun/heat but they are reciprocally affected by its agency and this makes the learning and experience more explicit. Hence, teachers need to be attuned to the distributed agency of the vibrant weather assemblages and know how to utilize it for pedagogical purposes, and put that message out to the children not only explicitly but also in the influential hidden curriculum of their pedagogy. By modelling "experience" and openness to the elements, teachers can become a powerful force for attuning to vital materialities of bodies. This suggests that 'learning' could be achieved when bodies are able to be affected differently by other bodies (e.g. when a hot slide generates new behaviours in vignette two), or when they come into relation with different bodies (e.g. a Mediterranean sun in vignette three).

Hence, extending (Rooney's 2018a) earlier recommendation, I suggest that there is a need to challenge the pedagogy that focuses on the cognitive (weather as a concept) and broaden it to a pedagogy that embraces humans' enmeshment and vulnerability with vital materiality. Such pedagogies are particularly important in early childhood education where socio-cultural and developmental pedagogy, which seek to promote a conscious meaning-making process, have remained dominant. Although it is not evident that it is utilized as such, the calendar time implicitly acknowledges our enmeshment by teaching cognitive skills to understand and respond (by choosing suitable clothes and activities to do) to weather. Hence, teachers can turn

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around dominant pedagogies, such as the calendar routine, and utilize as a tool to recognize and attune with the agency of the weather.

ECEfS that picks up on children's attunement to weather through lively assemblages of human and non-human vital materialities, might provide a way into a more enmeshed/embedded way of being in the world that might be critical in creating a more sustainable world. The aforementioned shift towards assemblage thinking may well be useful and illuminating in future ECEfS pedagogies and practices and perhaps beyond, as children and educators locate themselves as enmeshed in a wider vibrant world. More work of this kind is needed to understand the implications of such child-weather assemblage pedagogy for teaching and learning or finding spaces that invite such attunement.

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'Becoming-with bees': generating affect and response-abilities with the dying bees in early childhood education

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To cite this article: Kassahun Weldemariam (2019): 'Becoming-with bees': generating affect and response-abilities with the dying bees in early childhood education, Discourse: Studies in the Cultural Politics of Education

To link to this article: <https://doi.org/10.1080/01596306.2019.1607402>



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Published online: 22 Apr 2019.



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'Becoming-with bees': generating affect and response-abilities with the dying bees in early childhood education

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ABSTRACT

Engaging young children in sustainability challenges poses a pedagogical dilemma to the field of early childhood education. Using species extinction as an exemplary sustainability challenge, this study explores the pedagogical possibilities to engage young children with the potentially cataclysmic death of the bee. The study is framed within a posthumanist framework and draws ideas from post-qualitative research orientation. The study is empirically anchored to a narrative emerging from a staged theatrical performance of child-bee assemblage that enacts the collective agency of 'bee-ness'. Enabling possibilities of 'becoming-with the bees', the performance lends itself to triggering response-abilities and forming of relationships and thus a concomitant emotional affective response to the death of bees. The article suggests alternative directions for a sustainability pedagogy in early childhood education that represent a shift from loving, caring and preserving nature as an object outside ourselves, towards a perspective of 'becoming-with-nature', which considers humans as part of/entangled with nature.

KEYWORDS

Affect; assemblage; becoming-with-others; entanglement; performing-others; response-ability

Introduction

The Anthropocene is marked as an age wherein humans' destructive consumptive behaviour has significantly altered the state of the planet (Crutzen & Stoermer, 2000). Climate change, global warming, ocean acidification, loss of biodiversity, and species extinction are some of the major manifestations of the Anthropocene. This paper focuses on how to deal with species extinction issues within Early Childhood Education (ECE). As scholars argue, we are entering the sixth wave of mass extinction, which is entirely anthropogenic, i.e. caused by humans (Barnosky et al., 2011; Kingsford et al., 2009; Rose, Van Dooren, & Chrulew, 2017). This scenario begs the question: How can we rethink our way of knowing and relating with other-than-human species in ECE in such a way that they do not become extinct due to our own actions?

Of the various endangered species, this study deals with the alarming death of the honey bee which is becoming increasingly vulnerable in the Anthropocene. Bees play

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an essential role as pollinators for a healthy ecosystem which provides most of our food production, and an interruption of this process brings about a massive decrease in food productivity and a concomitant breakdown of the food chain (Brown & Paxton, 2009). This very creature that sustains our ecosystem and brings nutrition to us is in the grip of an extremely high mortality rate. As indicated by Cox-Foster et al. (2007), the phenomenon called colony collapse disorder has resulted in the loss of millions of beehives for beekeepers in different countries across the globe. This drastic decline in bee population is a result of multiple human-induced (anthropogenic) causes of bee death including habitat destruction and the use of pesticides (Neumann & Carreck, 2010). The death of such a vital creature has become foregrounded as a foreboding threat to humans' survival and the ecosystem at large, which urgently calls for a rethinking of the relationship between bees and humans as an exemplary template for human-animal relationships. Taking up the case of the dying honey bees, this paper explores a different way of knowing and relating to them. What kind of human-bee relationship is needed and possible at this precarious edge of extinction? This challenge calls for the need to better inform ourselves about bees, their role and capacities, in a way that entwines our own prospects and fate with theirs, where we begin to recognize that they are an integral part of our ecosystem and, indeed, of us.

Such anthropogenic changes bring huge challenges, particularly for young children who, compared to older people, are disproportionately affected as they will be inheriting a damaged planet, possibly a catastrophically damaged one. Although the damage has been caused by previous and present older generations, its effects fall unjustly on the young who, at least for now, have hardly contributed to this damage. It is important to explore how this exemplary extinction event is a harbinger of greater destruction and how to address it pedagogically in early childhood education. As we cannot afford to just tell dark doom and gloom stories to young children, lest they give up the dream of change and challenge, we need to have a mechanism to tell stories of entanglement that possibly give hope to our young children without denying and hiding the precarious situation of the ecosystem. Engaging young people meaningfully and responsibly in responding to this destruction brings a tremendous pedagogical challenge to the field of early childhood education. How to prepare children to meet this challenge and understand their relationship with the changing world, and what stories we tell (Haraway, 2016; Van Dooren, 2014) for the same end, matter a great deal.

With a view to rethink child-animal relationships and pertinent pedagogies, scholars have been calling for a paradigm shift that promotes the entanglement and enmeshment of human/children with the more-than-human world at large and other forms of life in particular. A notable example is the Common Worlds Research Collective (2018), which challenges the ingrained idea of an autonomous individual child, and introduces the common worlds framework which calls for the reconceptualization of the child as entangled with the more-than-human world – particularly animals. They argue that this entanglement has concomitant 'ethical, political and pedagogical' implications (Taylor, 2013, p. 115). Scholars within the collective (Nxumalo & Pacini-Ketchabaw, 2017; Taylor & Pacini-Ketchabaw, 2015; Taylor & Pacini-Ketchabaw, 2018; Taylor, Pacini-Ketchabaw, & Blaise, 2012) have been advocating a collective future rooted in a more-than-human entanglement thinking that invites children to 'learn-with' other species in their everyday common world in a non-hierarchical manner.

Drawing on the case of child-pet encounters in urban classrooms, Nxumalo and Pacini-Ketchabaw (2017) highlight the inadequacy of simplistic and anthropocentric relationships to loving, caring and learning about animals. Instead, they underline the need to engage with situated, complex and emerging temporal relationships producing different affective and ethical engagements while learning with the animal, which is required to deal with contemporary anthropogenic challenges that children are inheriting. Likewise, Nxumalo (2018) indicates children's everyday entanglement with the dying bumblebees and the emerging possibilities it offers to relate, learn with and respond to anthropogenic loss through various affective and embodied modes of knowing. Moreover, drawing on the case of the swamp hen, eel and the turtle, Gannon (2017) demonstrates how an encounter with these animals can serve as a pivotal point for affective and creative engagement leading to critical inquiry and multiple modes of responding to their coexistence with humans. Although Gannon's work is empirically anchored with secondary school students, its conceptual approach is situated within the 'common worlds' framework of early childhood studies. While Nxumalo and Pacini-Ketchabaw (2017) employed a multispecies ethnography to explore children's encounter with a walking stick pet introduced to a classroom, Nxumalo (2018) employed a worlding methodology as a mode of attuning to the child-bee encounter.

Drawing on the aforementioned earlier studies, this contribution is framed within a posthumanist framework and draws ideas from post-qualitative research orientations (Nordstrom, 2015). The paper is empirically anchored in a narrative that emerges from a theatrical performance (of becoming-bee) with an active characterization of the bee. Conceptually, the study focuses on Haraway's (2008) notion of 'becoming-with-others'. The central question is: What kind of pedagogies and stories can be used to engage young children with the life and potentially cataclysmic death of the bees?

The article is organized as follows. The first section provides a brief overview on the notion of performance as a practice of becoming-with-others and its conceptualization. The second section presents ideas from post-qualitative inquiry approach with details on the research context and how data are produced in relation to an encounter with a theatrical performance that leads to the emergence of different responses, affects and relationships. The subsequent section offers a description of the theatre per se, and how it affects becoming and learning with the bees. This is followed by a presentation and elaboration of how the theatre lends itself to mobilizing affect which in turn results in forming relationships with and responses to the situation of bees. The following section discusses the strategic benefits of becoming-with-bees. The article ends with a section that suggests alternative directions for a sustainability pedagogy in early childhood education, a shift from loving, caring, and preserving nature as an object outside ourselves towards becoming nature, i.e. humans as co-members of nature.

Performing-others as a practice of becoming-with-others

As indicated earlier, the article is anchored with a theatrical performance of child-bee assemblage wherein humans are acting, doing and 'becoming-with' bees. The term performance can have different meanings in different contexts. In a broader sense, the notion of performance entails how we perform and act our life-the doing of it. In everyday life, we act and we become something as we do it. Drawing on Austin's speech act theory,

Reinelt (2002) describes performance as 'part of an ongoing poststructural critique of agency, subjectivity, language and law' (p. 203). Fleishman (2009) states that:

Performance involves acts of storying, sounding, moving, feeling and relating that are all embodied and constitute alternative ways of knowing that are non-representational, experimental, and potentially political, both in the sense of transforming knowledge in the academy but also as a means of creating voice in marginalised communities. And that these ways of knowing that proceed from the body give us access to a vast range of ideas that distant and dispassionate contemplation cannot. (p. 126)

While heightening the performative characteristics of language in gender construction, Butler (1999) describes the notion of performativity as a subject formation process, which creates that which it purports to describe and occurs through language and other social practices. Hence, she argues that gender constitutes a continuous series of performative acts not a representational entity (Butler, 1999). When something is performative, it produces a series of both effects and affects.

Haraway's (2008) concept of 'becoming-with' as a practice of 'becoming worldly' (p. 3) is used as a way to rethink humanness and experience bee-ness. Haraway argues 'to be one is always to become with many' (p. 4). She points out that being human is inextricably tied to 'becoming with' multi-species others. Haraway specifically writes about political 'becoming with' in cross-species relations, i.e. becoming-other of *humans*. While working with Haraway's notion of becoming-with, Giugni (2011) highlights that 'cross-species relational entanglements are useful to transgress all kinds of "borders" of "self", "other", spaces, places, languages, politics, pedagogies in new ways' (p. 12). By highlighting the entangled world we live in and share with multiple other species, Haraway's (2008) notion of becoming-with captures the relationality and interdependence between humans and non-humans. Humans and non-humans (e.g. animals) share agency and become together while influencing each other. As much as what humans do matters and affects the bees, what the bees do also matters and affects humans. The theatrical performance of child-bee assemblage helps make the entanglement explicit through a performance.

This paper employs the concept of becoming-with by analyzing the theatrical performance of a child-bee assemblage. The assemblage enacts the collective agency of bee-ness where children are performing becoming-bee and enacting bee collective agency. The theatre invites the children: to become bee-like, to try out bee behaviour, and enact bee concerns. The theatrical assemblage is constituted of: actors (in bee suits), a bee set and props, children-becoming-bee-like, and an ecological narrative about bee pollination. In doing so, the theatre captures the urgency and what is at stake within the temporality of the created space. The next section contextualizes the empirical study upon which the article is based.

Encountering a theatrical performance of 'bee-ness'

This article is based on a post-qualitative study performed within a Swedish pre-school class consisting of 16 children (ages 4–6 years) and three teachers. Prior to the study, consent was obtained from the children. The school administration, the teachers and the parents offered their consent through a written signature. This allowed me to join, follow the group, participate, take notes and record (both audio and video) different emerging encounters in their daily routines.

One characteristic of post-qualitative research orientations is the decentering of the human researcher by consciously avoiding, for as much as is possible, predefined method but rather to begin with an intelligible encounter that compels and presses the researcher to think with the subjects of inquiry (St Pierre, 2018). While beginning and thinking with an encounter, a post-qualitative enquirer works with and hopes for what might be possible to emerge from the unexpected, which St Pierre refers as the 'not yet' rather than simply what is expected, rationalized or planned for – as in the case with structured methodology. My inquiry began with an encounter with a theatrical performance of child-bee assemblage that captivates and forces me to think with the bees. Hence, as shown below, the theatre per se has become my data and I started to think with it.

In one of the days of my scheduled visit, the preschool group was invited to watch a bee theatre. This is an educational excursion of the children to a free in-store theatre hosted by COOP, one of the biggest grocery companies in Sweden, forming part of the Swedish Cooperative Union. The overall idea of the COOP project is to create ecological awareness, ideas about organic food and sustainable environmental thinking among children (3–7 years old) and the significance of the bees in a fun and playful manner. Both the teachers and I had nothing to do with the performance. None of us intentionally set it up to create enmeshment. It was rather an initiative from COOP to teach and inform children about bees. I just joined the children that day without any intention other than to be with the children to see what might emerge. Being with the children on that day, I had the chance to witness the theatre, which brings about the emergence of the bee as a focus of inquiry.

While serving as a moment of potentiality, the encounter created affect that forced me to rethink and feel the threats posed on the bees. The theatre presents a moment portraying human's encroachment in the bees' life through destruction of their habitats. My prior knowledge on the central role bees play in the ecosystem was activated and that urged me to rethink human's entanglement with this insect, and the attributed vulnerability. As much as the affect the theatre creates in me, as will be shown, it affected the children and the teachers who were also captivated and drawn to the bees and their threatened situation.

Drawing on ideas from post-qualitative thought, my inquiry particularly employs Nordstrom's (2015) concept of data assemblage. The term assemblage, originally introduced by Deleuze and Guattari (1987), broadly refers to a principle of connectivity wherein any number of things (e.g. words, ideas, people and objects) are gathered within a context. The constituents of an assemblage are in a loose, ad hoc and changing relationship. Thinking and becoming-with the theatre has rhizomatically elicited different responses and consequences in the children's verbal reactions (discursive responses) and doings (material responses) forming what Nordstrom (2015) refers as data assemblage. For successive weeks and months after the theatre, the children and also the teachers have been repeatedly coming back to the bees every now and then in relation to their everyday pedagogical activities, mundane conversations, outdoor free play, and other instances in the pre-school environment. Various verbal utterances, comments, a song about a flower, bee drawings, bee crafts and bees' 'swimming pool' constitute the data assemblage. The next section offers a description of the theatre in in focus.

The theatre

The theatre piece is an assemblage of actors in bee suits ('Biesta' – the queen bee, and 'Biffen' and 'Stickan' – the two worker bees), a bee set and props, children-becoming-bee-like (participant children), and an ecological narrative about bee pollination. Rosen and Ring (2017) are the playwrights who are playing the character of Biffen and Stickan. The theatre is performed on a stage where the children are invited by Biffen and Stickan to become-like a bee, participate in their activity (reading the instruction from Biesta, dancing, pollinating, fighting back people who spray pesticide on flowers, treating sick bee with medicine and planting flowers) and follow them in a typical day in a beehive. The play is 40 minutes long and presented as a performance mode comedy fable and has three phases: prologue, the disaster phase, and happy ending.

Prologue

The theatrical performance begins with an opening with how Biesta founded the hive after observing what pollen does on flowers. Opening story goes:

Biesta was flying from one flower to another, a pollen suddenly stuck on her and fell on another flower, which later became an apple. Biesta noticed the magical nature of pollen and told other bees how a pollen multiply flowers and turn them into a fruit.

Scene I

Biffen and the children come into the hive and find Stickan oversleeping and snoring. They mock and wake him. Then comes the day's instruction from Biesta asking Biffen and Stickan to pollinate apples. Biffen and Stickan read the instruction together with the children. The instruction reads: *put pollen on the flower, flower becomes an apple, put pollen on the flower, flower becomes an apple ...* and so on. Together, they repeat the jingle: *pollen, flower and apple ... pollen, flower and apple ... pollen, flower and apple ...* along with a dance. It is a small choreography with a song having a main verse 'pollination poll pollination'. After dancing, the bees pollinate the flowers and one big apple is produced. The children and the bees are happy to see the big apple and decide to have an apple fest. Since one apple is not enough for the feast, they agree to pollinate more.

Scene II

The second round of pollination starts with the pollination dance. This time something unexpected happens. Suddenly, a strange voice is heard from outside the beehive, there is smoke in the air, the flowers and other plants are being sprayed with pesticides, and most of them start to fall down and die. The few remaining flowers do not taste good for the bees due to the pesticides. Suddenly, Stickan is struck by a virus. He feels strange, dizzy and can't find his way around and becomes unable to pollinate. He becomes sick and lies down on the floor. Biffen comes back to the beehive and observes what happened to Stickan, and feels very sad. Biffen continues to pollinate and the next apple has grown, but this time the apple is very small, unlike the earlier one. Stickan suddenly dies. Everything goes wrong. Biffen is distraught and asks the children what to do? Biffen and the children decide that they must do

everything again, but this time they have to do it right. Stickan wakes up with the help of medicine suggested by the children.

Scene III

The third round of pollination starts with the dance. This time Biffen is struck by a virus but the children solve the problem with the medicine and the bees go on with the pollen dance. Again the voice and the smoke comes back but the children protect the bees and scare away the people who came to spray on the flowers. Biffen and Stickan check the flowers and learnt that no one has sprayed on them and say 'the flowers are fine – let's pollinate more to have the fest'. Biffen and Stickan ask the children to join and help them to pollinate more fruits. Then the children participate in the pollination process, including the dancing and singing that help the bees pollinate. Biffen and Stickan give the children pollen (white round objects), and they jointly pollinate until enough apples grow. Now it is time for the apple fest! Biffen comes with a big plate with the apples.

Epilogue

At the end they all sit together and eat the apples. Biffen & Stickan ask the children if they are willing to help them with one more thing. The children agree. Then, all the children receive a small bag with seeds so that they can plant flowers for the bees at home.

Affect-production and response-abilities

The theatrical performance creates affect in the children that allows them to affectively understand and form relationships with the bees, which in turn lead to the emergence of children's response-abilities (Haraway, 2016) towards the precarious situation of bees. The performance creates a temporal space that yields the potential for the children to deterritorialize (Deleuze & Guattari, 1987) and become-with the bees, which allows them to identify themselves with the insects, with intertwined fates and consequences.

'Response-ability' to refer to one's ethical sensitivity and the ability to respond accordingly. Haraway defines 'response-ability' as 'cultivating collective knowing and doing' (p. 34), 'sympoiesis' (making-with) (p. 58), and as responses of *becoming-with and rendering each other capable*. Deterritorialization, borrowed from Deleuze and Guattari (1987), entails establishing a new relationship, new process and differentiation of role.

Reflecting on what happened in hindsight, pedagogically speaking, the theatre mobilizes affective forces and by doing so enables the children to 'become-with' and to 'engage in' multiple response-able practices. The emergence of multiple responses is manifested in a range of modes by evoking different thinking, feeling, actions (hands on doings) and utterances by the children. After the show, the bee has become an interesting subject and the children continued to engage with them, which continue to shape their response-abilities towards the insects' precarious situation. The play serves as a pivotal point for the children in helping them to recognize the extent to which they are implicated in the bees' lives and deaths. Below I will describe a range of responses and affects produced by the children in the successive weeks and months after the theatre encounter.

Nina (4.5 years old) wanted to have the bees come to the preschool, and said to the teacher 'I want to invite the bees to the preschool'. This subsequently urged the

teacher to ask 'What do you think we can do to realize that?' Nina came up with the idea of planting flowers in the schoolyard that led to planting flowers project by the entire group on the gardening day at the preschool. Hence, the preschool's environment is being made flower rich and pollinator friendly; and the bees are 'being cohabitated' in the school yard that challenges territory binaries.

Noah (4.3 years old) refrained from picking flowers: 'When I play outside, if there are not much flowers, I will not pick any. I will leave it for the bees to drink it.' Noah's response reflected an effort to ethically care and also shows some kind of connection to ecosystem of which bees are part, which indicates the reverence the theatre has created in him. Another utterance by Nina was expressed in the form of song 'The Wake up Flower' love song – lyrics below as written by her teacher (Figure 1).

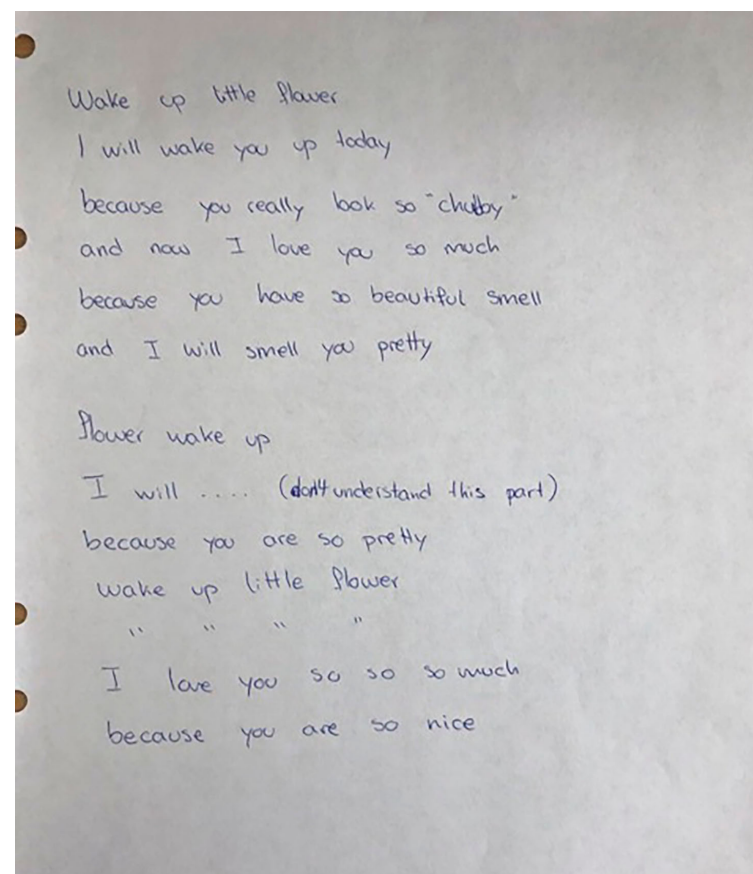


Figure 1. Nina's wake up flower song.

While relating it to the fruits he eats for snack at school, Tom said, 'Bee give us apples so we can have snack. We also make smoothie for carnival with the apple we got from the bee. Otherwise if all bees die we cannot make smoothie'. Tom's comment indicates humans' implication in the disappearance of the bees and our intertwined fate. Impassioned by the bees, Jonas said, 'Bees do magic ... and make fruits ... pollen is magical'. In a morning drawing session, Jack came up with an idea of drawing the bees which was well received and joined by many children. A range of thoughts and emotions are expressed in the children's drawing. Leya's sad and sick bees and Zena's naughty people spraying on the bees are presented in Figures 2 and 3.

Alicia expressed that 'Spray didn't make the bee feel good and they don't drink the flower because it tastes yuck'. Vanessa mentioned 'When the spray comes the flowers and bee are not happy. It was not nice and the apple became tiny'. Alicia's yucky response

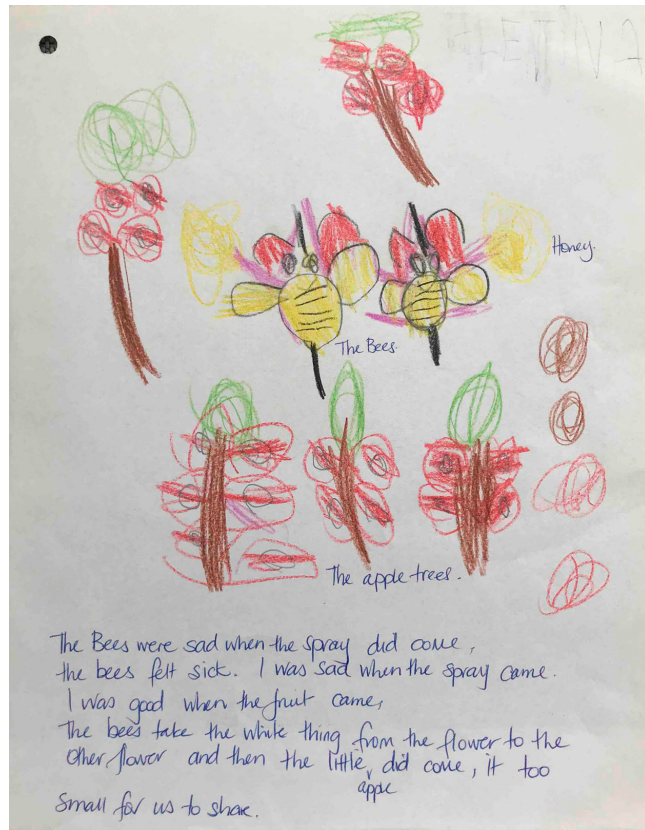


Figure 2. Leya's sad and sick bees.

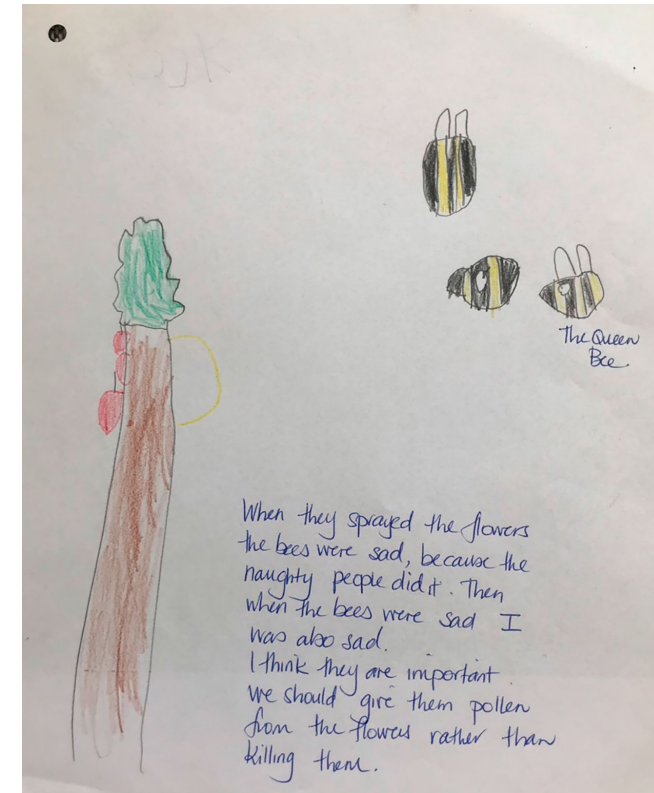


Figure 3. Zena's naughty people spraying and killing bees.

to the spray has also been reflected in her drawing. Zena (Figure 3) describe the people putting the spray as 'monsters'. While expressing her sympathy, Sara commented:

the spray is bacteria, the bees are sad because the apples are small like a baby ... I said go away to the spray ... I like it best when the bees dance and pollinate ... the bees are scared because the people are bigger than them.

As time goes, the affects the theatre produced, the ideas generated and the conversations emerged continued and meandered along different inroads of possibilities. The bees have continued to be part of the children's and the group's everyday activity at the pre-school environment. The children have continued to come into an alliance with the bees through various discursive and material engagements. More doings are generated forming larger and larger data assemblages. The teacher extended the bee drawing activity to a whole group bee craft project. On another day, during outdoor free play, Tom made a swimming pool, out of stones and glass balls, because he thinks the bees want to swim and relax when it is warm (Figures 4 and 5).



Figure 4. Tom's bee swimming pool.

More desires have continued to be evoked: Sara described what she experienced during a weekend as follows:

On Saturday, I did go to a car and saw a bee on a cold floor ... he can't fly because it has only one wing. I tried to pick and help him fly but he didn't fly. I think he was injured and I tried to see if he can move and fly, but he can't. I cannot do anything for him so I did leave him there ... I think he is not better, I think.

In this encounter, a real bee entered the assemblage and created different affective states (sadness, compassion and pity) that moved in the child forcing her to think and demand her action. It brought about the recognition that the bee was injured and needed assistance, and she tried to pick up the bee and help the bee to fly. The moment of encounter galvanized the child into a different mode of thinking, being and learning within the temporary space created within the assemblage.



Figure 5. Vanessa's and Noah's bee craft.

Ela recalled an earlier bee-encounter and stated:

One day, when I was in my summer house, my sister was trying to catch the bee. It is not nice, but the bee did fly fast and she could not catch it. We have to leave the bees alone.

Here, a real bee is once again joining the assemblage provoking more caution towards the bees. Peter, who discussed the theatre with his family said 'My dad and I will make a nest for the bees in our backyard'.

Few days after the theatre, an email sent to the teachers from Peter's mum indicates his reaction to the theatre:

When I picked him on Wednesday, he was bouncing home with his fruit bag (which contained fruits and flower seeds ...) in hand and he talked about Biffen and Stickan and a rap song that goes 'pollenera poll-poll-inera'. He thought that was very good.

Likewise, a comment from one of the teachers also confirms how the theatre influences the children:

Ever since the theatre, the children talk a lot about it – they really took it to their heart. They love singing the song – it is stuck in their head. Last week, we also walked around and pollinated while enjoying the sun. We looked at and documented spring signs and small insects in nature.

All the aforementioned excerpts are examples showing how the children have been affected by the theatre. Framing it with Haraway's (2016) term, these response-abilities – Noah's thought to refrain from picking, Nina's compassionate singing/doing, Sara's

sympathy (feeling) for the bee on the cold floor, Tom's understanding of not to take the smoothie for granted, Jonas' appreciation of pollen as magic, and Alicia's association of yucky feeling with the spray/pesticide – are all provoked by the theatre. These response-abilities are conveyed in the form of 'thinking-feeling-doing' (Barad, 2007) together not only as a separate cognitive activity that we often expect from an agentic child, but rather enact a collective child-bee assemblage.

Sustainability benefits of becoming a bee

As a mode of pedagogy, becoming-with the bees in the theatre offers an alternative possibility to the wider practice in ECE, which tends to moralizing children to sympathize and care for animal subjects. By urging ethical responses that address the entangled subjectivities, the theatre enables possibilities to imagine for what Haraway (2008) refers to as 'opening to shared pain and mortality and learning what that living and thinking teaches' (p. 83). In doing so, the performance has served as a way of knowing and relating to the bees, which ultimately led to the emergence of response-abilities in the children.

As indicated in the emerged data assemblage, there are 'quite definitive response-abilities that are strengthened' (Haraway, 2016, p. 115) in the children's reactions which are manifested in various discursive and material engagement with the bees. All the aforementioned actions and utterances of the children have a performative effect as they result in a change or transformation, i.e. generate response-abilities. The theatre of the performing bees created the possibility of understanding species relations as a performance with the performative effect, which could be a way to deterritorialize and become nature. As the children encounter and engage with the theatre, they experience themselves as part of nature, not separate from it, i.e. they become with the bees.

The theatre offers this possibility of becoming-with the bees without signalling a discouraging and pessimistic view about the situation of the bees. Rather, it creates a joyful moment to deal with the problem, which allows us to engage with and engender a life-giving process, pollinations, and form kinship with the bees. It created and led to moments wherein human beings are part of nature, included with other species, both imaginative and real. Moreover, the theatrical performance of becoming-with provides a moment of reassessment, and of rethinking of our own capacity and vulnerability. It allows a different way of knowing, caring and hearing about the bees by portraying how to learn to collectively think with the bees. It also enables the potential to expound the human's integrated relationship with the bees, and the encounters exhibited in the play permitted to see this relationship differently.

While producing the children's 'becoming-with' the bees, the theatrical child-bee assemblage, opens up spaces to relate to the bees and engage with their situation in different discursive and material expressions. Performing 'bee-ness' opens up possibilities for post anthropocentric analytical position and paves the way to see humans' relation/entanglement differently, which can help to re-position humans in a shared and inter-related world that we live in. In doing so, the performance de-centres the human child and triggers the becoming of a symbiotic network and the unity with 'nature'-bees in particular. As a strategy, becoming-with-bees appears to have elucidated the human-bee entanglement – a story that matches the historicity of our time (Anthropocene) and what is happening to us – humans. The theatre catalyses a possibility to recode and

decentre the human and, by doing so, to compose an alternative ontology in today's precarious time.

The children, while participating in the performance, became subjective seekers of bee-ness rather than posing as detached observers discovering and learning definitive facts/truth about the bees. By inviting the children to enter into a relational imagining of their own 'bee-ness', the theatre transports and carries the children into a different, imagined reality and life of bee and 'bee-ness', a new way of being, indeed, a new way of 'being'. This evokes affect and allows for the children to feel the affectual charge of materialities. The children are not just cognitively taken in the moment, but also engaged with an affective experience of 'bee-ness' and their identities. They are moved into another world, one that is inevitably entangled with our own. This entangled world is brought into being through the material and discursive relationship that the children are experiencing.

As Haraway (2016) indicates, we have to learn how to 'stay with the trouble' and live in tune with others as we are entangled with the more-than-human world. Highlighting the entanglement helps us see beyond the narrow anthropocentric view of the world and helps us pay attention to the complex and, mostly, symbiotic ways in which we are related with other species. Understanding such entanglement can open up and transform our way of being, thinking and doing which can help us to avoid our tendency to falsely separate ourselves from other creatures, which eventually can help us come to terms and 'thrive' with the more-than-human world. Drawing on Haraway (2008), the theatrical performance can be taken as an exemplary instance demonstrating how 'learning to play with strangers' (p. 243) can take place in practice. In this regard, it is important to highlight the pedagogical significance of the theatrical comedy fable which could be utilized as a tool for addressing sustainability issues in early childhood. Such pedagogy could have the potential to contribute to the endeavour to restore environmental education in the early childhood. Thus, turning into a 'multi-species becoming-with' (p. 260) approach could be an alternative pedagogy towards sustaining humans in staying with the trouble on terra, the planet Earth (Haraway, 2016).

Conclusion and way forward

Through becoming-with bees, the theatre provides a possible strategy for moving away from anthropocentrism to a more bio-centric way of thinking. It does so by mobilizing affect that leads us (children, teachers, and researcher) to empathize with and relate to the bees while simultaneously being implicated in and sensing our own affective vulnerability through an emotional response to their cataclysmic death. The theatre serves both as a mode of pedagogy and as a powerful tool for exploring and stimulating new knowledge on complex issues such as species extinction and sustainability. Apart from being a mere experience, one among others, the theatre affected the preschool environment by shaping and altering the pedagogical activities to become geared towards the bees, thus changing the children's sense of their relationship with the bees and the environment in general.

Here, teachers have an integral role to play by creating a pedagogical space that allows such encounters to flourish into a deeper inquiry. Traditionally, the pedagogy within early childhood education for sustainability (ECEfS) has taken a certain path which includes:

nurturing love and care for nature and the need to preserve it, building agency, focusing on science, and action-oriented practices. However, these approaches do not transgress anthropocentrism. Teachers need to reflect on and ask important questions: what kind of knowledge has the power to influence us (researchers and educators) and hence to influence the children that we are educating? What kind of knowledge do we appreciate, and what conditions do we create for the same end? How can we become affected by the cataclysmic collective death stories of our time, and in turn allow the children to be affected? Are we fostering creativity, or are we unintentionally stopping it while sticking to certain conventional ways of knowing and being?

Therefore, the pedagogy in ECEFS should engage children and keep them closer to the problem, which Haraway (2016) refers to as staying with the trouble and playing with the strangers (e.g. the bees) while telling lively stories. This calls for a transformative pedagogy that directly calls on teachers to think about how to recognize their pedagogical activities. A key point here is to move away from viewing children as sole agents and autonomous learners, or what Taylor (2017) refers to as environmental stewards. Instead, children should be allowed to think and learn with the more-than-human world that they are immanently entangled with and that they constantly encounter in their everyday life. This is particularly important in early years education because children are still open and able to see themselves as integral to this world, and capable of developing a symbiotic relationship of 'becoming with' this world, whereas adults often will have lost this capacity, ironically, in part as a result of the education they received.

In closing, encounters such as the theatre can have the potential to offer multiple possibilities to engage with various environmental and global challenges of our time. Supporting Gannon's (2009) suggestion:

[W]e need to create a space for emergent pedagogical possibilities that are open to the flows and intensities of encounters and pedagogical moments each of which 'has its own particular spatial, temporal and affective modalities and performances' and each of which gives rise to its own 'ethics of encounter and responsibility' and response-abilities. (p. 69)

Disclosure statement

No potential conflict of interest was reported by the author.

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