Practicing Climate Action: Following Climate Change Education Practice Elements in a K-12 School Using a Whole Institution Approach

A Thesis Submitted to the
College of Graduate and Postdoctoral Studies
In Partial Fulfillment of the Requirements
For the Degree of a Doctor of Philosophy
In the School of Environment and Sustainability
University of Saskatchewan
Saskatoon, Canada

By
Kristen Hargis

Permission to Use

In presenting this dissertation in partial fulfillment of the requirements for a Postgraduate degree from the University of Saskatchewan, I agree that the Libraries of this University may make it freely available for inspection. I further agree that permission for copying of this dissertation in any manner, in whole or in part, for scholarly purposes may be granted by the professor or professors who supervised my dissertation work or, in their absence, by the Head of the Department or the Dean of the College in which my thesis work was done. It is understood that any copying or publication or use of this dissertation or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University of Saskatchewan in any scholarly use which may be made of any material in my dissertation.

Disclaimer

Reference in this dissertation to any specific commercial products, process, or service by trade name, trademark, manufacturer, or otherwise, does not constitute or imply its endorsement, recommendation, or favoring by the University of Saskatchewan. The views and opinions of the author expressed herein do not state or reflect those of the University of Saskatchewan and shall not be used for advertising or product endorsement purposes. Requests for permission to copy or to make other uses of materials in this thesis/dissertation in whole or part should be addressed to:

Head of the School of Environment and Sustainability
117 Science Place
University of Saskatchewan
Saskatoon, Saskatchewan S7N 5C8 Canada

OR

Dean
College of Graduate and Postdoctoral Studies
University of Saskatchewan
116 Thorvaldson Building, 110 Science Place
Saskatoon, Saskatchewan S7N 5C9 Canada

Abstract

As humans, we now possess more knowledge about actions needed for planetary rehabilitation than hitherto seen before; however, current climate actions remain insufficient to address the most deleterious effects of climate change. With fewer than twelve years remaining to prevent climate catastrophe, it is imperative to recognize knowledge as more than cognitive accumulation. Most climate change education and research to date, however, has focused on instilling *individual* scientific cognitive clarity instead of learning how to do climate actions *together.* This study utilized a practice lens to adjust conceptual focus away from the knowledge of individual learners to the climate action practices they collectively 'carry,' (un)equally share, and mutually shape, wherein understandings, meanings, and purposes are irreducible to personal attributes. Shove and colleagues' conceptualization of practices was used to examine climate action practices occurring at a Kindergarten to Grade 12 school in Canada using a whole institution approach to climate change education. A whole institution approach includes climate change education within and/or across each of the domains of Overall Governance, Teaching and Learning, Community Partnerships, and Facilities and Operations The data generation methods used in the study included a sensory walk, observations, interviews, focus groups, document collection, and photography. The findings illustrate how the climate action practices observed and described by participants emerged, endured, and disappeared through a complex set of interactions, influences, (dis-)(re-)connections, motivations, and forms of monitoring. Key climate action practice elements (i.e., *materials*, *competences*, and *meanings*) within each of the four domains were followed and are described, as well as significant connections within and across whole institution domains. This research has implications for climate change education practice, policy, and research, which include 1) the potential of using a whole institution approach to climate action in education, 2) how to support the emergence, endurance, and disappearance (if needed) of practice elements, as well as connections between practice elements, and 3) how practice theory is beneficial for CCE research.

Acknowledgments

I want to begin by acknowledging the land on which this research was conducted, which is the Territory of the Anishinabek Nation: The People of the Three Fires known as Ojibway, Odawa, and Pottawatomie Nations. And further give thanks to the Chippewas of Saugeen, and the Chippewas of Nawash, known collectively as the Saugeen Ojibway Nation, as the traditional keepers of this land. I also want to acknowledge the land on which I completed this degree, which is Treaty 6 Territory and the Homeland of the Métis. I pay my respect to the First Nations and Métis ancestors of this place and reaffirm our relationship with one another.

I am grateful to have been a part of the Sustainability and Education Policy Network (SEPN), as well as their Monitoring and Evaluating Climate Communication and Education (MECCE) Project. Through my work as a SEPN Research Assistant, I was able to play a leading role in a program evaluation of the 'Getting Climate Ready' pilot project, which was commissioned by the Canadian Commission for UNESCO. My participation in this program evaluation helped me shape the overall direction of this dissertation and helped identify the K-12 school I would visit. Additionally, this work would not have been possible without generous funding and support from SEPN throughout the completion of this degree. Through my work with SEPN and now the MECCE Project as a Research Associate, I have received the highest caliber of academic and professional training. I am confident I am more than prepared for an academic or professional career. I also want to thank all of my research participants who volunteered their time and welcomed me into their community. You made my visit one I will always cherish and never forget.

Thank you to my husband who has supported me whole-heartedly throughout the completion of this degree. I am grateful to my mom who patiently listened to all my questions about academia and was unwavering in her support and guidance. A huge shoutout to my fellow SEPN colleagues, Kathleen Aikens, Naomi Maina, Jaylene Murray, and Yanyu Li, you kept me sane and were always supportive. Danke to Viktoria Hinz, my German roomie in whom I found a kindred spirit, a sister, and a forever friend.

I would also like to thank my thoughtful, caring, and meticulous supervisor, Dr. Marcia McKenzie. Your guidance, suggestions, feedback, and support shaped this work as well as my development from student to colleague. Thanks for sticking with me from the time I was a master's student until now. I am much changed since then, and you played a significant role in my professional development from then until now. I am also thankful to SEPN and MECCE Project Manager, Nicola Chopin, for being a constant virtual co-worker to survive the pandemic with, thoughtful colleague/boss, and dearest friend. I have learned so much from you throughout the years about all things life and work. I am forever grateful. Finally, I want to thank all the members of my advisory committee for their continued support and direction which helped shape this work: Drs. Dianne Miller, Paul Orlowski (member before his retirement), James Robson, Chelsea Willness, and Alex Wilson.

Dedication

Taken too soon

You've had to miss

Another life-changing moment

Are you proud?

Looking out the window now

The fullest, brightest rainbow comes into view

I know your answer.

Preface

Understanding reasons for climate change engagement is a topic close to my heart. Having grown up in Louisiana where most of my friends and family were climate change skeptics at best or deniers at worst, I grew up quite confused about climate change. It was only after I left that place and began my higher educational endeavors (in Arkansas, oddly enough) that my views began to shift. While I was still surrounded by many skeptics and deniers, I was also in a supportive environment where critical inquiry was highly encouraged. My educational experiences during that time transformed my own climate change beliefs due to complex interactions between individuals and places.

My previous experiences have affected my assumptions and the lens through which I plan to investigate climate change education (CCE). For instance, my decision to frame this study around Shove, Pantzar, & Watson's (2012) theorization of social practices rather than individual cognition in relation to acquisition of scientific knowledge stems from the realization of the complex interactions between various meanings, competences, and materials on my own climate change beliefs and actions. Additionally, while I began believing in and taking action on climate change as an undergraduate student in 2005, I did so without really understanding the science behind climate change. It was not until I was a master's student in 2013 that I really started engaging with what climate change meant scientifically.

Additionally, my focus on formal as opposed to informal CCE is affected by the educational setting responsible for my own belief transformation. As I conduct this study, I might assume what worked for me will work for others. Constant acknowledgement of my own personal background will ensure I remain open to all possible discoveries and modes of inquiry.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

AI	Artificial Intelligence
ASPnet	Associated Schools Network
CCE	Climate Change Education
CCUNESCO	Canadian Commission for United Nations Educational, Scientific and Cultural Organization
EE	Environmental Education
G.O.O.S.	Good On One Side
ITTD	Interview to the Double
MBA	Management by Walking Around
SDG	Sustainable Development Goals
SEPN	Sustainability and Education Policy Network
UNESCO	United Nations Educational, Scientific and Cultural Organization

Chapter 1: Introduction

> Knowledge is not something that people possess in their heads, but rather, something that people do together. (Gergen, 1991, p. 270)

Numerous scientific investigations have corroborated the existence of climate change as well as anthropocentric causation (Cook et al., 2013; Cook et al., 2016; Intergovernmental Panel on Climate Change [IPCC], 2014; IPCC, 2018; IPCC, 2022). As humans, we now possess more knowledge about actions needed for planetary rehabilitation than hitherto seen before; however, current climate actions remain insufficient to address the most deleterious effects of climate change (IPCC, 2022). With less than twelve years remaining to prevent climate catastrophe (IPCC, 2018), it is imperative to recognize knowledge as more than cognitive accumulation, no matter how academic the origination of factual information. Most climate change education (CCE) and research to date, however, has focused on instilling *individual* scientific cognitive clarity instead of learning how to do climate actions *together* (Brownlee et al., 2013; González-Gaudiano & Meira-Cartea, 2010).

Indeed, traditional CCE has focused on how individual values, attitudes, and beliefs influence behaviors (Brownlee et al., 2013), often relying on 'information deficit' models, which assume increased levels of scientific literacy will lead to belief and action (Wibeck, 2014). Higher levels of scientific knowledge, however, do not automatically change minds or mobilize feet (Kahan et al., 2012). Evidence also suggests that climate change beliefs only moderately affect actions (Hornsey et al., 2016). It is becoming increasingly evident that the convoluted challenges associated with climate change necessitate a paradigmatically different type of education to bolster the agency and empowerment of citizens necessary to address climate change (Brownlee et al., 2013; United Nations Education, Scientific and Cultural Organization [UNESCO], 2010; Wibeck, 2014).

Approaching CCE and research from a practice perspective may present such an opportunity. Utilizing a practice lens means educators and scholars adjust conceptual focus away from the knowledge of individual learners to the practices they collectively 'carry,' (un)equally share, and mutually shape, wherein understandings, meanings, and purposes are irreducible to personal attributes (Reckwitz, 2002; Shove et al., 2012). This means emphasis is placed on communal educational activities, not individual learners (Nicolini, 2013). Such a

shift in analytical focus enables a re-conceptualization of learning as occurring "in the middle of everyday practical experience," wherein social milieus create the contextual conditions within which learning occurs (McKenzie & Bieler, 2016, p. 16, also see Lave & Wenger, 1991; Nicolini, 2013). This readjustment aligns with the broader turn within the social sciences towards practice (Schatzki et al., 2001) and may hold potential for CCE and research to engender the large-scale transformation required by recent climate change.

What then is meant by practice? While a consensual practice definition is non-existent (Hager, 2012; Spaargaren et al., 2016), Andreas Reckwitz's definition is commonly cited (Spaargaren et al., 2016). For Reckwitz (2002, p. 249), practices are routine behaviors composed of the following interconnected elements: "forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge."[1] The definition utilized for this research is one put forward by Shove and colleagues' (2012) and is a pared down summary of Reckwitz's definition. For Shove and colleagues' (2012), **practices** are provisionally recognizable entities and performances that actively integrate the elements of which they are composed (Shove et al., 2012). These **elements** include at minimum: materials (e.g., objects, tools, technologies, the body), competences (e.g., background knowledge, understanding, skills), and meanings (e.g., ideas, emotions, aspirations, symbolic meaning) (Shove et al., 2012). Shove and colleagues (2012) justify this reductive schematic due to its analytical capability to illustrate "the recursive relation between practice-as-performance and practice-as-entity" (Shove et al., 2012, p. 15). That is, practices are product and process, noun and verb.

1.1 Definitions

Before overviewing the study's purpose and guiding questions, some additional definitions are presented:

- **Practitioner:** Individuals who 'carry' practices and integrate their elements (Shove, et al., 2012).

[1] Reckwitz's (2002) definition was a summarization of the most prominent theoretical praxeological ideas presented within the articles of Schatzki and colleagues' (2001) seminal work *The Practice Turn in Contemporary Theory.*

- **Bundles of practices:** Bundles of practices are "loose-knit patterns based on the co-location and co-existence of practices" (Shove et al., 2012, p. 81).
- **Complexes of practices:** When practices "depend upon each other…they constitute *complexes*, the emergent characteristics of which cannot be reduced to the individual practices of which they are composed" (Shove et al., 2012, p. 87).
- **Climate action practices:** With the definition of practices mentioned above in mind, climate action practices are broadly defined as those supporting climate change mitigation and/or adaption (see United Nations Development Program [UNDP], 2018) and are "whatever actual and potential practitioners recognize as such" (Shove et al., 2012, p. 82).
- **Whole institution approach to climate action:** A whole institution approach to climate action includes climate action in all domains of school life: Overall Governance (e.g., leadership and overall focus on climate action), Teaching and Learning (e.g., climate action in courses), Community Partnerships (e.g., broader community engagement on climate action), and Facilities and Operations (e.g., climate actions related to physical buildings) (UNESCO, 2016).

1.2 Research Questions

This case study utilizes Shove and colleagues' (2012) conceptualization of practices to describe climate action practices occurring at a Kindergarten to Grade 12 (K-12) school in Canada using a whole institution approach to climate action. Following Shove and colleagues' (2012, p. 22) strategy, this study "follow[ed] the elements of practice" to understand how climate action practices change as they emerge, endure, and disappear. In particular, this research answers the research questions listed in Table 1.1.

Table 1.1

Research Questions

Central Question: How do climate action practices emerge, endure, and disappear within a K-12 school utilizing a whole institution lens to climate action?	
Sub-questions	1. What practice elements (e.g., materials, competences, meanings) are involved in climate action practices at the school?
	2. How are practice elements connected and actively integrated (or not) within and across domains?
	3. How do practitioners become motivated (or not) to 'carry' practices within each domain?

	4. Have forms of feedback (e.g., monitoring) affected how climate action practices have persisted and changed, and if so, how?

In subsequent sections of this thesis, the broader literature is reviewed and synthesized before overviewing the proposed methodology and methods. A discussion of validity then follows, after which ethical considerations, limitations, and concluding remarks are presented.

Chapter 2: Literature Review

This review of the literature begins with a discussion of what is known about 'good' CCE from the research. An orientation to theories of practice within education is then briefly reviewed before overviewing the practice perspective utilized for the proposed research. A synthesis of how CCE research has engaged with components of this version of practice theory is then presented, highlighting gaps which the current research addresses.

2.1 'Good' Climate Change Education

While the field of CCE is still emerging, research suggests it should employ a whole institution approach to CCE (Bieler et al., 2018; Hargis & McKenzie, 2022; Hargis et al. 2021; UNESCO, 2016). A whole institution approach to CCE involves engagement within and across each of the domains of Overall Governance (e.g., policies, meetings), Teaching and Learning (e.g., curricula, hidden curricula), Community Partnerships (e.g., field trips, guest speakers), and Facilities and Operations (e.g., solar panels; see Figure 2.1). Within the Teaching and Learning domain, a whole institution approach also includes incorporating CCE in all subjects. If CCE is only included in science classes, for example, it sends the messages that climate change solutions, causes, and effects are only scientific in nature versus also requiring social and political analysis and action (González-Gaudiano & Meira-Cartea, 2010; Hornsey et al., 2016). The success of a whole institution to CCE approach depends on involving "students, teachers, principals, school staff at all levels, and the wider community – such as families and community members – in reflecting and acting on climate change" (Canadian Commission for UNESCO [CCUNESCO], 2020, p. 26). A whole institution lens to CCE also aligns well with practice theory as it shifts the focus from *individuals* to school and local communities working *together* for climate action.

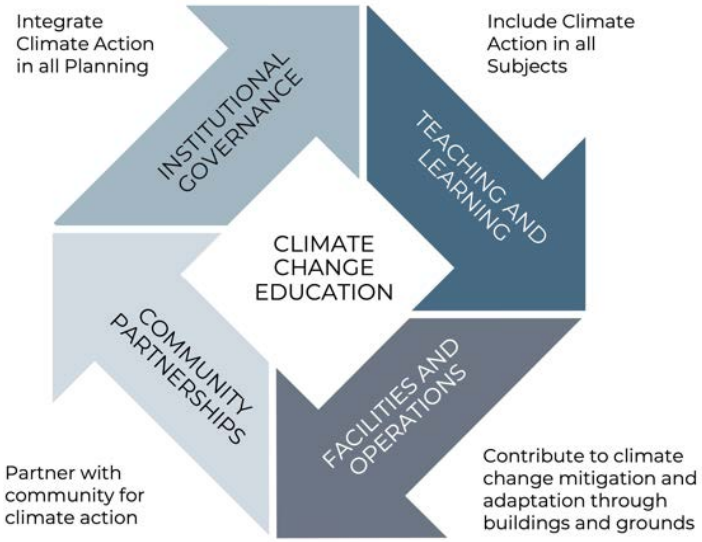


Figure 2.1. *Whole Institution Approach to CCE*. *Note.* This figure illustrates a whole institution approach to CCE (Hargis & McKenzie, 2020; MECCE Project & NAAEE, 2022).

Research also suggests that 'good' CCE should include a focus on cognitive, psycho-social, and action-oriented learning dimensions, all of which should include a justice orientation (see González-Gaudiano & Meira-Cartea, 2010; UNESCO, 2015, 2019; also see Figure 2.2). The cognitive learning dimension includes a focus on developing the knowledge and learning agility needed to understand climate change causes, impacts, and solutions (Monitoring and Evaluating Climate Communication and Education Project [MECCE] Project & the North American Association for Environmental Education [NAAEE], 2022; UNESCO, 2015).

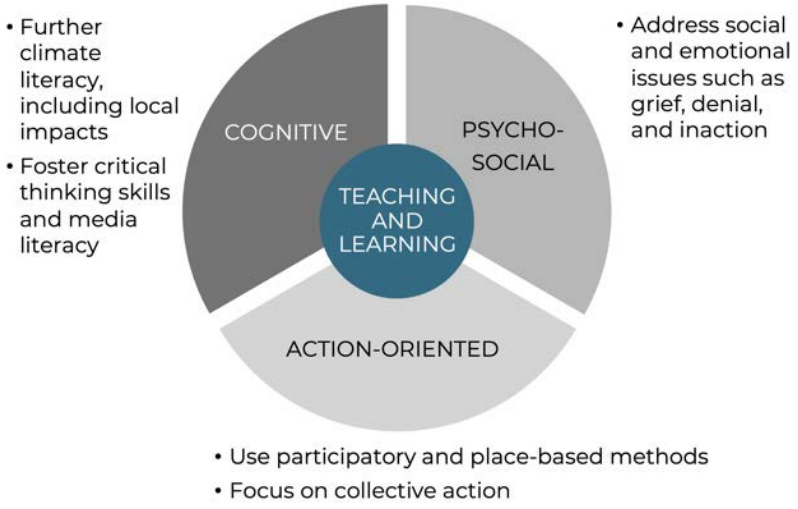


Figure 2.2. *Holistic CCE Framework*. *Note.* This figure illustrates the holistic learning dimensions (Hargis & McKenzie, 2020; McKenzie & Kwauk, 2021; MECCE Project & NAAEE, 2022).

As student knowledge of climate change grows, students may develop eco-grief or eco-anxiety, which illustrates the importance of addressing the psycho-social components of CCE (Doherty & Clayton, 2011; Norgaard, 2011; Randall, 2009). While small amounts of concern can lead to action, without the emotional resilience needed to process climate emotions, students may feel overwhelmed and hopeless (Dooley et al., 2021; Clayton et al., 2017). Indeed, climate grief and anxiety are increasingly affecting the daily functioning of youth around the world (Hickman et al., 2021, p. e863; also see Patel et al., 2021 for additional considerations for Black, Indigenous, and People of Color communities). It is essential that CCE supports students' emotional resilience, bolsters their agency, and empowers them to feel that they, and society, can and are taking meaningful climate action (Bouman et al., 2020; Bright & Eames, 2022; Brosch, 2021; Dooley et al., 2021). The psycho-social dimensions of CCE also include cultural and political considerations, especially since the greatest predictors of climate change belief, concern, and action are related to culture and politics (Callison, 2014; Gregerson et al., 2020; Kahan, 2015). This influence is illustrated in a range of interdisciplinary work that has emphasized the importance of language and framing to make climate change come to matter in relation to the priorities of different communities, as well as to overcome prior doubt and inaction (Kahan et al., 2012; Lee et al., 2015; Rowling, 2019).

Finally, action-oriented CCE is also essential, as students may disengage with climate change if it is seen as distant and unsolvable (Amel et al., 2017; Monroe et al., 2017; Rowling, 2019). Including local climate change-related problems and solutions is essential so that students can see that climate change issues are both local and actionable for individuals and communities (Monroe et al., 2017).

Climate justice should also be integrated across all holistic learning dimensions, including the fact that those most affected by climate change have contributed the least to the problem (United Nations, 2019; Kanbur, 2015). Climate justice issues also intersect with broader social and ecological justice issues, including colonization, racism, sexism, classism,

ableism, and xenophobia (Godfrey, 2012; Godfrey & Torres, 2016). By not addressing the underlying and systemic issues contributing to climate and other forms of injustice, the status quo is maintained and strengthened and we are kept "in an endless cycle of ineffective band-aids while domination, extraction, and oppression persist" (Godfrey & Torres, 2016, p. xxv).

'Good' CCE should also incorporate Indigenous knowledges (Amsler et al., In Press; Ferland, n.d.; Tanyanyiwa, 2019; Mbah et al., 2021; Viswanathan, 2022). Incorporating Indigenous knowledges in CCE (and education in general) is important because Indigenous knowledges "can help us to close some gaps in our knowledge about the environment that will enable us to counter the threats to the natural environment (Nesterova, 2020, p. 1051)." Additionally, in settler colonial societies, such as Canada, including Indigenous knowledges in CCE "can support the processes of transitional and historical justice to heal the damage inflicted on Indigenous peoples during colonialism and reconciliation and the building of new, just and equal relationships between Indigenous and non-Indigenous groups" (Nesterova, 2020, p. 1051). In addition to the learning dimensions mentioned above, CCE should also be holistic from an Indigenous paradigm in that it:

> addresses all aspects of a person and/or topic: the spiritual, emotional, physical and mental/intellectual. It recognizes that climate change education from an Indigenous paradigm is not anthropocentric; the holistic health, wellness, and sustainability of land, water, animals, and other aspects of a thriving ecosystem are just as important to the health, happiness, and survival of human beings. (Ferland, n.d., p. 8; also see Mbah et al., 2021)

Some scholars have also argued that failure to act on climate change at the scale required is rooted in coloniality, which is then recirculated through ideas related to the Anthropocene and education for sustainable development, wherein students are taught knowledge as opposed to alternative ways of being in relation to/with nature or learning to critically interrogate the myth of Western superiority (Amsler et al., In Press; Mbah et al., 2021; Stein, 2019). That is, the incorporation of Indigenous knowledges alongside Western forms of CCE, through anti-oppressive pedagogies is essential to understand why so many individuals and communities fail to act on climate change in the face of overwhelming scientific evidence that we must (Amsler et al., In Press; IPCC, 2022).

Land-based and place-based education have also been proposed as effective teaching methods to support climate action for both Indigenous and non-Indigenous students (Datta et

al., 2022; Ferland, n.d.; Mbah et al., 2021; Viswanathan, 2022). Ferland (n.d.) argued that when "relationships with land are strengthened, climate change comes to matter, and…all participants, Indigenous or not, benefit from an Indigenous land-based approach to climate change education" (p. 1). Land-based CCE can be incorporated across subjects and with diverse pedagogical practices (e.g., storytelling, experiential activities, art, language and naming, ceremony; see Ferland, n.d.; Mbah et al., 2021).

2.2 Practice Theory

Lave and Wenger's (1991) conceptualization of learning as occurring within communities of practice is a common reference point for many educational practice theorists. Even though Lave and Wenger (1991) were not the first to acknowledge the value of experience within education,[1] their conceptualization of learning as 'legitimate peripheral *participation*' marked a significant paradigm shift wherein learning became conceptualized as a collective, participatory social process, as opposed to individual, cognitive acquisition (Hughes et al., 2007). A common critique of Lave and Wenger's (1991) approach is their overemphasis on reproduction (i.e., newcomers learn to reproduce the community's practices) as opposed to transformation (Fenwick, 2012; McKenzie & Bieler, 2016).[2]

While a unified version of practice theory is nonexistent (Nicolini, 2013), there are some common components within its uptake in education. Most educational theorists of practice would agree in principle with Schatzki (2001) that practices are "embodied, materially mediated arrays of human activity (p. 11)." That is, practices are arrays of human activity in that they consist of the elements of human activity, whereby bodies and social activities are mutually constituted (embodied) in practice, a constitution that is, at minimum, mediated by material objects. This "constitutive entanglement of the social and the material" is often referred to as socio-material (Orlikowski, 2007, p. 1438). Social-material approaches

[1] For example, philosophers Rousseau and Dewey also emphasized the importance of learning from experience (Hughes et al., 2007).

[2] Other common critiques are related to the under-theorisation of politics and history (among others) (Barton & Hamilton, 2005; Engeström, 2007; Frankham, 2006, for additional critiques see Hughes et al., 2007 & Fuller, 2007).

to practice within education reject Euclidean 'container' notions of context,[3] instead arguing human and non-human entities fashion contexts through assembled interactions (Fenwick, 2012). Binary divisions (e.g., subject/object) and fundamentalist distinctions (e.g., human/non-human, micro/macro) are also challenged (Fenwick, 2012). As such, socio-material practice approaches enable closer "analyses of participation than are commonly undertaken in conceptions of communities of practice" (Fenwick et al., 2011, p. 14). While educators have conceptualized learning as participatory outcomes of communities of practice for some time, socio-material approaches attend not only to 'who' but also to 'what' participates and how, as well as the resulting implications of those interactions (Fenwick et al., 2011).

2.1.1 Dynamics of Practice

While the relationship between practice, change, and learning is debated (Hager et al., 2012), "understanding how practices change, as well as how they are stable and enduring, is a key issue in thinking through the relationship of practice to learning" (Hager et al., 2012, p. 10). As such, Shove and colleagues' (2012) approach to the dynamics of practice approach is beneficial for CCE and research. Shove and colleagues (2012) are centrally concerned with how practices appear, persevere, and disappear. Their account of the dynamics of practice[4] was created due to an absence within praxeological literature of *how* practices change (Shove et al., 2012).

According to this theorization, practices actively integrate at least three elements (*materials*, *competences*, and *meanings*), wherein a recursive relationship exists between the constitution of practices and their ongoing enactment. Practices appear, persevere, and disappear partly through elemental integration, which occurs when practices are enacted (Shove et al., 2012). Practices exist when elements (*materials, competences, and meanings*) are linked, change upon the introduction or recombination of elements, and disintegrate when links between elements are broken (Shove et al., 2012, see Figure 2.3). Within this conceptualization, elements are "ingredients of practices and points of connection between

[3] Euclidean notions of context are remnants of 18th and 19th century realities wherein social life mainly transpired within discrete nation-states, which is inapplicable to 21st century mobile realities (Law & Urry, 2004).

[4] The author gave this name to Shove and colleagues' (2012) theory as a way to refer to it within the text.

them" (Shove et al., 2012, p. 122). These elemental integrations are interdependent and mutually shaping, forming a 'connective tissue' (Shove et al., 2012). Elemental 'lives' begin before, change through, and extend beyond their integration (Shove et al., 2012). While elements are mobile, each moving in characteristically different ways, the constitution of elements is relatively stable compared to practices, which are constantly forming, re-forming, and de-forming, (Shove et al., 2012).

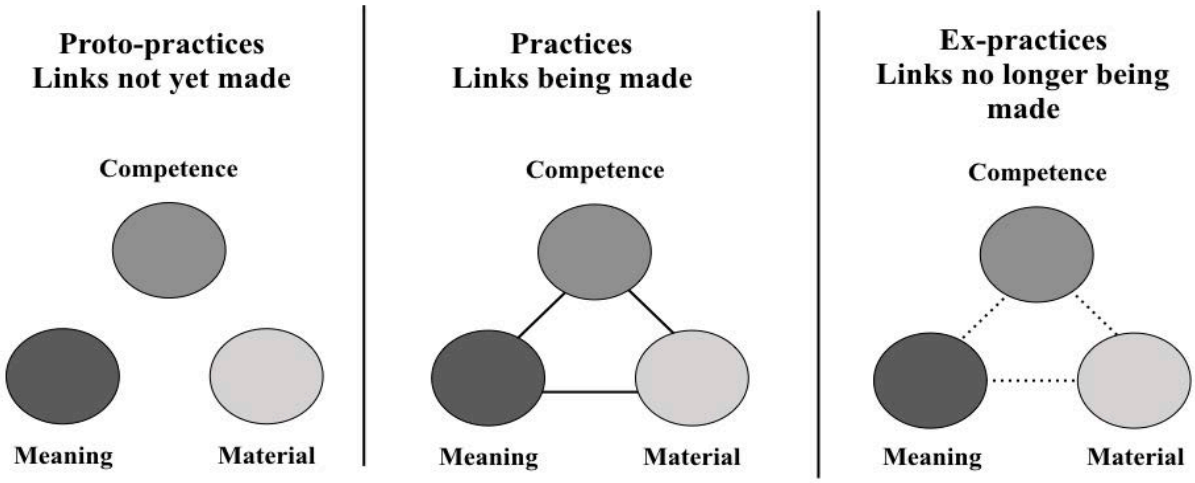


Figure 2.3. *Illustration of 'Proto-Practices,' Practices,' and Ex-Practices.' Note.* This figure illustrates proto-practices where links are not yet made, practices where links are being made, and ex practices where links are no longer being made.

For example, driving is dependent on owning a car (*material*), knowing how to drive (*competence*), and believing that driving to work is an acceptable form of transportation (*meaning*) (Shove et al., 2012). Historically, the practice of driving has changed upon the introduction of more reliable cars (*materials*) whereby drivers no longer needed to also be mechanics (*competence*) (Shove et al., 2012). This introduction of a new *material* element (i.e., more reliable cars) enabled engagement with a more diverse range of practitioners and also changed the *meaning* of driving from one of adventure to one of practicality (Shove et al., 2012). Additionally, many elements required for driving existed before cars were invented and were only later linked. For example, the idea in England that one should drive on the left-hand side of the road (*meaning*) originated from the practice of horse riding in the 1700s where one might need to wield a sword with their right hand (Shove et al., 2012). Only later was this *meaning* linked to the practice of driving (Shove et al., 2012).

To appear and survive, practices must recruit practitioners to 'carry' them. In Shove and colleagues' (2012, p. 126) conceptualization, practices "make agency possible" in the sense that "human agency is loosely but unavoidably contained with a universe of possibilities defined by historically specific complexes of practice," wherein practices "do not exist unless recurrently enacted by real-life human beings." That is, practices exist only when practitioners actively integrate the elements they 'carry' and not all are faithful carriers (Shove et al., 2012). Recruitment and defection are partially related to inequality as "not every human being is capable of undertaking every possible practice, nor are practices uniformly distributed" (Shove et al., 2012, p. 65). This acknowledgment enhances previous conceptualizations of 'participation' because who is allowed to 'carry' a practice not only affects individual access, it also determines the future shape of that practice and patterns of (in)equality (Shove et al., 2012).

The life of practices is also affected by inter-practice connections (Shove et al., 2012). Shove and colleagues (2012, p. 83) proposed three formulations: "one in which practices exist but without being integrated, one in which practices are provisionally linked by ties of co-existence [i.e., bundles] or co-dependence [i.e., complexes], and one in which connections are no longer sustained (see Figure 2.1)." Practice bundles and complexes appear and disappear through practice collaboration and competition (Shove et al., 2012). Through competing and collaborating "certain practices establish the terms and conditions on which others interact" (Shove et al., 2012, p. 91). These relationships affect trajectories of elements and practices, of which practice bundles and complexes are constituted (Shove et al., 2012).

Connected practices also shape each other through circuits of reproduction, which include forms of monitoring and cross-referencing (Shove et al., 2012). These circuits are affected by past and current configurations of elements, practices, and relations and may appear neutral but are skewed by patterns of inequality (Shove et al., 2012). Shove and colleagues (2012) argue, citing Urry (2007), that this practice coordination often occurs 'on the move' within cultural and historical contexts across space and time. In short, practices emerge, endure, and disappear not only through (dis-/re-) connections between elements but also through (de-/re-)linkages between practices.

The dynamics of practice approach also aligns with a growing focus on materiality found within Science and Technology Studies, Indigenous and settler colonial studies, feminist, new materialist, and spatial theorizations (e.g., Barad, 2007; Bennett, 2010; Goeman, 2008; Ingold, 2010; Latour, 2005; Wilson, 2008). For instance, Shove and colleagues (2012) take Latour's (2000, p. 114) argument quite literally that materials are "the stuff out of which socialness is made." Attention to materiality also expands notions of agency. For example, new materialist approaches encourage theorists to consider agency "non-anthropocentrically, as a situated process in which material culture is entangled" (Knappett & Malafouris, 2008, p. xii). That is, new materialist approaches "help us understand 'agency' as an expression of sociomateriality and practical experience" (McKenzie & Bieler, 2016, p. 14), which aligns with the dynamics of practice approach where practices are active integrations of elements (e.g., *materials*) that make agency possible (Shove et al., 2012).

The dynamics of practice approach also has potential to connect the practice turn with the one towards mobility when researching CCE (Urry, 2007, also see McKenzie & Bieler, 2016 regarding the centrality of mobility to considerations of place as a dimension of practice).[5] Like the turn towards practice, the focus on mobility in recent decades is also a turn away from Euclidean container views of society to deal with the mobile, the fleeting, the sensory, the emotional, and the kinesthetic (Law & Urry, 2004).

Consideration of the influences of land, place, and other species as constitutive dimensions of practical experience (see McKenzie & Bieler, 2016) would also strengthen Shove and colleagues' (2012) account of practice. While Shove and colleagues (2012) mention the co-constitution of space and practice, they do not extend their theorizations to place. Shove and colleagues' (2012) account could also connect more explicitly to learning, such as the critical situated learning approaches described by McKenzie and Bieler (2016). In their account, "the activity itself does something to the learner" (McKenzie & Bieler, 2016, p. 16), wherein situated, practical experiences act as "pedagogical pivot points" with the

[5] The mobility turn countered the a-mobile history within social science research wherein the movement of "people, objects, information, and ideas" took center stage (Büscher & Urry, 2009, p. 99).

potential to foster critical learning and social change (Ellsworth, 2005, p. 8). In particular, Shove and colleagues (2012) could link their account of practice to learning by considering what happens to those who carry practices and how practices and practitioners are changed in the process. Further exploration of the interconnections between theorizations of mobility, place, and learning to the dynamics of practice would allow an even deeper analysis of how practices and learning change as they move across time, space, and place.

While the dynamics of practice approach was not utilized within any of the educational literature reviewed, there is promising potential for CCE research. For instance, Shove and colleagues' (2012) suggestion that we are surrounded by connected and unconnected elements (e.g., from past practices) illustrates not only how practices evolve but also presents a new way of understanding practice potential. Put another way, we are surrounded by future practice possibilities. Utilizing a dynamics of practice approach to research whole institution approaches to CCE would mean following the elements of practice across all four areas. For example, within the domain of Teaching and Learning, a teacher may instruct students *about* climate action (*competence*) by having them talk about what taking climate action means (*meaning*) and showing a video (*material*) with some examples. Practices can also connect across domains. For example, learning *about* climate action within the Teaching and Learning domain can be strengthened by learning *through* action within the Community Partnerships domain by conducting climate action projects with partner organizations (UNESCO, 2016). The next section overviews existing CCE research in relation to the elements of practice and situates this work within the broader research on CCE.

2.2 Elements of Practice in CCE Research

Previous CCE literature reviews have focused on interventions in formal and non-formal settings (Monroe et al., 2017), foundational processes influencing climate change beliefs (Brownlee et al., 2013), and CCE goals, barriers, and solutions (Wibeck, 2014). The current review examines how CCE has been researched within K-12 schools to date in relation to the elements of practice (*materials, competences, and meanings*) as conceptualized by Shove and colleagues (2012).

Topics of inquiry in existing CCE research most commonly centered on ensuring *competence* in climate science. The majority of studies focused on measuring and/or

improving scientific knowledge of climate change for students or teachers (Anyanwu et al., 2015; Bofferding & Kloser, 2015; Dijkstra & Goedhart, 2012; Karpudewan & Khan, 2017). There was also a strong focus in the existing literature on how to teach climate science (Bofferding & Kloser, 2015; Karpudewan & Khan, 2017; Niebert & Gropengiesser, 2013; Shepardson et al., 2012). This scientific focus within CCE research is not surprising and matches previous findings of formal and non-formal CCE more broadly (Monroe et al., 2017). Interestingly, the only study found that explicitly examined the relationship between increased scientific knowledge, favorable attitudes towards science, and pro-environmental intentions found no relation (Dijkstra & Goedhart, 2012). This finding also aligns with previous research indicating public climate change belief does not rely upon scientific knowledge (Hornsey et al., 2016; Kahan et al., 2012). While one study considered the social construction of scientific knowledge (Karpudewan & Khan, 2017), climate action *competences* were largely only considered within scientific framings.

There was a minor focus in the existing research on what climate change knowledge *meant* for individuals in relation to taking climate action. One study sought to understand whether students, teachers, and environmental specialists located the imperative for climate action within individual practices or broader social, political, and economic mobilizations (Waldron et al., 2016). There was also some focus on how different types of hope associated with CCE can *mean* action or inaction (Ojala, 2015); however, this phenomenon was not connected to the notion of affect or tested more broadly in relation to other emotions. One study also considered symbolic *meanings* by comparing metaphors utilized by scientists and students to understand climate science (Niebert & Gropengiesser, 2013). Overall, climate change *meanings* remain largely unconsidered within CCE research or only considered in relation to scientific *meanings* and *competences*.

Material elements rarely featured in CCE research. Körfgen, Keller, Kuthe, Oberrauch, and Stötter (2017) did examine how learning settings affected engagement with climate change themes within class projects; however, they did not connect their observations to materiality. There was also some focus on intertextuality in relation to whether or not discourses within public climate change documents were present within curriculum (Chang & Pascua, 2017). When present, *materials* were often examined in relation to scientific

competences. For example, Román and Busch (2016) examined how climate change was framed linguistically within science textbooks. Additionally, Ho and Seow (2017) employed a cross-case comparison to consider advantages and disadvantages of incorporating climate change scientific knowledge within one or multiple disciplines within curriculum (Ho & Seow, 2017). While there was some focus on *materials* within CCE research, they were often only incorporated through a scientific lens, such as scientific textbooks.

As illustrated above, current CCE and research mainly relies on *materials*, *meanings*, and *competences* from one discipline (i.e., Science). The current study addresses this gap by considering climate action practices through an interdisciplinary lens. For example, acknowledging the importance of *meanings* within CCE not only within science but also when incorporating knowledge from psychology and sociology will strengthen the connection of the *meanings* element of CCE to other practice elements (i.e., *competences* and *materials*). Incorporation of psychological and sociological insights can illuminate *how* climate change beliefs are constructed (Brownlee, et al., 2013), the *meanings* embedded within those beliefs, and how those *meanings* come to coalesce (or not).

While the literature reviewed mainly only focused on one practice element, the current study describes how all three elements of climate action practices are connected (or not) and how climate action practices are related to each other (or not) across the four whole institution domains so that future practice and policy interventions can encourage greater climate action (Shove et al., 2012). The literature reviewed also mainly focused on individual qualities, not shared practices. This study enables a more holistic analysis through the focus on collective practical reality and potential. Within the literature reviewed, there were also very few explicitly stated constructivist approaches (3 articles); therefore, this research contributes to diversifying epistemological and ontological approaches to CCE research.

The next chapter overviews major methodological concerns relevant to practice research as well as the chosen methodological framing and methods for the current study.

Chapter 3: Methodology and Methods

This section begins by stating the major methodological issues to consider when designing practice-based research. Strategies for overcoming these challenges are then presented. These strategies are then connected to the overarching theoretical framework utilized for the current research (see Shove et al., 2012). Case study methodology design considerations in relation to the proposed study are then highlighted before the methods for the proposed research are presented.

3.1 Method and Methodological Challenges and Strategies

Methodological challenges for practice-based studies exist at all stages of the research process (Gherardi, 2012). When gathering data, praxeologists must first demarcate the practices under consideration (Dobernig et al., 2016; Gherardi, 2012). From there, praxeologists debate about the 'correct' type of qualitative methods to capture implicit and explicit practice information (e.g., Browne, 2015; Nicolini, 2017; Schmidt, 2017) as well as the validity of mixing in quantitative methods (Halkier, 2017; Littig & Leitner, 2017). Still others consider if new methods are needed, or if traditional methods can learn to 'dance' together in practice (Haldrup, 2011). When interpreting data, choices abound regarding the level and unit of analysis utilized (Gherardi, 2012). Finally, the literary style chosen to represent practice is just as important as the chosen study method (Nicolini, 2009).

A review of the literature found several recommended method and methodological strategies for overcoming praxeological challenges. As a response to the praxeological debate regarding appropriate data generation methods, the potential of new, mobile, and hybrid methods is considered below, especially given their potential to capture implicit practice knowledge upon which practices often depend (Buegger, 2014). A discussion of these methods is followed by an overview of methodological strategies to address the remaining challenges.

3.1.1 Responding to the Method Debate

To address the issue of appropriate qualitative data generation methods, especially for capturing implicit practice knowledge, many praxeologists draw on new and hybrid methods created for the 'mobility turn' within the social sciences (Sheller & Urry, 2006; Urry, 2007). Mobile methodologies utilize movement as part of the research process under the assumption

that mobile methods produce different data than sedentary ones (Hein et al., 2008). Praxeological researchers have utilized a range of new 'mobile methods' such as photo diaries, blogs, head cams, time-space diaries, and geographical information system mapping (Hein et al., 2008; Rief, 2017). Many of these new mobile methods are actually hybrid formations wherein traditional methods are combined and taught to 'dance' (see Haldrup, 2011). Walking interviews are a commonly used hybrid method within praxeological research that combine the traditional methods of participant observation and interviewing (see Ferguson, 2011; Heidenstrøm & Kvarnlöf, 2017). Walking interviews utilize movement as a methodological tool to capture participants' experiences *and* interpretations (Holton & Riley, 2014; Kusenbach, 2003). Through the use of walking interviews, praxeologists gain access to information unavailable to sedentary interviews and uninterrogated shadowing due to the experiential prompts provided by visiting various locations during the course of an interview (Holton & Riley, 2014; Kusenbach, 2003). Mobile methods are situated in present time, allowing closer access to situated bodily experiences, resistances, feelings, and emotions (Büscher & Urry, 2009; Hein et al., 2008; McKenzie & Bieler, 2016).

Indeed, emotions such as happiness and anger are often displayed implicitly through expressive body movements. One way suggested to capture such implicit, embodied practice knowledge involves utilizing methods and methodologies that attend to the five bodily senses (Ginkel, 2017; Niewöhner & Beck, 2017; see also Pink, 2009 regarding sensory ethnography). Attention to sensible knowledge situates practice as "*seeing*, saying and doing, thereby adding the dimension of seeing (which comprises a set of sensible capacities) to the traditional ones of saying and doing" (Gherardi, 2012, p. 74).

Narration is also a sensible, embodied aspect of practical experience (e.g., breath regulation in oral storytelling and body language in communication) that is always emplaced (McKenzie & Bieler, 2016). As such, narrative and place-based methods also hold potential to capture implicit practice knowledge. While no praxeological studies were found that explicitly attended to aspects of narration or place, narrative and place-based methods hold potential, along with sensory and mobile methods, to capture the nuanced dimensions of practice (e.g., values, thoughts, and emotions).

Gherardi (2012) also contributed to the call for new methods by creating an interview technique called the 'interview to the double (ITTD),' which captures implicit normative dimensions of practices. The ITTD is a projective strategy wherein participants are asked to pretend the researcher will become their double and to provide all the details necessary so that the researcher is not unmasked (Gherardi, 2012). While the ITTD does not capture an accurate portrayal of the practices in question, it provides insights into the normative and moral dimensions of practices that are otherwise difficult to sense (Gherardi, 2012; Nicolini, 2009).

While separate, mobile, sensory, place-based, and narrative methods also overlap in their focus, as practices often occur 'on the move' and are shaped by sensory reactions, stories told, and places within which they occur. These methods share a combined interest in practice that is useful when identifying appropriate methods for praxeological research. The next section considers methodological strategies for praxeological research.

3.1.2 Responding to Methodological Challenges

Many of the methodological suggestions for praxeological research identified in the literature utilized one or more approaches recommended by Nicolini (2017). Despite the diversity of theoretical thought underlying the methodological strategies he proposed, he argued it is possible to mobilize (not unify) this multiplicity (Nicolini, 2013; 2017). Nicolini (2013) also recommended researchers 'zoom in' on the accomplishments of a practice before 'zooming out' to perceive relationships with other practices across space and time. His four strategies are meant as an extension to that stage direction (Nicolini, 2017). This section begins by describing Nicolini's (2017) methodological strategies, which provide guidance for praxeological research, in general. Another strategy is then presented for connecting an understanding of practical experiences with situated, critical learning, in particular (see McKenzie & Bieler, 2016). Additional suggestions for interpreting and textualizing praxeological data are then overviewed before connections are made between the strategies presented and the theoretical orientation for the proposed research.

The first strategy for praxeological research recommended by Nicolini (2017) is gaining a situational orientation. This involves the researcher familiarizing herself with the practices studied, often through observation (Laube, 2017; Nicolini, 2017; Sedlačko, 2017).

This situated perspective is necessary because familiarity with practices often makes certain aspects invisible to practitioners (Nicolini, 2017). Additionally, practices exist in layered textures that are difficult to separate empirically (Gherardi, 2012; Nicolini, 2017). For example, the time spent seat adjusting, mirror checking, and signaling are usually absent from descriptions of a road trip even though they are crucial to driving a car. While all these practices make it possible to drive, they may not all hold relevance to the praxeological inquiry. By gaining a situational orientation, the researcher is better able to identify practices relevant to their investigation. The situational orientation emphasizes the necessity of relevant, situated practice identification and delimitation as part of praxeological investigations (Nicolini, 2017).

The second strategy recommended by Nicolini (2017) is a genealogic orientation. This approach involves focusing on a practice's historical development and disappearance (Nicolini, 2017). A genealogic orientation includes focusing on practice transformations over time and across settings (Laube, 2017), grounding analysis in a historical perspective (Schäfer, 2017), and considering the history of practice assemblages (Sedlačko, 2017).

The third strategy recommended by Nicolini (2017) involves utilizing a configurational orientation. This approach 'zooms out' to follow how practice performances hang together to form larger constellations and assemblages (Nicolini, 2017; also see Schäfer, 2017; Sedlačko, 2017). The configurational orientation also includes a focus on the assembled composition of practices as well as comparisons of different versions of a practice that exist simultaneously (Laube, 2017).

The fourth strategy recommended by Nicolini (2017) involves utilizing a conflict-sensitive orientation. This approach considers how two or more practices co-evolve through conflict and interference (Nicolini, 2017). The conflict-sensitive orientation can also capture implicit practice knowledge through crises and controversies. Buegger (2014) explains that during crises and controversies, implicit knowledge often becomes explicit because actors must justify their actions, making tacit knowledge easier to access. This strategy also considers conflicts in relation to how they emerge and are overcome through assembling (Sedlačko, 2017). A conflict-sensitive approach can also help identify instances of

contradictions and cognitive dissonance, which can be used as a teaching tool (Adcock 2012; McFalls & Cobb-Roberts, 2001; McGrath, 2020).

While the previously mentioned methodological strategies addressed the challenges of praxeological research, in general, a final strategy is presented, which links practical experience to learning in particular. McKenzie and Bieler (2016, p. 32) suggest that bringing together the lenses of the social, place, and narration enables "a deeper orientation to the functioning of practical experience within learning and education." In their consideration of the social, they expand beyond Lave and Wenger's (1991) notion of communities of practices to include more generative aspects of sociality (see McKenzie & Bieler, 2016). These aspects include, for example, how social time is produced through bodily rhythms and forms of resistance (McKenzie & Bieler, 2016). Their reference to place "imperfectly directs us to the qualities of practical experience associated with place and land, but also includes interactivity with other *material* elements that shape our practices and experiences, such as with non-human objects and other species" (McKenzie & Bieler, 2016, p. 21). Their emphasis on place expands notions of materiality common to socio-material practice-based approaches (e.g., Fenwick et al., 2011), which do not consider the socio-historical relations between land and materiality (McKenzie & Bieler, 2016). For McKenzie and Bieler (2016, p. 26), narration is an "inescapable aspect of practical experience" that involves not only naming and unnaming places (e.g., by discarding settler colonial labels for land as 'property') but also telling and performing stories that are embodied, politicized, emotive, and affective (McKenzie & Bieler, 2016).

While the aforementioned methodological strategies are useful when generating *and* interpreting data, the interpretational challenges previously mentioned regarding determining the level and unit of analysis are aided by wielding theoretical tools and concepts (Gherardi, 2012). For example, the unit of analysis is affected by whether a theoretical orientation views practices as 'containers,' 'processes,' 'results,' or some combination of all three (Gherardi, 2012). After data is generated and interpreted, praxeologists can textualize practices utilizing a variety of linguistic strategies to draw readers close to the 'real thing' (Czarniawska, 2007). Some examples include, using multiple writing styles (Nicolini, 2009) heroic stories, fictionalization, and multimedia strategies to dramatize (without sentimentalizing) practice

(Czarniawska, 2008). No matter the literary style, practice descriptions should have multiple layers and consider the embodiment of practices (Müller, 2017). Using literary strategies allows researchers to "generate descriptions and 'bring worlds into being' in the texts we compose" (Nicolini, 2017, p. 24).

As this section has illustrated, several methods and methodological tools are available to praxeologists for generating, interpreting, and textualizing their research. This research utilized a whole institution approach to follow the elements of practice across all four whole institution domains (i.e., Overall Governance, Teaching and Learning, Community Partnerships, Facilities and Operations; configurational orientation), attend to the history of practices in and across these domains, including in relation to land and place (genealogic orientation), and investigate crises and conflicts (conflict-sensitive orientation), through a situated (situational orientation) analysis. These strategies, which focus on practical experiences, in general, were also examined through the critical situated learning lenses of the social, place, and narration, in particular. The next section discusses methodological design considerations for the current case.

3.2 Case Study Design

Case studies investigate "episodes of nuance, the sequentiality of happenings in context" related to the main phenomenon or case under consideration (Stake, 1995, p. xii). Case studies are best situated to answer 'how' and 'why' questions (Yin, 2014). The following 'how' question guided the current case study: How do climate action practices emerge, endure, and disappear within a K-12 school utilizing a whole institution lens to CCE? Theoretical propositions should also guide case study research (Yin, 2014). The current study's propositions are adapted from those proposed by Shove and colleagues (2012) that: climate action practices exist when the elements of practice are linked, and climate action practices emerge, endure, and disappear as elemental links are made, maintained, and broken. Case study research should also clarify the unit of analysis (Yin, 2014). For the current study, the unit of analysis is climate practices, which are simultaneously products and processes, 'carried' by individuals in a K-12 school within or across the whole institution domains. Case study designs should also link data generated to the study's propositions (Yin, 2014). For the current study, deductive and inductive codes connected the data generated to the propositions

(see Data Analysis section). Case study designs should also develop criteria for interpreting findings (Yin, 2014). As an intrinsic case study, the primary aim is understanding the case (Stake, 1995); therefore, the main criteria for interpreting the findings is geared towards the development of rich descriptions in relation to the theoretical framework and the crystallization method of validation (see Data Analysis section).

While acknowledging the limitations of case study approaches, such as their tendency to rely too much on story-telling, make 'fuzzy generalizations,' and lack internal and external validity (Barth & Thomas, 2012), a case study is necessary in this instance to describe a unique case wherein a whole institution approach to climate action is implemented. The current case study describes an intrinsic case wherein climate action practices are occurring within a K-12 school across all four whole institution domains. The selection of one case is justified due to the unique nature of the case, which was studied intensely over four weeks (Stake, 1995; Yin, 2014). The methods utilized within this case study are detailed next.

3.3 Data Generation

According to Yin (2014, p. 114), case studies should generate "multiple sources of evidence." The following sections address Yin's (2014) suggestion by detailing the methods used. Nicolini (2013) suggested ethnographic methods are best suited for studying practices; therefore, many of the methods outlined are ethnographic and/or sensory ethnographic in nature.[1] Data generation protocols for all methods addressed the elements of practice identified by Shove and colleagues (2012), including links between elements and practices to describe how climate action practices emerge, endure, and disappear, using the methodological lenses previously identified by Nicolini (2013, 2017) and McKenzie and Bieler (2016). Case study research pivots on the identification of a case; therefore, this section begins by describing site selection (Creswell & Poth, 2018). Details related to data generation methods within relevant domains,[2] participant selection, and data analysis for the proposed research are then overviewed.

[1] Sensory ethnographic methods rethink ethnographic methods to notice, attend to, and document sensory reactions (Pink, 2009).

[2] I follow Thomson and Hall (2017, p. 162), in referring to data generation as opposed to data collection, which assumes data already exist awaiting for researcher collection; however, "things aren't data until we make them data."

3.3.1 Site and Participant Selection

In response to recent international calls for CCE (General Assembly resolution 70/1, 2015; UNESCO & United Nations Framework Convention on Climate Change [UNFCCC], 2016; UNFCCC, 2015), the United Nations Educational, Scientific and Cultural Organization (UNESCO) launched a Climate Change Pilot Project within their Associated Schools Network (ASPnet). Ten primary and secondary education schools within Canada participated in this international project, which ran from September 2017 to May 2018 and entailed a whole institution approach to climate action under the direction of the Canadian Commission for UNESCO (CCUNESCO). To implement the pilot project, schools were provided with a Getting Climate Ready (UNESCO, 2016) guide. The Sustainability and Education Policy Network (SEPN) conducted an evaluation of this project using interviews and a survey (see Chopin et al., 2018; Hargis et al., 2018), which highlighted a school exhibiting promising CCE for the current case study.

The site chosen for this study was purposively sampled from SEPN's CCUNESCO evaluation referred to above and was a pre-Kindergarten to Grade 12 school (Creswell & Poth, 2018). While SEPN's evaluation identified evidence of climate action practices already occurring, the current case study further investigated those actions over four weeks. During the 2018-2019 school year, the school used a whole institution approach to address the Sustainable Development Goals (SDGs), focusing on climate change during April 2019.

Data generation for the current case took place during late April to mid-May 2019. Table 3.1 illustrates the data generated by whole institution domain, method, and participant type. Participants included administrators, staff, teachers, students, and community members (see Appendix A for Recruitment Materials). All participants completed informed consent and/or informed assent forms (see Appendix B).

The Indigenous peoples inhabiting the land where my research was conducted are part of the Saugeen Ojibway Nation, which is made up of two distinct First Nations – the Saugeen First Nation and the Chippewas of Nawash Unceded First nation (Saugeen Ojibway Nation, 2019). Before the British arrived, the Saugeen Anishnaabek "occupied a land base of about two million acres (Environment Office, 2021a, n.p.). In 1763, a Royal Proclamation was issued to impede European settlement on First Nations land in North America. However,

continued appropriation of land by Europeans, coupled with the promise of land on Manitoulin Island, led the Saugeen Anishnaabek to relinquish all land south of Owen Sound to the Europeans in 1836 (Saugeen Ojibway Nation, 2019). In 1847, Queen Victoria confirmed by issue of Royal Declaration that the Saugeen Anishnaabek still held the Saugeen Peninsula (i.e., all land between Southhampton and Owen Sound, as well as all islands within 7 miles, Environment Office, 2021a; Saugeen Ojibway Nation, 2019). Only seven years later, however, the Crown said it could no longer protect Saugeen Anishnaabek land from settlers, so Treaty No 72 was negotiated in 1854 (Environment Office, 2021a). This Treaty ceded less than 500,000 acres of land, and in return, the Saugeen Anishnaabek "were to receive proceeds from all lands sold to be held in trust (Environment Office, 2021a, n.p.)." The remaining reserves were also to be protected from European advancement, a promise that was not kept (Environment Office, 2021a). Many reserves and islands were eventually surrendered to the British, and it was not until 1968 that around 90 fishing islands in Lake Huron were returned to the Saugeen Anishnaabek (Environment Office, 2021a).

The Saugeen Ojibway Nation is still pursuing legal claims against the federal, provincial and municipal governments with varying success. With regards to their successes, in recent years, they have reached agreements with Bruce County to transfer 306 acres of County forest within the Lindsay and Amabel Tract (Bruce County, 2021) and Grey County to transfer 275 acres of County forest in the Georgian Bluffs (Grey County, 2020). An agreement was also reached with Saugeen Shores to provide "approximately 1.7 hectares of municipal property, financial compensation and a commitment for ongoing municipal support for housing development (Environment Office, 2021c, n.p.)."

The Saugeen Ojibway Nation has also faced ongoing challenges to their sovereignty. For instance, in 2021, a court decision rejected Saugeen Ojibway Nation's claim for Aboriginal Title[3] to parts of Lake Huron and Georgian Bay and the lands beneath them (Environment Office, 2021b). The same court decision also passed judgement on a Treaty Claim that the Crown misled the Saugeen Ojibway Nation when negotiating Treaty 72, which led to the surrender of the Bruce Peninsula (Environment Office, 2021b). The judge found

[3] According to Canadian law, an Aboriginal title is an Indigenous land right that is protected by section 35 of the Canadian constitution (Environment Office, 2021b).

that the Crown did break its promise (from Treaty 45 ½) to protect the Peninsula but found the Crown did not owe the Saugeen Ojibway Nation fiduciary duty (Environment Office, 2021b). The Saugeen Ojibway Nation Joint Council will appeal the Court's dismissal of the Aboriginal title as well as the dismissal of the Crown's fiduciary duty in the Treaty Claim (Environment Office, 2021b).

Table 3.1

Data Generated by Whole Institution Domain, Method, and Participant Type

Domain	Method	Participant Type	Participant #	Document #	Photo #
Overall Governance	Interviews	Administrators	1		
	Observations	Students	7		
		Teachers	1		
		Community partners	2		
	Documents			4	
	Photos				10
Teaching and Learning	Interviews	Teachers	12		
	Focus groups	Students	19		
		Teachers	7		
	Observations	Student	54		
		Teachers	7		
	Documents			8	
	Photos				109
Community Partnerships	Observations	Students	13		
		Teachers	1		
		Community partners	2		
	Documents			2	
	Photos				13
Facilities and Operations	Photos				84
Total Participants			**126**	**14**	**216**

Note: For classroom observations, student numbers include the total number of students who returned consent and assent forms, not the total number of students in the class observed. For the student focus groups, student numbers include the total number of students who returned consent and assent forms, not the total number of students in the class (those who did not return both forms still completed the activity, but their pictures were not collected, and their conversations were not recorded).

The total discrete participant number was 96, not the 126 participants indicated in Table 3.1 because several participants participated in more than one research activity. The total participant number by participant type (not including participants who participated in more than one research activity) was 78 students, 13 teachers, 1 administrator, and 4 community members. In 2019, enrollment included 202 elementary students (Education Quality and Accountability Office [EQAO], 2020a) and 54 secondary students (EQAO, 2020b), for a total of 256 students. This means that 30.5% of students at the school completed at least one research activity. In 2019, the total number of teachers at the school was 14, meaning 92.9% of teachers at the school completed at least one research activity. At the time of the site visit, there were two administrators at the school, meaning 50% of administrators at the school participated. Staff members at the school were invited to participate (i.e., the cafeteria workers and janitors), but they declined. The following sections detail how and from whom data were generated.

3.3.2 Sensory Walk

Data generation began with me becoming situated to the place within which the school was located by conducting a sensory walk of the school surrounds. Several theorists (e.g., De Certeau, 1986; Gray 2003; Lee & Ingold, 2006) have noted place-making occurs through walking, which is also a multisensory activity (Pink, 2008). During this sensory walk, I documented the route taken, sights, sounds, textures, and smells encountered as well as areas that appear heavily used and neglected (Thomson & Hall, 2017) in my field notes, which also included a Google Map screen shot of the school surrounds. Written observational notes were numbered to match numbers of places observed on the Google Map screen shot. During this sensory walk, I also took photos of the surrounding built and natural environment. A short description of the surroundings as they were first encountered also accompanied the map. This mapping activity provided "a means to (re)present place as lived and embodied" (Powell, 2010, p. 539). I also asked for a school tour when I arrived and documented my first sensory impressions of the school in my field notes. The sensory walks enabled me to become attuned to my embodied experience, which helped me better understand the experiences of the people within the place analyzed (Pink, 2008).

3.3.3 Observations as Multi-sensory Participation

Observations are crucial to case studies (Stake, 1995; Yin, 2014) and can capture rules and norms often taken for granted or unreported due to memory limitations (Guest et al., 2013). Observations enabled richer data generation related to climate action practices that would have been overlooked or otherwise unavailable (Guest et al., 2013). This information supported an intuitive understanding of the data, lessened bias in reporting, and aids in defending the findings (Guest et al., 2013). This study utilized formal and informal sensory ethnographic observations. Sensory ethnographic methods shift focus from 'participant observation' to 'multisensory participation,' wherein the researcher attempts to experience the event *with* participants (Pink, 2009). This conceptual shift enabled me to better understand participants' perceptions as well as my own emplacement and the co-constitution of the places and practices I sought to learn about (Pink, 2009). This knowledge supported an "experience-based empathetic understanding" of what participants experienced and knew (Pink, 2009, p. 65).

Observational protocols were used for formal observations, which included classroom lessons, field trips, eco-team meetings, and 3% Project meetings (explained below) meetings (see Appendix C). The protocols focused on capturing the climate action practices observed, practiced and/or discussed as well as the *materials*, *competences*, and *meanings* used to engage in/talk about climate action practices. Students' reactions, comments, and engagement with the material were also noted. The protocols also had space to document my sensory reactions. Informal observational field notes (e.g., information about the physical building) were used to support the development of a rich case description (Stake, 1995; Yin, 2014).

3.3.4 Interview to the Double

Interviews are an important data generation method for case studies (Stake, 1995; Yin, 2014), enabling researchers to explore and explain phenomena (Guest et al., 2013), such as climate action practices. Overall, the interviews within this study are conceptualized as a social practice where knowledge is constructed, not collected (Brinkmann & Kvale, 2015; Holton & Riley, 2014) and is emplaced and embodied (McKenzie & Bieler, 2016).

Interview participants first completed a demographic survey, which included questions related to the *materials*, *meanings*, and *competences* associated with climate action practices at their school (see Appendix C). The remainder of the interview utilized the ITTD

technique previously discussed (see the Responding to the Method Debate section) to capture the implicit and normative assumptions surrounding the planning and implementation of a climate action month (Gherardi, 2012). I asked participants to pretend that I was going to switch places with them to plan and carry out a month focused on CCE at their school. I asked the participants to tell me everything I needed to know so that I was not un-masked when carrying out those practices myself, including what I needed to know, do, see, feel, and hear, as well as needed *materials*. The prompt also included a short example of the type of information participants should provide (Gherardi, 1995). I also asked participants to provide their instructions in the second person to make the interview less threatening (Scheller, 2001, as cited in Nicolini, 2009). Initially, I allowed participants to talk relatively uninterrupted, only asking questions of clarification (e.g., how would you do that) (Nicolini, 2009). After their story was finished, I asked *focused* follow-up prompts as needed, following a protocol but remaining semi-structured and open-ended, with about ten questions (see Appendix C). When possible, interviews followed observations and occurred later in the data generation period to enable me to foster participant's trust (Branthwaite & Lunn, 1985).

In keeping with sensory ethnographic methods, the interviews are conceptualized as multi-sensory events (Pink, 2009). Not only did I ask participants to tell their stories from a sensory perspective, I also asked them to use/bring whatever they needed to tell their story, which could include pictures and/or other objects. I also informed participants that they could stand up or walk around the room/school if they felt their story was better told through movement. I noted the multi-sensory experiences participants talked about in their stories as well as those experienced in the interview itself (e.g., the feel of the seat cushions, sounds, smells, etc.).

The interviews lasted up to one hour and were audio recorded. Guest and colleagues (2013) recommend interviewing between 6-12 individuals for case study research. The current study included interviews with 13 participants involved in each of the four domains of Overall Governance, Teaching and Learning, Community Partnerships, and Facilities and Operations (see Table 3.1). Participants were selected utilizing maximum variation sampling to obtain multiple perspectives regarding climate action practices (Creswell & Poth, 2018).

Snowball sampling was also utilized, meaning participants were asked to identify other potential participants (Guest et al., 2013).

3.3.5 Focus Groups

Focus groups were utilized to generate data on shared climate action practices occurring at the school as well as to observe group dynamics to better understand how *materials*, *competences*, and *meanings* associated with those actions were negotiated (Guest et al., 2013). This information provided a glimpse into how teaching and learning about/through climate action practices is socially negotiated in relation to practice elements and other practices. Focus group participants included teachers and students.

For the teacher focus group, participants mapped where climate action practices were occurring at the school and discussed the *materials*, *competences*, and *meanings* associated with those practices. Before the focus group began, teachers completed a demographic survey (see Appendix C). The focus group began by establishing a working definition of climate action practices. I presented the whole institution definition of climate action practices mentioned previously (see Introduction) on chart paper. I asked participants if they agreed with that definition. Any suggestions for changes and/or additions were written on the chart paper.[4]

After a working definition of climate action practices was established, the map-making session began and consisted of three rounds. During the first round, I gave participants a map of the school and asked them to label where climate action practices were occurring. I prompted participants to add community features or buildings as needed to indicate actions occurring outside of the school building (e.g., if a class goes outside to learn about climate change). Prompts were also included to ensure participants considered all four whole institution domains. During the second round, participants were asked to include dates next to the climate action practices mapped. During the third round, participants were provided with emotion stickers and asked to indicate any emotions associated with planning for or carrying out each practice. The mapping activity was followed by a series of prompts to better understand the climate action practices mapped in relation to underlying *materials*,

[4] No changes to the definition I offered were provided by the participants. The comments on the chart paper were examples of practices at the school in each domain.

competences, and *meanings* and to learn how the mapped climate action practices were associated with what occurred within their classes (or not) (see Appendix C).

The literature recommends that focus groups include 5-7 individuals for complex topics (Guest et al., 2013; Krueger, 1994). One teacher focus group was held, which had 7 participants.[5] Participants were over-recruited to ensure adequate numbers (Guest et al., 2013; Krueger, 1994). The question protocol included about 15 focused questions (Krueger, 1994).

The student focus groups were held during their regularly scheduled class time in coordination with interested teachers. After filling out the demographic survey, students completed a drawing and discussion activity (see Appendix C).[6] The class was divided into two groups. One group drew pictures of climate action practices currently happening at their school. The other group drew pictures of climate action practices their school could be doing. Each group was asked to pick a representative to report back to the class at the end of their discussion.

Immediately following all focus groups, I wrote field notes documenting details an audio recorder cannot capture (e.g., participants' body language, emotions displayed) (Krueger, 1994). The focus groups were also audio recorded and lasted about an hour. Guidance on conducting focus groups from key texts was used (e.g., Guest et al., 2013; Krueger, 1994), such as how to deal with different participant types (e.g., dominant talkers, shy respondents, expert respondents).

3.3.6 Documents

Documentary information is useful for almost every case study (Stake, 1995; Yin, 2014). Documents collected for the current study confirmed and augmented evidence generated from other sources, aided in developing further questions, and enabled a better understanding of the site context (Bowen, 2009; Yin, 2014). The documents also enabled further understanding of the *material* element of climate action practices (Shove et al., 2012). Purposive sampling was utilized with the central inquiry in mind when collecting documents

[5] A second teacher focus was scheduled but only three teachers indicated interest, and no teachers showed up to the focus group. Another focus group was not planned because 50% of teachers at the school had already attended the first focus group, and a focus group of only 3 teachers was smaller than the recommended focus group size.

[6] See Greig and Taylor (1999) regarding drawing as an effective research method when researching with children.

(Yin, 2014). Documents were collected during the site visit and included school board policies, and course/field trip materials.

3.3.7 Photography

Photo generation captured data that cannot be articulated linguistically and data which were difficult to recall to further understand climate action practices at the school (Schwartz, 2009, as cited in Prosser, 2011). The photos provided "insights based on [the] spatial and compositional arrangements" of materials and were used to "generate novel ideas and inferences" (Schwartz, 2009, as cited in Prosser, 2011, p. 481). The photos were also used to provide visual context to the findings and were purposively sampled.

The aforementioned methods enabled the study of climate action practices from a variety of angles and align with the aforementioned methodological strategies (see Table 3.2). To organize the vast amount of data generated, a data generation database was created (Yin, 2014). Data analysis techniques for the generated data are reviewed in the next section.

Table 3.2

Methods and Methodological Strategies

Method	**Methodological Strategy:**
Sensory Walk	Situated, Place
Observations	Situated, Place, Social
Interview to the double	Genealogic, Conflict-sensitive, Configurational, Narration
Focus Group Mapping exercise	Situated, Genealogic, Configurational, Conflict-sensitive, Place, Social, Narration
Focus group Drawing exercise	Situated, Configurational, Place, Social, Narration
Documents	Genealogic
Photos	Situated, Place

3.4 Data Analysis

This section overviews data analysis procedures, which were driven by the research questions (Krueger, 1994). Details are provided regarding how data were prepared for analysis, and how they were analyzed. As previously mentioned, all interviews and focus groups were recorded. For the interviews, I created verbatim transcripts to capture participants' thoughts as accurately as possible, with the understanding that transcriptions

only produce hybrid representations[7] (Brinkmann & Kvale, 2015). For the focus groups, I transcribed 'just the gist' of conversations (Gibbs, 2007) due to practicality and the purpose of the focus groups to capture key ideas and group opinions (Gibbs, 2012; Guest et al., 2013; Krueger, 1994). For the student focus groups, I also created verbatim transcripts of their report backs at the end of the session. Clean versions of interview transcripts and summaries of focus groups (Krueger, 1994) were sent to all participants for member checking where possible.

Analysis began with inductive hand coding and memo-writing to note emerging ideas (Creswell & Poth, 2018). Inductive codes included descriptive codes (which are codes summarizing the main topic discussed), In Vivo codes (which are codes using participants' own words), emotion codes (which are codes capturing emotion), and simultaneous codes (which are two or more codes applied to a single datum). Following Saldaña's (2016) coding recommendations, similar codes were grouped into emergent categories. The resulting themes were interrogated in relation to the chosen practice theory. This first cycle of coding preceded the development of a codebook, which includes these emergent themes as well as deductive codes related to practice theory and according to the whole institution domains (see Creswell & Poth, 2018 and Appendix D).[8]

Coded data supported theme development (Creswell & Poth, 2018). When developing themes, the method of zooming in and out (Nicolini, 2013) directed my analytical gaze to zoom in on practices within one domain before zooming out to see how practices were related across domains. This method was appropriate because "practices can only be studied *relationally,* and they can only be understood as part of a nexus of connections" (Nicolini, 2013, p. 229). Theme development supported the descriptions and assertions made about the case (Stake, 1995; Yin, 2014). These descriptions and assertions are meant to assist the reader in making naturalistic generalizations, which are conclusions drawn from "vicarious experiences so well constructed that the person feels as if it happened to themselves" (Stake, 1995, p. 85). That is, the findings are presented in ways to which the reader can relate (Stake, 1995). While single case studies are not always well suited to develop 'grand generalizations,'

[7] That is, transcripts are always an interpretation of the conversation.

[8] See Fereday and Muir-Cochrane (2006) for a highly cited article that uses a hybrid process of inductive data-driven codes and deductive theory-driven codes.

they can support the development of 'petite generalizations' about the case or modify 'grand generalizations' (Stake, 1995).

Knowledge gained from this study will be mobilized in a number of ways. A two-page research brief will be created for policy makers, highlighting how policy can better support the elements of practice needed for climate actions within schools. This study will also result in academic publications as well as a two-page summary reported back to the school. Issues related to data validity are considered next.

3.5 'Crystallization as Validity'

Referring to crystallization as validity, Richardson (1997) describes how, "Crystallization, without losing structure, deconstructs the traditional idea of 'validity' (we feel how there is no single truth, we see how texts validate themselves); and crystallization provides us with a deepened, complex, thoroughly partial understanding of the topic" (as cited in Lincoln, Lynham, & Guba, 2011, p. 122). Within this conceptualization, just as crystals reflect and refract light, so too should research be allowed to illustrate multiple meanings (reflect) and allow those meanings to alter the direction of interpretation (refract) (Lincoln et al., 2011).

This study demonstrates crystallized validity by including a diverse range of voices, interpreted through a constructivist lens to allow for multiple meanings to emerge and guide analysis (Ellingston, 2009). It is also acknowledged that the results are only a partial understanding of reality and are affected by my own biases. Ensuring the crystallization of this study involved "continually checking, questioning, and theoretically interpreting the findings" (Brinkmann & Kvale, 2015, p. 284). This process was made possible by maintaining "a chain of evidence" through memo writing (Yin, 2014, p. 44). These memos were an audit trail that documented the analysis path (Guest et al., 2013). Audit trails are records of steps and decisions taken during "codebook development, coding, summary text reports, queries run, and so on" (Guest et al., 2013, p. 298). The purpose of maintaining an audit trail is not to assert the analysis supports *the* best interpretation of the findings, but instead illustrates *how* the interpretation was developed. Valid data are nothing without ethical generation and, as such, ethical matters are overviewed next.

3.6 Ethical Considerations

Ethical care was considered before, during, and after data generation. Formally, ethics approval was obtained through the Institutional Review Board at the University of Saskatchewan. Ethics approval was also obtained at the school board level. Additionally, I "perceive[d] and judge[d] 'thickly' (i.e., using [my] practical wisdom) in order to be ethically proficient, rather than mechanically follow[ing] universal rules" (Brinkmann & Kvale, 2015, p. 90). This approach to ethical care is particularly relevant for case studies where it is difficult to determine when formal data generation begins (Brinkmann & Kvale, 2015). Before generating data, adult participants read and signed informed consent forms, which indicated the purpose and procedures of the study, any potential risks and benefits, and their rights as participants. Student participants signed assent forms, and their parents signed consent forms (see Appendix D). When creating transcripts, participants were given numbers, which were used during analysis and reporting to protect their identity.

One potential ethical issue was related to the study's focus on *meanings*, which includes negative and positive emotions associated with engaging in CCE or climate action practices. Participants may have felt scared or worried about climate change, which may have surfaced when talking about CCE or what it means to take climate action. Information was included in the informed consent and assent forms that participants could choose to not answer any of the questions and that the session could be stopped any time, which was reviewed with participants. For the classroom observations, not all participants in the classroom or meeting space gave their assent or consent. In those cases, no data was collected for those participants. During the observations, personal information or other details not related to the research questions was overheard at times. When that happened, I did not document or analyze that information. Photographs taken at the site did not include people. Having addressed relevant ethical considerations, potential limitations are considered next.

3.7 Limitations

There are several potential limitations for this study. As data generation only occurred over four weeks, a whole case description is not possible. The goal of case study research; however, is not to describe the whole case but "to make sense of certain observations" (Stake, 1995, p. 76-77). A second inherent limitation is that the study of practices always begins "in

the middle of action," making it impossible to completely understand any practice from beginning to end (Nicolini, 2013, p. 221). Observations can be made; however, about how the elements and practices observed are currently connected and interacting (or not) (Nicolini, 2013). Additionally, as this study is a single-site case study, comparability is limited. As previously mentioned; however, case studies can make 'petite' generalizations and modify 'grand' ones (Stake, 1995).

Chapter 4: Findings

The findings below illustrate how the climate action practices observed and described by participants emerged, endured, and disappeared through a complex set of interactions, influences, (dis-)(re-)connections, motivations, and forms of monitoring. Using a dynamics of practice approach, key climate action practice elements (i.e., *materials*, *competences*, and *meanings*) within each of the four domains (i.e., Overall Governance, Teaching and Learning, Community Partnerships, and Facilities and Operations) were followed and are described as well as significant connections within and across domains.

According to Shove and colleagues (2012), practices change as links between practice elements are made, broken, and re-combined. To understand how climate action practices at the school were changing (or not), practice element connections were identified. The elements of practice were found to be connected harmoniously, partially, contentiously, not yet, and no longer. In the description below, *harmonious connections* indicate that a particular practice element was described and/or observed during more than one research activity and no indication of disagreement or conflict related to that element surfaced during any of the research visit activities either within or across one or more domains. *Partial connections* indicate that the practice element was described and/or observed during some but not all research activities either within or across one or more domains. *Contentious connections* indicate that the practice element was described and/or observed in relation to conflicts, contradictions, disagreements, or cognitive dissonance either within or across one or more domains. Practice elements described as *not yet connected* or *no longer connected* (i.e., practice elements from past practices that are no longer involved in current practices) indicate practice elements that were circulating at the school which were not yet connected or were no longer connected within or across one or more domains.

Practice connections are made and broken not only between individual practice elements (i.e., *materials*, *competences*, and *meanings*) but also between multiple practices, which share similar elements (Shove et al., 2012). This multi-layered level of connections illustrates the connective tissue, which holds practices together and breaks them apart. Several practice elements that are key for CCE are also part of other practices at the school. Where

relevant, these practices are described in relation to relevant practice elements to illustrate the broader connective tissue of which climate action practices are a part.

The findings below are presented by whole institution domain (i.e., Overall Governance, Teaching and Learning, Community Partnerships, and Facilities and Operations) in relation to key themes related to CCE that emerged from each domain. Practice elements are indicated parenthetically, and practice element connections are described narratively (Research Sub-questions 1 and 2). Both practice elements and their connections within and across the four domains are summarized in tables for each theme/sub-section. Practices are also shaped and changed through forms of feedback and monitoring and only exist when practitioners are motivated to 'carry' them. As such, where applicable, practitioner motivations are mentioned (Research Sub-question 3). A section on how forms of feedback and monitoring may have affected CCE at the school is also included at the end of each section (Research Sub-question 4).

4.1 Overall Governance

Within the domain of Overall Governance, key practice elements (i.e., *materials*, *competences*, and *meanings*) related to CCE were usually connected harmoniously within and across domains, with a few exceptions (see Tables 4.1-4.3). Relevant practice elements and their connections are described below in relation to three themes that emerged within the domain of Overall Governance, which included doing the 'extra,' distributed leadership, and the importance of taking gradual steps to effect change.

Key practitioner motivations to engage in CCE (or not) included: 1) the desire to always improve, 2) an 'energy' at the school, 3) an identity related to caring for the environment, 4), school designations, programs, and policies, 5) attachment to place, 6) student/teacher interest and leadership on CCE, 7) other priorities related to the health and well-being of staff and students, 8) knowledge of how to take meaningful climate action as well as (dis)belief that meaningful climate actions are possible, 9) fear about the future of the planet, and 10) the need to work with the community. These motivations are discussed within their related theme and are also identified in Tables 4.1-4.3.[1]

[1] A separate section on motivations is not included because practice elements can also serve as motivations, and this would have meant duplicating content.

4.1.1 Doing the 'Extra'

Across research activities, it was evident there was a common practice at the school of putting in 'extra' effort. The practice of doing the 'extra' stemmed from both a *material* necessity as well as an overall culture of collaboration and environmental concern. Practice elements related to doing the 'extra' were harmoniously and no longer connected (see Table 4.1) within the domain of Overall Governance and across the domains of Teaching and Learning, Community Partnerships, and Facilities and Operations. The shared understanding (*competence*) that staff at the school must do the 'extra' was circulating in relation to CCE as well as several related practices (i.e., staff cutbacks and EE). To provide context, the importance of doing the 'extra' due to staff cutbacks is first described before illustrating how this *competence* manifests in relation to EE, CCE, and practice element connections.

Declining student enrollment, teacher layoffs, and the moving and retiring of teachers made the need for 'extra' effort essential. Administrator 1 reflected on the contentious reality related to staff layoffs saying, "Like any school in Ontario, right now we're under siege.[2] And whatever your political opinions, it is what it is. We've got lots of staff getting laid off." Administrator 1 explained that the implication of this reality for CCE is that when teachers who teach CCE are laid off, their skills and knowledge (*competences*) are lost and there is a sudden drop in energy (*meaning*) among staff, which can make it difficult to focus on CCE if they are worried about survival. Knowledge and skills (*competences)* are also 'lost' when teachers move to other places; their skills and knowledge presumably also moving with them. For instance, one teacher at the school had moved to Australia, and Administrator 1 mentioned, "he'll be in Australia doing the same thing [i.e., teaching CCE]." Another teacher had left the school to go to the Arctic to study the effects of climate change on that region but still came back to the school from time to time as guest speaker. Additionally, while Teacher 2 was still teaching at the school during the research visit, this was her last year before she retired, so the knowledge, skills, and passion that she brought to the school would soon be missing.

[2] NB: The layoffs were partly related to increases in teacher to student ratios. Teacher 1 also mentioned that overall student numbers affected how many teachers and staff were at the school, which is related to a decision to only run one school bus to the same school versus running busses to three different schools.

In the context of teachers getting laid off and teachers leaving due to retirement or moving, several teachers were teaching subjects for which they did not have a background (e.g., Teacher 4 was teaching secondary Science even though her background was in Social Studies) and were celebrated for their efforts (*meaning*). Similarly, teachers who were willing to share their subject expertise with other teachers were also praised, as seen in this statement from Teacher 6 about the only teacher at the secondary level with a background in Math and Science, "we've put a lot of pressure on him, and he has risen to the challenge." She went on to say, "for me it's a big stretch to think about being a Science teacher, but I'm certainly interested in information, and I'm not afraid to do my homework and to beef up my background knowledge." This expectation also extended to students. During her interview, Teacher 11 began talking to a student about her drama skills and needing those skills at an upcoming event, "she's got a ton of drama skills that [she's] bringing to our Footprints Conference simply because you're a senior student and you have these skills, and we need you. So, there's no saying 'no' and that's kind of how we roll."

The shared understanding (*competence*) that students, teachers, and staff need to do the 'extra' existed not only out of necessity but was also harmoniously connected to a culture of collaboration and environmental concern (*meanings*) which also motivated practitioners to 'carry' practices related to EE and CCE. Immediately upon entering the school building, I sensed an atmosphere of community, acceptance, collaboration, and energy (*meanings*) and wondered if my impression stemmed from a researcher's hopeful expectation or was a shared sentiment. My interactions, interviews, and observations with administrators, teachers, staff, and students confirmed the latter. With great acceptance, however, came great responsibility to give back to the community in relation to EE and CCE. This was indicated by comments from Teacher 6 during an interview, "When you come here, you're taken into the fold, and it's just expected that you're going to *do the extra* [for EE and CCE] to fall into what we are, which is an EcoSchool within a biosphere" (emphasis added). This mandate was taken seriously, and each year, they are motivated to improve on their past work related to EE and CCE. Teacher 8 mentioned, "I think every year we add something [related to climate action]. We think at the beginning [of the school year], 'what else can we do?' So, this year we added the [metal] silverware rather than using plastic forks." It was also evident that the teachers

were excited about EE and CCE and supported (*meanings*) each other when needed. As Teacher 9 mentioned:

> It's so helpful that every other teacher that you're working with is excited and interested [in EE and CCE]. So, whenever that inevitable day comes that your level of energy is dwindling, you build on each other, you help build each other up.

School practices related to doing the 'extra' were also represented by and harmoniously connected to several designations, school programs, and commitments related to EE and CCE, which went beyond what is required of a public school or by their school board. For instance, the school was a Platinum EcoSchool and a UNESCO ASPnet school.[3] The school also started their own program called Simply Living Simply, which saw the whole school designing and working towards monthly environmental challenges each month that were often also related to climate change mitigation and adaptation.

Representatives from the school also volunteered to be on the original curriculum writing committee for the Specialist High School Majors program for the Environment in Ontario. When they first heard about the curriculum writing opportunity, several teachers excitedly "raised [their] hands loudly" (Teacher 11) and received board approval (*meanings*) to participate. The teachers were motivated to participate in the curriculum writing in part due to the funding attached (Administrator 1) but also because they felt (*meaning*) "we are the environment" (Teacher 11). The Specialist High School Majors program also required an experiential learning component. Since the school was already doing a lot of experiential learning they said, "Let's go bigger than [school name]. Let's have an environmental conference for *all* [District name] students," which they call their Footprints Conference.[4] This conference explores issues related to EE and CCE (described in more detail below). Together these commitments and designations mutually supported and drove environmental and climate actions at the school and were a *material* manifestation of what doing the 'extra' looked like at the school for EE and CCE.

[3] UNESCO ASPnet schools commit to support UNESCO's ideals related to intercultural learning, global citizenship education, education for sustainable development, and other UNESCO and UN priorities (see https://aspnet.unesco.org/en-us).

[4] The Footprints conference, which was open to all secondary students, also served as an advertisement for what students could expect in Grade 10 if they choose to take the Outters class.

The connection between these *material* designations and commitments, as well as the desire to do the 'extra' was also cyclical and self-reinforcing in relation to CCE motivations. When asked why they decided to teach CCE in their classes, numerous teachers mentioned the reason was related to the school's designation as a UNESCO ASPnet school and/or an EcoSchool. For example, Teacher 9 mentioned, "because the school is on a UNESCO site, and we are a UNESCO school, I think you just naturally gravitate towards climate change as a topic." The teachers also mentioned that they wanted to become a UNESCO ASPnet school because of the biosphere. That is, there appeared to be a reciprocal relationship between place and commitments to EE and CCE. The school also had a 50-year history of outdoor education through their Outters class and associated annual trip to Algonquin Park. This history was often referred to as the starting point for CCE at the school.

Table 4.1

Key Practice Elements and their Connections Related to Doing the 'Extra'

		Within & Across Domains			
		H	P	C	N
Competences (e.g., knowledge, understanding skills)	Have to put in 'extra' effort	X			
	CCE knowledge lost when staff laid off, move, or retire				X
Meanings (e.g., ideas, emotions, aspirations, symbolic meaning)	Passion and energy lost when teachers get laid off, move, or retire				X
	Celebration of putting in 'extra' effort/always focused on improving (M)	X			
	Acceptance, support, collaboration, energy, and excitement (M)	X			
	Environmental concern and identity (M)	X			
	Teacher interest and board approval for Specialist High School Majors curriculum writing	X			
Materials (e.g., objects, tools, technologies, place, body)	Declining enrollment and staff layoffs				X
	Platinum EcoSchool (M)	X			
	UNESCO ASPnet school (M)	X			
	Simply Living Simply	X			

	Specialist High School Major in the Environment curriculum writing and funding (M)	**X**			
	Place (M)	**X**			
	Outters and trip to Algonquin (M)	**X**			

Note. Practice elements in this table may also be connected to other practices. This table and similar tables that follow in subsequent sections are not an exhaustive list but a heuristic to illustrate key practice elements and their connections within and across domains. H = harmonious connections. P = partial connections. C = contentious connections. N = elements that are not yet connected or that are no longer connected. Elements that also serve as motivations are indicated with a M.

4.1.2 Distributed Leadership

Distributed leadership (between teachers, students, and administrators) was used at the school for several practices, including practices related to CCE. The practice elements associated with distributed leadership for CCE were harmoniously connected and not yet connected (see Table 4.2) within the domain of Overall Governance and across all other domains (i.e., Teaching and Learning, Community Partnerships, and Facilities and Operations). The approach towards distributed leadership utilized for CCE also acknowledged the importance of having a key person spearheading initiatives, as well as student leadership.

Leadership for climate action and CCE at the school was largely distributed between motivated teachers and students, with support from the administration. The distributed nature of their governance structure was particularly evident during the teacher's focus group, wherein they mapped climate action practices at the school across all four whole institution domains (see Figure 4.1). Following the mapping exercise, I noted few actions were mapped within the domain of Overall Governance. To this, Teacher 2 mentioned, "This [i.e., the map] reflects our governance. That it's across grades…to me this is school governance." Part of their governance structure also includes them "push[ing] each other on" (Teacher 2). Teacher 10 noted, "It doesn't feel like a push. It feels like, Whohoo!" Agreeing with Teacher 10, Teacher 14 noted it feels like a "tickle." Teacher 10 continued, "it [i.e., the push] fills you with life. It enlivens." That said, while they all agreed that they support (*meaning*) each other to keep going and to keep improving, several teachers noted the importance of having a key person (*material*) "to push the agenda gently along" (Teacher 2). Teacher 4 mentioned in her interview, "I think the reason why things work here so well, and why it's definitely a focus is

we have [Teacher 2] who is very, very strong leadership, and she's very, very passionate about it." Similarly, Teacher 9 mentioned:

> I know when you're working with Teacher 2, it's just contagious, right? You feel it. So, she's really an integral part of this school because she has so much energy and so much belief in changing the world that you can't help but think that way too.

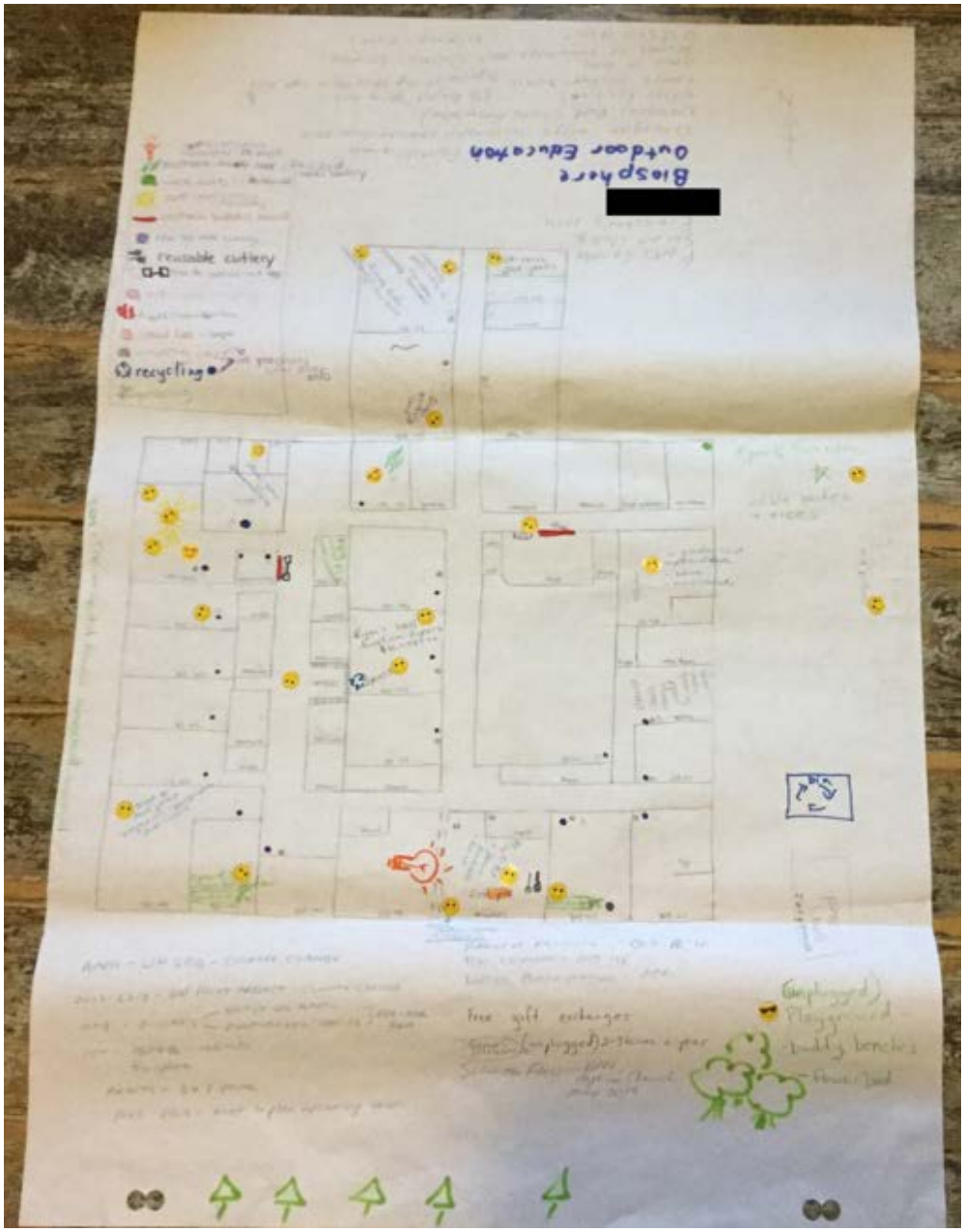


Figure 4.1. *Map of Climate Action Practices at the School*. *Note.* This is a picture of the climate action practices mapped during the teacher's focus group. Identifying information has been redacted.

At the school, the key person for CCE (i.e., Teacher 2) led separate from but supported by (*meaning*) the school administrators. During the interview with Administrator 1, he noted, "I just try to make sure that I don't get in the way." Teacher 2 who had been at the school long enough to see several different administrators come and go from the school, recounted similar sentiments in relation to the role of administrators and CCE at the school, mentioning, "You either need admin to step out of the way and let you go with your passions and do well, or become quite versed in it [i.e., CCE]. I find either model is equally as effective." Beyond not getting in the way, Administrator 1 also described his role in relation to CCE as allowing the focus on school programs, such as Simply Living Simply (described below) and outdoor education, as well as being a 'positive enabler' (*meaning*). For Administrator 1, being a 'positive enabler' means:

> creat[ing] a healthy environment where staff feel supported, where people bring in neat initiatives and you mentor…so there's the environment of the school, which allows you to care for the environment of the world. And that sounds weird, in a way, but really if you look after our citizens, our kids, and help them be in a place where they can learn, then we've made the first step towards them being able to be agents of change.

Distributed leadership for EE and CCE at the school was supported by the presence of several key *materials*, particularly summer planning meetings, checklists and posters, and the large table in the staff room. Every August, the elementary teachers at the school meet to plan activities for the following year for their Simply Living Simply program. This program began in 2014 after a broader community meeting in which it was discussed what the end of Big Oil would mean for their community, and how they could prepare. After the community meeting, around six or eight teachers developed a "grandiose plan" to accomplish 15 environment-related goals a month (Teacher 1). Following several iterations of the program, they now aim to complete 3 environmental goals a month. While the program had always included a whole school component (e.g., publishing the goals on their website for the whole community to engage with), it had evolved to include additional components (e.g., hosting whole school UNESCO assemblies, see Figure 4.2). Over the years, the program had included a focus on

water, climate change mitigation and adaptation, and the SDGs. The summer planning meetings involved deciding what the year's theme would be and which teacher would be responsible for each month (a list of themes and teachers responsible for that theme was posted in the staff room, see Figure 4.2). While the Simply Living Simply program was largely led by the elementary school teachers, the secondary students are often invited to the monthly assemblies, and the secondary teachers often included elements of the monthly themes in their classes (e.g., through guest speakers).

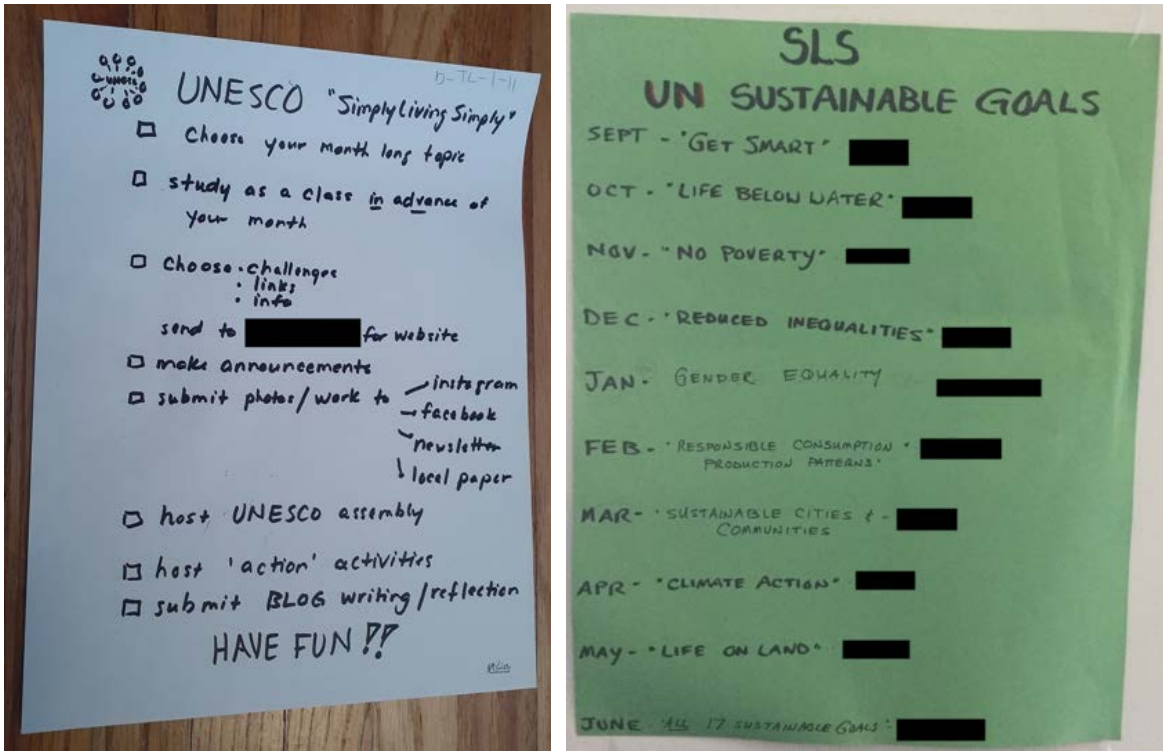


Figure 4.2. *Simply Living Simply Checklist and List of Monthly UN SDGs for the Simply Living Simply Program*. *Note.* The picture on the left is the checklist teachers used for the Simply Living Simply Program. The picture on the right illustrates the monthly SDG theme for the Simply Living Simply Program during the 2018-2019 school year, and the teacher responsible for that month. Identifying information has been redacted.

Another *material* essential to their distributed governance structure for CCE was the staff room, including the large central table contained within. The central nature of the table (and the fact there is only one table in the staff room) meant that the teachers ate lunch together every day (see Figure 4.3). On Fridays, the teachers also rotated cooking lunch (in

pairs) for the other teachers and staff, which they brought to the school. Recounting the importance of these lunches, Teacher 2 stated in the teacher's focus group, "Friday lunches are a *big* factor in people coming together, eating…it's something that is touching us deeply, and then when you eat with someone, you feel comfortable, and you feel attached to them, and the next thing you're having conversations and hugging."

The importance of the staff room became particularly apparent during the teacher's focus group mapping exercise (which was held in the staff room at the central table). While mapping, Teacher 2 asked one of the teachers to "put a bright star in the staff room. [It's where] all the intelligence and energy oozes out of us." As part of the activity, I also asked the teachers to place emotions stickers next to the climate actions they mapped, and it was apparent that the staff room had the most positive emotions associated with it. When asked why that was the case, Teacher 4 mentioned, "it's our central hub." Agreeing, Teacher 5 said, "it's always a positive place." Teacher 10 continued, "we come in and vent a bit, yes, but we leave usually giggling about something."

Figure 4.3. *Teacher's Focus Group Map Excerpt and Picture of the Staff Room*. *Note.* This figure is an excerpt from the teacher's focus group map of climate actions at the school focusing on the staff room, as well as a picture of the table in the staff room.

The staff room and its central table served as mediators for building a supportive environment, wherein the staff felt safe discussing a variety of topics, including climate change and CCE. Teacher 2 recounted, "the discussion that happen at this table…we can

puzzle about. Or we can say to each other, 'why are you saying this is related [to climate change].' There is permission to not know."

Finally, student leadership was a key part of distributed leadership for CCE at the school, especially in relation to project ideas and implementation. Several student-led projects were related to the elimination of single-use plastics as there was an understanding (*competence*) among the students and teachers that plastic is made from petroleum and that reducing plastic use is directly related to reduced use of that fossil fuel, which mitigates climate change. In describing one of these projects, which involved students across the school as well as the community, Teacher 2 said:

> Students mentioned how many plastic bags are used by tourists at our little grocery store. So, the tech class created a wooden box. The Art class did some signage. A club was formed with community people and staff and students to sew t-shirt bags.

The t-shirt bags were handed out for free to tourists during the summer. She went on to mention another student-led project to remove single use plastics from the school:

> Students came to us a year ago and said, 'Why do we still have straws in our cafeteria and our community?' And again, we went, 'Thank you beautiful human beings! What shall we do about it?' 'We'll just stop using them.' And they then went into the community, and they're working with our municipality on single use plastic, and they're coming up with hashtags, so we'll see where that goes.

Similar examples and support for student-driven initiatives were expressed by multiple teachers.

Beyond project ideas for the school and community, students were also involved in broader planning meetings to support climate action and CCE at the school. For example, seven elementary and secondary students were involved in the school eco-team. At an eco-team meeting I attended, the students discussed an upcoming waste audit, as well as putting pictures on their trash cans (again) to indicate what should go in the waste bin (see Figure 4.4). While not discussed in this meeting, I observed other discussions at the school related to how waste reduction is related to reduced greenhouse gas emissions (e.g., less release of methane), and this appeared to be an understood *competence* at the school related to EE and CCE.

A community member who represented a local organization also attended the meeting to discuss a project his organization was working on with the eco-team to decrease water

usage in the area. The students offered new suggestions for the campaign name and shared a logo they designed (see Figure 4.4). While not discussed in this meeting, other discussions were happening at the school among teachers and students related to the connection between reduced water usage and greenhouse gas emissions (e.g., less energy used to heat water, pump water into houses, and dispose of wastewater) and as such it appeared to also be an understood *competence* related to EE and CCE at the school.

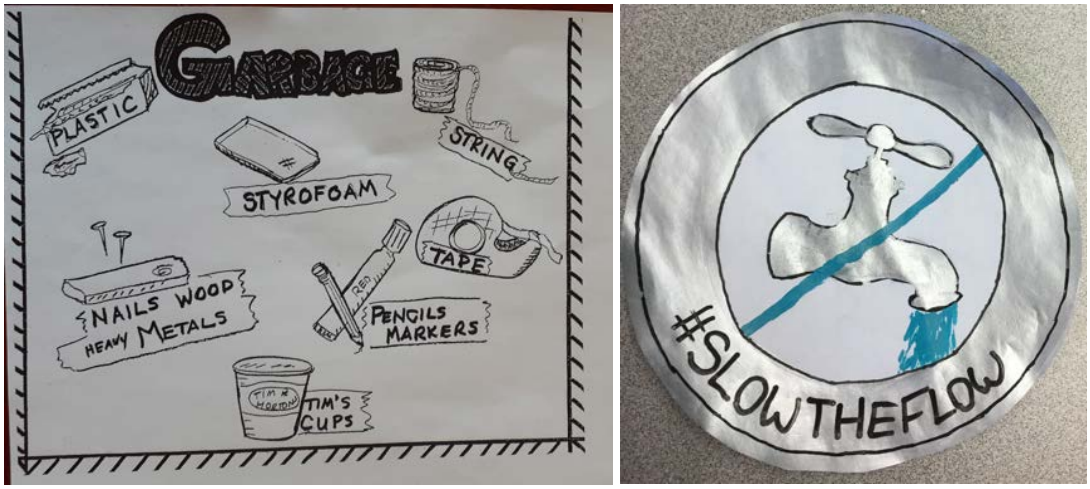


Figure 4.4. *What is Garbage at the school and the #SlowTheFlow Campaign Logo*. *Note.* The photo on the left illustrates what should be placed in the garbage bin at the school. The figure on the right is the student-designed Slow the Flow campaign label.

Table 4.2

Key Practice Elements and their Connections Related to Distributed Leadership

		Within & Across Domains			
		H	P	C	N
Competences (e.g., knowledge, understanding skills)	Importance of distributed leadership and student leaders	**X**			
	Permission to not know something about climate change	**X**			
	Importance of student leaders	**X**			
	Understanding how reducing plastic use, waste, and water use is related to climate change mitigation	**X**			
Meanings (e.g., ideas, emotions,	Support and push each other to improve (M)	**X**			
	Energy and passion for CCE (M)	**X**			

aspirations, symbolic meaning)	Administrators should not get in the way – be a 'positive enabler' and create healthy environment (M)	**X**			
	Positive emotions associated with staff room (M)	**X**			
	Celebration of student leaders and student-driven projects and ideas	**X**			
Materials (e.g., objects, tools, technologies, place, body)	Key person to push the CCE agenda gently (M)	**X**			
	Summer planning meetings for Simply Living Simply (M)	**X**			
	Simply Living Simply checklist (M)	**X**			
	SDG poster in staff room	**X**			
	Large central table in the staff room	**X**			
	Friday lunches	**X**			
	Straws and other single use plastic, t-shirt bags, wooden boxes, signage	**X**			
	Eco-team meetings	**X**			
	Picture of what should go in the garbage				**X**
	Slow the flow logo				**X**

Note. Practice elements in this table may also be connected to other practices. This table and similar tables that follow in subsequent sections are not an exhaustive list but a heuristic to illustrate key practice elements and their connections within and across domains. H = harmonious connections. P = partial connections. C = contentious connections. N = elements that are not yet connected or that are no longer connected. Elements that also serve as motivations are indicated with a M.

4.1.3 One Person Can Make a Difference through Gradual Steps

Another theme within the domain of Overall Governance was the idea that one person can make a difference by taking small, gradual steps towards environmental and climate action. The practice elements related to this theme were harmoniously, contentiously, partially, and not yet connected (see Table 4.3) within the domain of Overall Governance and across the other domains (i.e., Teaching and Learning, Community Partnerships, and Facilities and Operations).

The understanding (*competence*) that small, gradual changes are important for environmental and climate action was communicated by several participants. During an interview with Administrator 1, he said "small changes make big changes globally…climate action doesn't have to be radical…it can just be a small change that spreads. So, we want to facilitate that." Similarly, during a class observation of a discussion about climate action,

Teacher 6 mentioned, "Small steps are all we can manage. We have to be gradual and realistic."

There was also evidence that students received messages about the potential to take 'big' environmental and climate action while also encouraged to keep their ideas small. As such, the practice elements related to this idea were labelled as contentiously connected. An example of this contention was seen during an interview with Teacher 7, as well as through her comments during an observation of her Grade 7/8 Global Goals class. For the Global Goals class, students had been tasked earlier in the year to choose an SDG about which they were passionate to develop an action project - several students selected SDG 13 on climate action for their projects. In preparation for their action project, the students had made maps measuring statistics related to their selected SDG, created protest art, and completed a rant (described below). When describing what the final action project could look like in her interview, Teacher 7 mentioned that it "could be a fundraiser, could be an initiative, could be an event, *the sky is the limit* (emphasis added)." She also mentioned in her interview that:

> Some of them dream *really*, *really* big, and I feel like they might have difficulty getting to some sort of event or fundraiser that they want to do. So, my goal is just helping them find those resources and steering them in ways that I think that they can be successful.

During the observation of the global goals class,[5] Teacher 7 reminded the students that, "it doesn't have to be a big thing to have an impact. It can be something simple that makes an impact." Across the interview with Teacher 7 and the observation of her class, there appeared to be belief and disbelief (*meanings*) that students could/should aim to go beyond taking simple sustainability and climate actions. This (dis)belief expressed by Teacher 7 and others correlated with varying levels of motivation among some students to take 'larger' climate actions, as well as belief that they *could* take meaningful climate action.

While the students were told that they could make a difference through small, gradual actions, there was evidence that some (though not all) of the students wanted to take more impactful environmental and climate actions but did not know how (*competence*). As such, knowledge of how to take meaningful action was labelled as partially connected. An example

[5] During this observation, I started to become more of a participant than an observer, as the students came up to me to get advice on the projects they were developing.

of this partial connection was seen in a brainstorming activity undertaken in a Grade 5/6 class, which was led by Teacher 13 prior to my focus group activity. For this activity, students considered (on three pieces of chart paper, which were later taped on the classroom wall) what climate change is, what the school was currently doing about climate change, and what else they could do about climate change. On one of these brainstorming papers, a student mentioned, "we need to realize that we are like small changes affecting a very large problem." On the same paper, another student mentioned, "We need to take a stand to show our global leaders that climate change is a problem, and we need to act now." While the idea to "take a stand" is notable, it was not accompanied by what that may look like in practice (though this may have been part of their discussion). In the Grade 9 focus group, it was mentioned that the school should set higher standards related to climate action and go beyond adding more recycling cans. When asked what that would look like, it was suggested to spread the word about how serious climate change is by using their own talents (e.g., related to making videos) using platforms such as social media (*materials*). Since this idea (*meaning*) was not yet happening, the associated practice elements were labelled as not yet connected. It appeared that students who knew/had ideas about how to take meaningful climate action were also more motivated to take such action.

Evidence that some students did not know how to take meaningful environmental or climate actions (*competence*) was also seen at a 3% Project meeting. During 2019, the 3% Project visited schools with the aim to mobilize 1 million students (3% of Canada's population) in 500 high schools to create local sustainability solutions (3% Project, 2022). Two 3% Project meetings were held at the school during the research visit, the first of which was in-person with Project staff, and the second of which was virtual with a Project mentor whose role was to help students develop sustainability action projects.

At the first 3% Project meeting, staff visited the school to host an assembly about the SDGs and actions students could take to address sustainability, including climate change mitigation and adaptation. The assembly included a presentation about the SDGs for a larger group of students and was followed by a seminar for a smaller group of students who were

interested in developing sustainability and climate action projects.[6] The presentation was shown in the cafetorium,[7] and the seminar was held in the music room (*material* spaces, see Figure 4.5).

Figure 4.5. *Picture of the Cafetorium and Music Room*. *Note*. The photo on the left is the Cafetorium where the 3% Project presentation was held. The picture on the right is the Music Room where the 3% Project seminar was held during the first meeting. All seats were filled.

The seminar began with the speaker opening the floor for student questions. The second question came from a brave Grade 8 student who stated, "I'm scared about the future. Are you?" The speaker then asked the rest of the students if they were scared (*meaning*) of the future of the planet and most raised their hands (this practice element was labelled as partially connected as it existed for most but not all students).[8] Then the speaker asked the adults in the room if they were scared about the future of the planet when they were growing up, to which they all shook their heads no. The speaker mentioned to the students, "It is ok to be scared, but you need to take action." He also mentioned, "Once you start to act, you will find hope everywhere."

This conversation about fear prefaced the speaker listing three sustainability and climate change-related actions students can take now, which were to: 1) vote with their dollars (in relation to spending and investing), 2) participate in democracy (e.g., voting and

[6] At the first 3% Project meeting, around 75 students attended the presentation portion, and around 50 students attended the seminar portion, 32 of which agreed to participate in this research and returned the necessary forms. Around 30 students attended the second 3% Project meeting, 22 of which agreed to participate in this research and returned the necessary forms. These 22 students also attended the first meeting.

[7] This is the name affectionately given to the space where the 3% Project presentation was given, as this space was used as both a cafeteria and an auditorium.

[8] It is possible that fear of the future motivated the majority of the students to attend the 3% Project seminar.

protests), and 3) participate in action projects. To these suggestions, one of the students, who was a 'climate leader' at the school, mentioned they cannot do most of the things that the speaker suggested. Another student, who was also a 'climate leader' at the school, mentioned they had previously walked out in protest of Doug Ford, but that their action did not 'go anywhere' because those who participated were only connected to local people on social media.

Responding to these comments, the speaker (and other students) mentioned the "tremendous power" they have to influence who their parents vote for and what they buy. The speaker also cited research which found that children (especially daughters) aged 10-16 are particularly influential in convincing their parents (especially fathers) to be climate change concerned and to take action (i.e., Lawson et al., 2019). The speaker also mentioned the importance of strategic action and connecting to larger organizations on social media to obtain broader recognition of actions, such as protests or walkouts (i.e., broader social media connections did not yet exist at the school). While it was clear that teachers believed in the student's potential to make a difference in the world in relation to climate change mitigation and adaptation (usually through simple changes), it was evident students were not always sure how to make that happen and/or wanted to go beyond the simple.

There were also different beliefs at the school about the types of climate actions that are effective. Teacher 5 mentioned that she had talked about the Fridays for Futures protests to reinforce that "even as students, they have a voice, and it's important that they express that voice when they are able to." Even though the protests (*material*) were discussed in several classes, the students were not protesting. Their lack of action may be related to a connection that does not yet exist That is, between the *meaning* among enough students that climate protests are an effective and worthwhile action to take and how to mobilize this action (*competence*) to have the greatest impact (e.g., through media and social media). Drawing on the 3% Project's assumption, it is possible that the number of students at the school who felt that protests were a meaningful action had not reached the 3% threshold.

The emphasis at the school on simple, gradual changes may be related to the school's history of how they became climate action advocates, which began with physical education, and slowly evolved to include outdoor education, EE and now CCE (*competences*). As

mentioned above, the school's journey toward CCE began 50 years prior with the first Outters trip to Algonquin Park (*material*). This trip was originally more about physical education than it was outdoor education, EE, or CCE. Administrator 1 described whether the students and teachers on the first trip knew they were establishing what would become the foundation for CCE at the school, asking:

> Did they know they were doing that? I don't actually know. It was a real—this is a *hard* trip. Who can portage the longest? There were awards for the best portager. And that is partially about physical education. About the machismo of being the strongest kid. But then the roots of that were based in a natural environment perspective in the natural environment, and it sort of grew from there within the school.

Ever since that first trip, the Grade 10 Outters class annually takes a trip to Algonquin Park.

In later years, additional frameworks (*materials*) were added which supported their journey towards CCE. For instance, they signaled a focus on global citizenship education and EE by becoming a UNESCO ASPnet school in 2007 and an EcoSchool in 2014. The school's Simply Living Simply program began in 2015 and operated under the premise of "how do we educate our student population and our community [about environmental and climate friendly actions] without turning it into an 'us' and 'them' and a negative. So, it started off quite gently" (Teacher 2). That is, they slowly worked *with* not against the community (*meaning*).[9] After two years of working with the theme "Water: Every Drop Counts" in their Simply Living Simply program, they then declared, "full disclosure, we're doing climate change [education]" (Teacher 2). When that happened, there was no push back because the groundwork had been laid over the past two years with the Simply Living Simply project, which was all about taking action to address climate change without ever using the word. Similarly, and referring to the gradual progression the school had taken towards CCE, Administrator 1 stated in his interview:

> I don't know that it was early on so intentional, but it's become more intentional…and it's ironic that the climate change [education] becomes organic because it grows and people get ideas, and then they get together, and say, 'this is a good idea. Let's try this in our classes.'

[9] The need to work with the community may have also motivated them to focus on simple, gradual changes.

Finally, the name of their whole school program, Simply Living Simply, embodies the understanding at the school about the importance of taking 'simple' actions.

Table 4.3

Key Practice Elements and their Connections Related to One Person Can Make a Difference Through Gradual Steps

		Within & Across Domains			
		H	P	C	N
Competences (e.g., knowledge, understanding skills)	Should take small steps that are gradual and realistic towards environmental, and climate action/One person can make a difference			X	
	Knowledge of how to take/mobilize meaningful action (M)		X		
	How to mobilize protests to have an impact				X
	Knowledge of physical education, outdoor education, EE, and CCE	X			
Meanings (e.g., ideas, emotions, aspirations, symbolic meaning)	Belief and disbelief that students can/should go beyond simple environmental and climate actions (M)			X	
	Idea to use talents to communicate about climate change				X
	Fear about the future of the planet (M)		X		
	Protests are an effective climate action				X
	Need to work with the community (M)	X			
Materials (e.g., objects, tools, technologies, place, body)	SDG goals			X	
	Chart paper		X		
	Social media (using talents to communicate about climate change)				X
	Cafetorium and music room			X	
	Broader social media connections				X
	Protests				X
	Algonquin Park trip	X			
	UNESCO ASPnet school and EcoSchool	X			
	Simply Living Simply	X			

Note. Practice elements in this table may also be connected to other practices. This table and similar tables that follow in subsequent sections are not an exhaustive list but a heuristic to illustrate key practice elements and their connections within and across domains. H = harmonious connections. P = partial connections. C = contentious connections. N = elements that are not yet connected or that are no longer connected. Elements that also serve as motivations are indicated with a M.

4.1.4 Feedback and Monitoring

Within the domain of Overall Governance, formal and informal feedback and monitoring related to CCE were observed. Formal forms of feedback included the school board's school development goals and related plan that the school develops to meet those goals, as well as requirements related to maintaining UNESCO ASPnet school and Platinum EcoSchool designations. Informal forms of feedback included observations, self-monitoring, and conversations.

The school board had four goals that applied to all schools in the district, which included: 1) ensuring the well-being of students and staff, 2) providing quality instruction (especially in relation to numeracy and literacy), 3) parent engagement, and 4) being "accountable for the responsible stewardship of resources" (school board school goals). The school developed a plan to meet the school board's four goals, which identified school-specific needs in relation to each goal, strategies for addressing those needs, professional learning needed, and the school's plan for implementation and monitoring. Administrator 1 mentioned that when representatives from the school board visit, they will ask him:

> How are you doing on the goals? And right now, obviously, numeracy, literacy are one of our major reasons for being here. But that can all be threaded into environmental education. So, when you look at climate change and you're doing numbers, there's lots of chances for numeracy and literacy in curriculum.

While this form of monitoring was not inherently related to CCE, the school had chosen to interpret the directive that they should be "accountable for the responsible stewardship of resources" to also include natural resources.

Monitoring related to the school board's school development goals had also led to new climate actions. For instance, the school was invited (along with a few other schools) to the school board to present about their Simply Living Simply program because it addresses the school board's goals in creative ways through CCE. Following the presentation, Teacher 2 was also invited to join a school board committee, which was created due to their presentation to make the school board building more climate friendly.

The school also participated in several feedback and monitoring activities as part of their UNESCO ASPnet and Platinum EcoSchool status. For instance, to maintain their EcoSchool status, they must submit evidence of and reflections on the environmental actions

taken by the school throughout the year, which are often related to climate change mitigation and adaptation. The school eco-team was also a product of their EcoSchool designation and conducted waste and energy audits to track how the school was doing in relation to these climate change mitigation activities.

Informal feedback and monitoring included observations, self-monitoring, and conversations. In relation to observations, Administrator 1 mentioned he greets each student as they get off the bus and observes them for clues about how they are doing/feeling. He mentioned that while this may seem unrelated to CCE, if students (or staff) are stressed, then they are not in a good position for a day of teaching and learning related to climate change or anything else.

Self-monitoring and conversations were also mentioned as informal forms of monitoring and feedback. For instance, when the Simply Living Simply project began, they attempted to achieve 15 goals a month. After the first year, they "were all like 'whew, man that was a lot of work" (Teacher 1). The second year of the Simply Living Simply program was lighter in terms of the number of goals they set out to achieve, but they didn't "follow through as much as we could have" (Teacher 1). Through conversations with each other at their annual summer planning meetings, they finally settled on three monthly goals as a manageable number to focus on in a meaningful way. At these planning meetings, the teachers also considered additional components they could add to make the Simply Living Simply program better, which came from their overall motivation to always improve.

4.2 Teaching and Learning

Within the domain of Teaching and Learning, key practice elements (i.e., *materials*, *competences*, and *meanings*) related to CCE were connected harmoniously, partially, contentiously, not yet, and no longer (see Tables 4.4 & 4.6-4.7). Relevant practice elements and their connections are described below in relation to three themes that emerged within the domain of Teaching and Learning related to underlying assumptions about the nature and purpose of CCE, climate change-related content included in classes, and methods/skills used to teach CCE. Key practitioner motivations to engage in CCE (or not) included: 1) student/teacher interest, 2) inclusion of climate change in curricula and focus on cross-

curricular inclusion, and 3) research. These motivations are discussed within their related theme and are also identified as such in Tables 4.4 and 4.6-4.7.

4.2.1 Underlying Assumptions About the Nature and Purpose of CCE

Several underlying assumptions about the nature and purpose of CCE were found at the school. The practice elements related to this theme were harmoniously, partially, and contentiously connected (see Table 4.4) within the domain of Teaching and Learning and across the other domains (i.e., Overall Governance, Community Partnerships, and Facilities and Operations). This theme comprises three sub-themes which are: students, teachers, staff, and sometimes parents are learning about climate change together, CCE is good for the environment, and climate action should be (and is) driven by teachers' and students' interests.

The underlying assumption that everyone in the school community was learning about climate change *together* pervaded within and outside of the classroom. Within the classroom, several teachers mentioned the importance of admitting when you do not know something about climate change, and then learning about that topic together. The shared understanding about the importance of learning together (*competence*) through collaboration (*meaning*) was commonly used and as such was labelled as harmoniously connected. For instance, Teacher 2 explained, "it's good when you say. I just heard this. I don't know much about it. Let's look at it together. They see us all learning and galloping along. It's so healthy. It makes it really real." Similarly, Teacher 7 mentioned:

> So many times, kids will ask a question that I won't know the answer to, and I will just simply say, 'You know what, I don't know.' And then that leads to a further lesson of…[looking it up online and projecting the search] on the white board [*material*] and doing the research together.

The understanding that students and teachers should learn together was also used when teachers encountered resistance from students about climate change (*competence*).[10] Teacher 4 mentioned when students say they do not believe in climate change (*meaning*), she tells them, "'I'm just telling you some of the facts that I know, and let's explore this together.' And I always say, 'I'm not an expert, either. Let's see…' It's teaching them that way." Related to this sub-theme, several participants also mentioned the importance of being

[10] Practice elements related to learning about CCE together when encountering resistance were labelled as harmoniously and contentiously connected since they existed amidst conflict but were commonly used by teachers

skeptical of sources (*materials*) and teaching students how to evaluate the credibility of sources (*competence*), especially when encountering climate change disbelief (*meaning*).

Beyond the classroom, the understanding existed that CCE is a journey for the entire campus community (*competence*).[11] This learning happened through presentations by guest speakers at climate change-related assemblies, discussions among teachers about climate change, and CCE resources (*materials*) teachers shared with each other often via email. Reflecting on bringing in guest speakers, Teacher 2 mentioned, "And interestingly, every step of it, of course, the adults in the building are learning as well. That every time we get somebody new in, we all learn from it." Teacher 7 also mentioned, "And we as a staff, I think that we have really grown together and feed off of each other and inform each other and keep each other in the know." That is, the emphasis on community learning had also contributed to community building among the staff (*meaning*). Also reflecting on CCE at the school in the teacher's focus group, Teacher, 9 stated, "I have learned a huge amount." Teacher 2 agreed saying, "I have too. It's changed my life. By working at this school, it's changed my life."

While there was an understanding that the school community is learning about climate change together, there was also an understanding that this did not always include parents (*competence*), and as such practice elements related to this understanding were labelled as partially connected. Several teachers mentioned that they cannot (and are not there to) change parent's minds about climate change. Teacher 4 mentioned, "probably one of my favorite lines is, 'I am not here to change your parents. I'm here to have an impact on you.'" Teacher 2 mentioned, however, that one of the ways she knows they are still progressing in relation to CCE is because an environmentally minded parent told her that their daughter still comes home and teaches them new things. That is, the purpose of CCE/intended target of CCE differed among teachers, with some teachers indifferent to how CCE may impact parents and others seeing student discussions with parents (*material*) about climate change mitigation and adaptation as a measure of CCE success (*meaning*).

Another understanding circulating at the school, and for which practice elements were harmoniously connected, was that CCE and climate action are good for the environment (*competence*). This understanding was key to larger uptake and support for CCE in an

[11] All practice elements related to this understanding were labeled as harmoniously connected.

otherwise conservative area where many people who lived in that area did so because of its natural beauty (see Figure 4.6) and felt connected (*meaning*) to that local place (*material*). Administrator 1 mentioned:

> Generally, people who live in [name of the area] are people who live here because they care about the environment. I mean it's a beautiful natural environment. They want to keep it the way it is. It's beautiful, and they care about keeping it beautiful.

Figure 4.6. *Pictures of the Local Area Surrounding the Research Site*. *Note.* These are pictures taken near the school.

There was an understanding among teachers that they should mention the connection between environmental concern and CCE (*competence*) during discussions with students (*material*) who indicated they did not believe in climate change (*meaning*) or did not want to

participate in climate action projects. Practice elements related to teacher's interactions with students who did not believe in climate change were labelled as contentiously and harmoniously connected because they existed amidst conflict, but the *competence* of how to deal with this conflict among teachers was shared. For instance, Teacher 5 mentioned that she refers to the connection between not only CCE and environmental concern, but also to broader citizenship skills when she encountered students who did not want to participate in climate action projects:

> for students that are not wanting to participate, just enforcing that the topic that they're looking at, regardless of their belief on the topic—belief in quotations—is that the topic, in general, has many, many benefits on top of just learning about climate change or how to be better to the environment, they're taking home a whole slew of skills in terms of responsibility and cooperation and leadership skills et cetera.

Similarly, while Teacher 8 had not encountered students who did not believe in climate change (she taught Grade 3 students), she mentioned that if she did, she would say:

> 'Everything we're doing is good for the planet and you can't deny that. So, I'm still going to talk about it because you can't deny that this is a good thing for Mother Earth.' So, if I ever had to, that's the stance I would probably take. Because they will have that opinion. I know they do.

Making explicit the connection between CCE and climate action with education and actions that are good for the environment (*competence*) resonated with students because the deep love (*meaning*) they had for their local environment (*material*) was part of their identity. Teacher 11 encapsulated this in her statement that "we [i.e., the campus community] are the environment." Participants often mentioned taking care of the environment was part of who they are saying, "[students] just know the drill here" (Teacher 6) and "here, it is what it is to be a (mascot name) to be looking after the environment" (Teacher 9). On more than one occasion, participants mentioned that they no longer thought about what they did to take climate action, they just did it.[12] Referring back to Shove and colleagues' (2012) description of practices, their identity as stewards of the environment was a key *meaning* circulating at the school that could not be attributed to just a single person. Instead, this identity was a key element in maintaining cultural practices related to CCE.

[12] When I first arrived, the teachers often did not think they were doing much around CCE, but upon further conversations, I often found that they were doing quite a lot automatically.

Related to the assumption that CCE was good for the environment was the understanding shared by teachers at the school of the importance of taking learning outside the school building walls and into nature (*competence* and *material*).[13] As Teacher 1 mentioned during her interview, "certainly incorporating an outdoor aspect into whatever it is that you do is key for us…it doesn't matter what time of the year it is." The importance of taking learning outside also surfaced at the end of the teacher's focus group when the teachers were asked to comment on the most important topic discussed during the focus group. One of two topics mentioned was the importance of taking students outside. When answering this question, Teacher 2 pondered:

> I wonder if it's getting kids into nature a lot too. If you see the wonder of it. Then you want to preserve. Or you want to honor it and make it sacred. Our school does a lot of that. Let's get outside. Let's get out in the bush.

In response, Teacher 9 asked, "do you think our location is affecting it?" Several teachers agreed that their location affects their focus on outdoor learning for CCE. Teacher 10 continued, "kids love eating stuff out of the garden. They get the connection. They love getting their hands dirty." The importance of getting students out into nature was mentioned by secondary and primary teachers; however, Teacher 2 mentioned in her interview that establishing a connection to place (*meaning*) through outdoor education was particularly important for the junior kindergarten and other primary students to make CCE, "less doom and gloom." She continued that for this age group, "That it's about more the exposure. Research shows the more exposure kids have to nature, the more they fight to preserve it and hold it deeply in their heart."

At the school, there was also the understanding that climate action should be (and is) driven by student's and teacher's interests (*competence*), which was at times mutually reinforcing and at times led to new projects and initiatives.[14] For instance, Teacher 2 mentioned that when she and her students select the climate change-related challenges they want to address, that the challenges "come from the interspace [*meaning*] of the students that you're working with. So, it might be different if your class was doing it versus another

[13] Practice elements related to this understanding were labelled as harmoniously connected as they were shared among all the teachers.

[14] Practice elements related to this understanding were labelled as harmoniously connected as they did not exist amidst conflict.

teacher or another student body [*materials*].” Similarly, Teacher 10 mentioned how teacher interest in a topic can manifest in student interest saying, “well you want to be enthusiastic always, because if you’re enthusiastic, the students will pick up on that, and they’re going to love it.” She also mentioned the importance of “find[ing] what *we* love” in relation to CCE. Teachers’ interest in CCE and enthusiasm for climate action (*meaning*) often led to students selecting climate change as a topic for further research and action. This enthusiasm also operated in reverse, with student (and staff) interest in CCE influencing other staff members to teach CCE. For instance, when asked how she decided to teach CCE in her classes, Teacher 4 mentioned, “I think it’s because it’s a passion of other staff members. So, then when you see it in the students…they come to me, and I just built on it.” Teacher and student enthusiasm were key motivations for CCE at the school.

The teachers’ understanding that climate action should be driven by student’s and teacher’s interest and enthusiasm (*competence*) also led to new CCE directions that were not previously anticipated by either the students or the teacher.[15] Teacher 8 recounted her experience with the climate change month she led the previous year (which was called ‘get moving’) with her Grade 3 students. The idea behind the month was for students to make healthy choices for themselves *and* the environment/climate. Her original idea (*meaning)* for the month was that they would discuss activities that are not powered by greenhouse gases, such as using paddle boards instead of Sea-Doos or walking more instead of driving a car. Her students, however, had the idea (*meaning*) to have an outdoor classroom (*material*), which connected to their goals because by learning outside, they were not using paper (i.e., not cutting down as many trees, as well as associated emissions). Teacher 8 and her students ended up participating in Outdoor Classroom Day (see https://outdoorclassroomday.com/). They also had another outdoor classroom day later in the year and spent Monday mornings outside for the rest of the year.

Table 4.4

Key Practice Elements and their Connections Related to the Underlying Assumptions about the Nature and Purpose of CCE

[15] Practice elements related to new CCE directions based on teacher and student were labelled as harmoniously connected as they were developed together.

		Within and Across Domains			
		H	P	C	N
Competences (e.g., knowledge, understanding skills)	Admit when you don't know something about climate change and then learn together	X			
	Suggest learning together when encounter resistance to CCE	X		X	
	Be skeptical of climate change sources/know how to evaluate the credibility of sources	X		X	
	Entire campus community is learning about climate change together	X			
	Teachers are not at the school to change parent's minds about climate change		X		
	CCE is good for the environment	X			
	Mention CCE is good for the environment and fosters citizenship skills when encounter resistance	X		X	
	Importance of taking learning outside as much as possible	X			
	Climate action should be driven by students' and teachers' interest (M)	X			
Meanings (e.g., ideas, emotions, aspirations, symbolic meaning)	Collaboration related to CCE	X			
	(Dis)belief in climate change (students and teachers)	X		X	
	Community building through community learning about climate change	X			
	Purpose of CCE/target audience of CCE		X		
	Connection to place part of identity/culture	X			
	(Dis)belief in climate change (students and teachers)	X		X	
	Interspace of students and teachers working on climate action projects	X			
	Enthusiasm and passion for CCE among teachers and students (M)	X			
	Idea to talk about activities that don't use greenhouse gases	X			
	Idea to have an outdoor classroom	X			
Materials (e.g., objects, tools,	Computer and whiteboard	X			
	Reliable sources	X		X	
	Guest speaker's presentations about climate change	X			

technologies, place, body)	Discussions among teachers about climate change	X			
	Resources shared among teachers	X			
	Student discussions with parents about climate change mitigation and adaptation		X		
	Place	X			
	Discussions between teachers who do believe in climate change and students who don't believe in climate change	X		X	
	Outdoor classroom	X			
	Specific students and teachers working on Climate action projects together	X			
	Outdoor classroom	X			

Note. Green = practice elements related to the sub-theme that students, teachers, staff, and sometimes parents are all learning about climate change together. Orange = practice elements related to the sub-theme that CCE is also good for the environment. Blue = practice elements related to the sub-theme that climate action should be and is driven by student's and teacher's interests. Practice elements in this table may also be connected to other practices. This table and similar tables that follow in subsequent sections are not an exhaustive list but a heuristic to illustrate key practice elements and their connections within and across domains. H = harmonious connections. P = partial connections. C = contentious connections. N = elements that are not yet connected or that are no longer connected. Elements that also serve as motivations are indicated with a M.

4.2.2 CCE Content

Related to CCE content, three key sub-themes were found circulating at the school and were comprised of practice elements that were connected harmoniously, partially, contentiously, and not yet (see Table 4.6) within the domain of Teaching and Learning and across the domains of Overall Governance, Community Partnerships, and Facilities and Operations. These sub-themes were related to: a cross-curricular emphasis at the school, asking how actions are related to climate change mitigation and adaptation, and limited inclusion of Indigenous knowledges and climate justice.

The practice of CCE at the school is sustained, in part, by a broader provincial initiative for cross-curricular education (*material*), which happened 15 years prior.[16]

[16] Practice elements related to the provincial mandate for cross-curricular education were labelled as harmoniously connected as there was no indication of conflict related to the mandate.

Administrator 1 described how teachers can creatively (*meaning*) connect CCE to this wider provincial initiative by finding common threads across subjects:

> So, you could explore about gas emissions in Math and use Math to explore that. And then you could write to public officials and do your Civics and Social Studies...So that although you're spending an hour on Math, you're actually spending three hours on climate education in kind of a sneaky way, not a sneaky way, but in a smart way.

The benefits of knowing how to include CCE within multiple subjects (*competence*) were described as not only a creative way to deal with barriers related to time but also enabled students to see that climate change had *meaning* in their lives beyond the classroom. Numerous examples of cross-curricular CCE were described and observed during the site visit, some of which are included in Table 4.5.

Table 4.5

Selected Examples of Cross-Curricular Inclusion at the School

Subject	**Example of Inclusion**
Social Studies	Write letters to public officials about climate change mitigation and adaptation; responding to natural disasters; connections between Canada and other countries related to climate change; how to design a city from a politician's point of view to be more climate friendly
Language Arts	UNESCO CCE assemblies (involve reading and writing); reading comprehension questions related to climate change; media literacy related to climate change
Science	Biodiversity and ecosystems (e.g., species going extinct because of climate change and the subsequent effect on other species); solar ovens; carbon content in soil
Math	Make cubes to illustrate what 350 parts per million looks like (and hang up in halls as an art installation); graphing and tabling data related to climate change; temperature projects
Art	Using recycled materials or nature to make art (e.g., carbon footprint of countries represented by plastic lids); protest art

Shop	Benches to hold reusable water bottles and cloth bags

Across interviews with teachers and staff at the school, it was apparent that it was common knowledge (*competence*) that CCE was supported (*meaning*) by the provincial curriculum (*material*), especially at the primary level.[17] Teacher 2 mentioned:

> It is all contained within the curriculum as it stands right now. And it is easy to explain away everything that we're doing [related to CCE] in terms of the curriculum…it's honorable work, but it's also work that is clearly stated we should be doing within our guidelines.

At the primary level, these curriculum connections were discussed at their annual meeting in August to plan the Simply Living Simply program for the upcoming year. Related to the idea that CCE is supported by the curriculum, several teachers mentioned the need to have curriculum connections pre-identified if ever questioned (*competence*). For instance, Teacher 5 stated:

> I think you really want to be sure that you have the curriculum connections ready. So that if you get any backlash from parents or staff or admin, you're able to back up what you're doing in terms of it being right in the curriculum.

Alternatively, at the secondary level, it was apparent teachers had to be more creative to ensure CCE was included within their classes due to limited time within the curriculum. Teacher 11, who teaches Grade 11 and 12 students, mentioned the importance of knowing how to create "tactical teaching opportunities" [*competence]* because they are "very tied to the 110 hours within our curriculum boxes [*material*]."[18] Several secondary teachers mentioned trying to incorporate content from the monthly goal set by the primary teachers into their classrooms through field trips, guest speakers, and attendance at the monthly UNESCO assemblies (*materials*) organized by the primary teachers and students. Several secondary teachers also mentioned that CCE was very student-led in that if students brought up the topic, then they would discuss it. At the secondary level, an idea for increased focus on CCE at the secondary level surfaced during the Grade 9 student focus group, which involved

[17] Practice elements related to the understanding that CCE is supported by the provincial curriculum were labelled as harmoniously and contentiously connected as provincial curriculum connections to CCE were harmoniously connected for teachers but were also used if teacher's focus on CCE was ever contested.

[18] Practice elements related to the support of the provincial curriculum for CCE at the secondary level were labelled as contentiously connected due to the time constraints for including climate change content.

establishing a separate class dedicated to climate change at the school (*meaning,* not yet connected).

Another common sub-theme found circulating at the school related to CCE content was asking how actions are connected to climate change. Elements related to this sub-theme were usually labeled as partially connected within the domain of Teaching and Learning and across the other domains (i.e., Overall Governance, Community Partnerships, and Facilities and Operations) because most students and staff can (or can with prompting) make the connection to practices and climate change, whereas others are not yet able to make the connection. Some practice elements were related to future ideas, and as such were labelled as not yet connected. The practice of asking how actions were connected to climate change surfaced in multiple interviews, four classroom observations, and all teacher and student focus groups.[19]

Teachers often asked students how actions were related to climate change (*competence*) because they felt that being able to make this connection was important for taking actions to address climate change (*meaning*). Students were often able to make this connection (with and without prompting). For instance, during a Grade 5/6 focus group, a student was able to connect how planting more trees was related to climate change mitigation with prompting from Teacher 2. The student was in the group drawing pictures about actions they wished the school would take related to climate change and was drawing a picture (*material*) that mentioned the school should plant more trees (*meaning*). Teacher 2 asked the student what planting more trees had to do with climate change. At first, the student said "Oxygen." Teacher 2 said, "The opposite of Oxygen. Trees give off Oxygen, and that's what we breath in, but what do they suck in?" The student still did not know. Teacher 2 started to say Carbon, and the student finished the word. From there, the student said, "then when you cut them [i.e., trees] down, it releases Carbon Dioxide." The student then said, "we are putting more and more Carbon Dioxide in the air, and that is why we need to plant more trees."

Students were also able to connect how actions were related to climate change without teacher prompting. This was seen during a Grade 6-7 classroom observation where the

[19] This practice is also connected to the assumption that they are still learning about these connections *together*, which was mentioned above.

students were writing a newsletter article (*material*) about the climate change extravaganza event that occurred while I was there. For the event, climate change related stations were setup all around the elementary school (see Figure 4.7).[20] and was followed by an assembly where the students in charge of the SDG 13 month presented their climate change-related projects to the entire elementary school. During the newsletter class, several students wrote how the event was connected to climate change mitigation and adaptation (e.g., buying local food produces less greenhouse gas emissions) even though making this connection was not part of the assignment prompt, which just asked for a detailed report about the climate change event.[21]

[20] The event followed a similar structure to another event held every fall at the school called their Harvest Festival, which included a focus on locally grown products and produce.

[21] This was class that had planned the climate change extravaganza event and assembly for SDG 13.

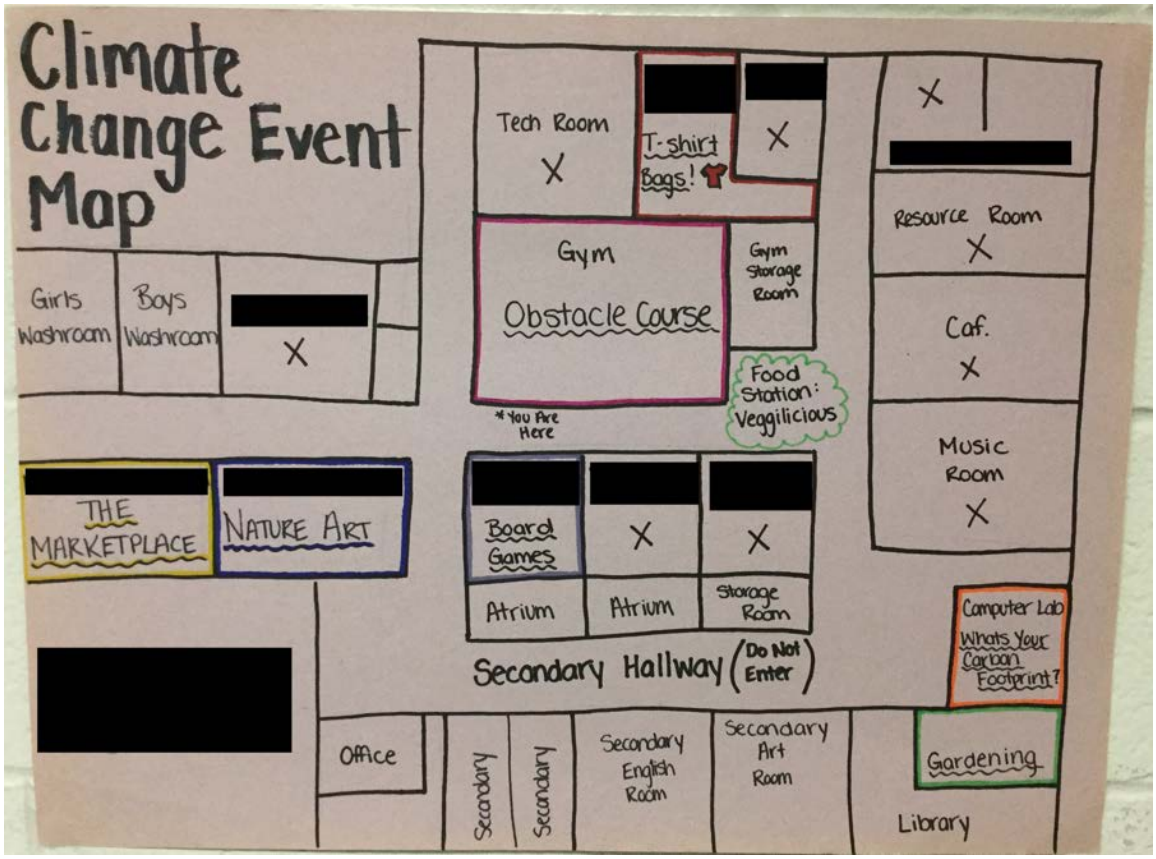


Figure 4.7. *Climate Change Extravaganza Event Map*. *Note.* The figure on the top illustrates pictures from two of the Climate Change Extravaganza stations. The picture on the bottom is a map of the school with the other stations listed. Identifying information has been redacted.

Some lessons were entirely focused on enabling students to see connections between actions and climate change. An example of this was seen in a Grade 3 Science class about the relationship between soil (*material*) and climate change with Teacher 8 (the students had been asked to bring soil from home). Teacher 8 began the lesson by asking the students to think back to the climate change month, and then asked, "What's in the air that causes climate change?" Some students said they did not know, while others said pollution. Student 1 then excitedly yelled (*meaning*), "Carbon!" Teacher 8 then asked, "Plants have a special role with Carbon Dioxide. What is it? Student 2 said, "they clean the air so we can breathe Oxygen." Teacher 8 continued questioning, "Why is that good?" Student 3 answered, "so they can [re]fresh the air." Teacher 8 asked, "How does that help climate change?" Student 4 answered, "If plants are storing it [i.e., Carbon Dioxide], it doesn't get out and cause

pollution." Student 3 continued, "CO2 is stored in space above the earth. It's staying there." Teacher 8 continued, "Yes. What's helpful for climate change?" One of the students said "Soil." Teacher 8 said "Yup, soil stores Carbon Dioxide." From there they watched a video (*material*) called "Soils: Our ally against climate change." After the video, Teacher 8 continued a similar line of questioning to ensure the students understood the video and to help them further see the connection between soil and climate change mitigation. The class ended in the computer lab (*material*) where students learned how to garden in a way that protects the carbon in the soil.

A Grade 8 History class with Teacher 2 also focused on students understanding connections between actions and climate change. At the beginning of the lesson, students were asked for words related to climate change, which were written on a whiteboard (*material*, see Figure 4.8). After the initial brainstorm, the students were given an index card with various activities written on them (*material*, see Figure 4.9) and asked to go to the room next door to put the cards in either a red (if the action was bad for climate change) or a green (if the action was helpful for climate change) hula hoop (*material*). They were told they would have to defend their choice, but that they would also have the option to move their card later. After the students placed their cards in the hula hoop, they all sat on the floor around the hula hoops in a circle. As the students were placing their cards, the students asked if they could overlap the hula hoops if they felt something was good and bad for climate change. Teacher 2 said that was fine if they could defend their choice. Teacher 2 told them they were going to go around the circle, and students could ask anything that was puzzling them regarding why a card was placed in a particular hula hoop. The person who placed the card in that hula hoop then had to defend their choice. Other students (and the teacher) could also help as well to make the connection between the activity on the card and its relationship to climate change.

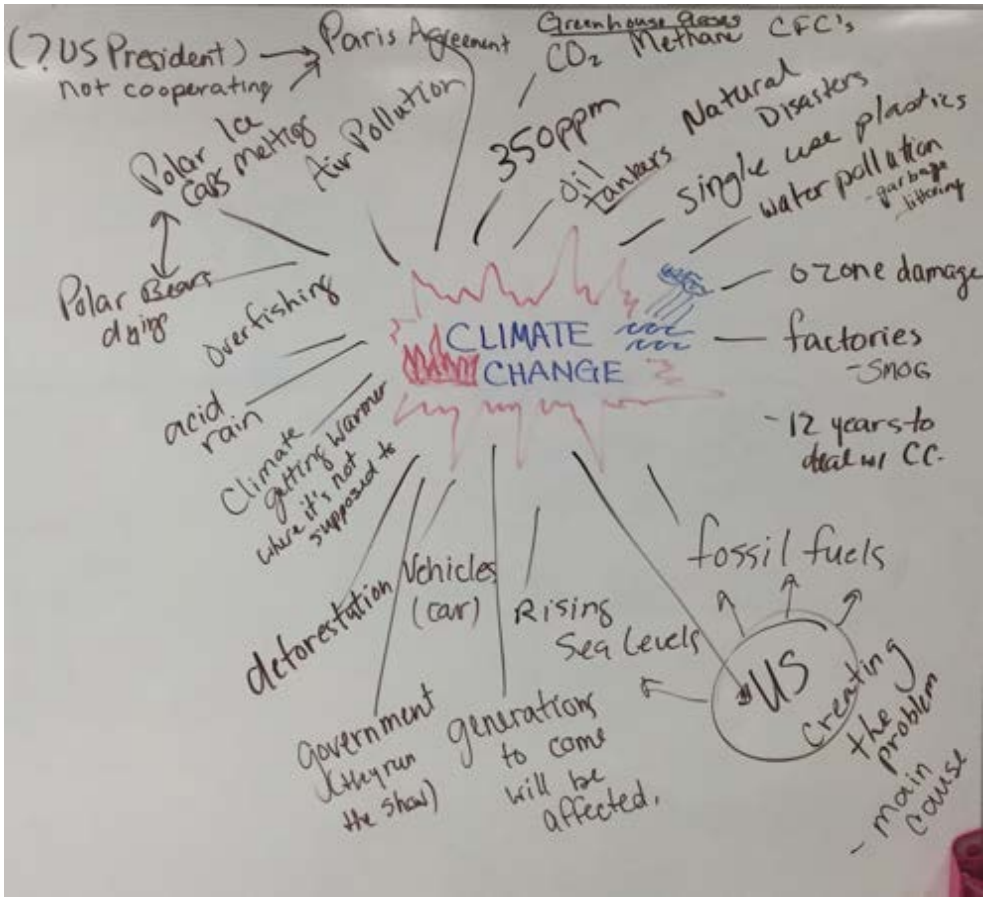


Figure 4.8. *Grade 8 History Class Brainstorm*. *Note.* This brainstorm occurred before the hula hoop activity with Teacher 2.

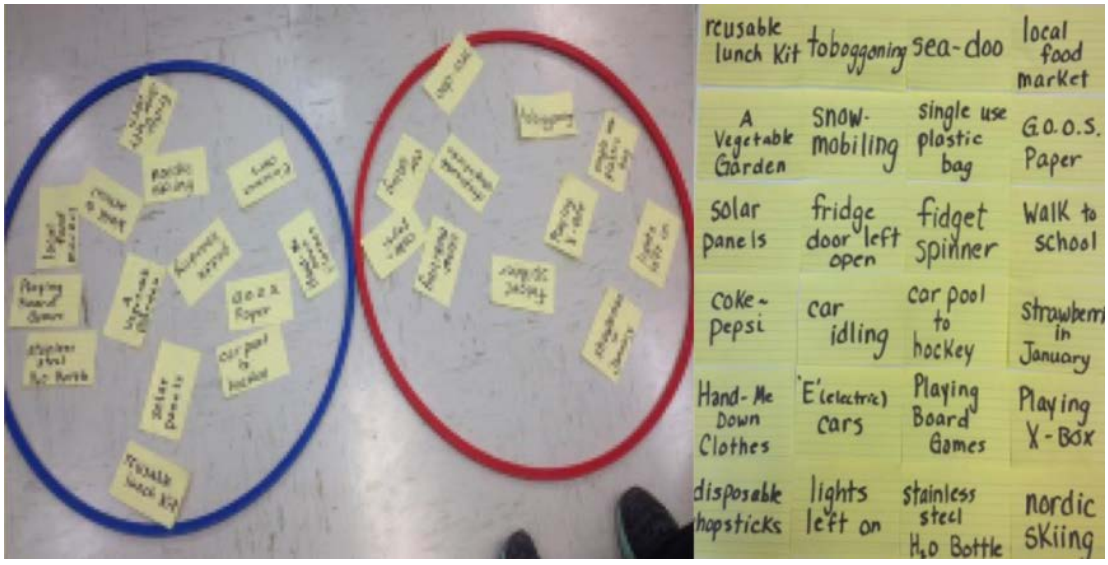


Figure 4.9. *Hula hoop activity with a sample of cards used*. *Note*. This is a picture of the hula hoop activity with a sample of cards used taken from the school's webpage. A picture of the activity was not taken during the visit.

After the cards were placed in the hula hoops, Teacher 2 and the students discussed the various actions in the hula hoops and their relationship to climate change. For instance, Student 5 mentioned he was puzzled why voting was in the red hula hoop. Teacher 2 mentioned, "Some people who vote do not understand climate change, so they can vote for people who take actions to make it worse." Student 5 then mentioned, "The conservative government rolled back climate change progress." Student 6 said he felt, "voting should not be in the red hula hoop if they vote for actions that can help climate change." Teacher 2 then asked for a show of hands if the voting card should be in the green hula hoop. The majority of students raised their hand. In defense of voting being in the green hula hoop, Student 7 mentioned, "It's not an individual vote that makes climate change worse." Similarly, Student 8 said, "It's leaders today who are making things worse."

During the same activity, the students also debated the difference in climate impact between *using* versus *manufacturing* items, such as board games and cross-country skis, which were two activities written on the index cards. The students also discussed why eating peaches in February (another activity listed on the index cards) where they live is climate harmful as well as trade-offs (e.g., the electricity used to freeze local fruit versus the energy used to ship in fruit from other places in the world).

After the hula hoop activity, everyone returned to the room where the words related to climate change were listed on the white board. Teacher 2 asked the students, which actions were bad for the earth but not bad for climate change? They talked about many of the actions with Teacher 2 facilitating discussion around how the actions listed that were bad for the earth could be connected to climate change. For example, overfishing was written on the board, which by itself, is just bad for the earth, but Teacher 2 facilitated a discussion that helped the students see the connection between that practice and increased greenhouse gas emissions.

While multiple examples were found of students and teachers being able to connect actions to climate change, not all students were able to make this connection or were not able to make the connection all the time. For instance, in the Grade 6-7 newsletter observation

class mentioned above, one student wrote we should use less plastic. I asked what using less plastic had to do with climate change, and she said, “It helps climate change because most plastic goes into the ocean and pollutes it for the animals, and pollution creates a hole in the atmosphere.” Other students were not able to make the connection between actions and climate change all the time. For example, another student in the same class wrote how various activities were related to climate change; however, only one of her responses was correct. She wrote going meatless was connected to climate change because eating meat is not good for animals, using plastic bags was related to climate change because they kill animals, and playing board games was related to climate change because they do not use electricity.

The practice at the school of discussing how/thinking about how actions are connected to climate change had also been taken up by students without teacher or researcher prompting, as evidenced by both student focus groups and one of the meetings observed. For instance, during the Grade 5-6 focus group, Student 9 (who was in the group writing and drawing pictures about what the school could be doing to address climate change) mentioned that they should be using computers more instead of paper (*meaning*). Student 10 then said, “but then you would have to think about the other materials it would take and with the plastic, which also causes climate change.”

In the Grade 9-10 focus group, students also discussed how their ideas were connected to climate change without any teacher or researcher prompting. For instance, one of the students discussed wanting more fun activities and projects and was questioned by another student as to how that was related to climate change. The student who proposed the idea mentioned a climate change conference held by the school as an example of a fun climate change-related activity.

Finally, during the 3% Project seminar meeting, one of the students asked the speaker what Artificial Intelligence (AI, *material*) had to do with climate change (the earlier presentation included much information about AI). The speaker mentioned AI can solve various issues related to climate change but also acknowledged AI can worsen climate change as well.

Discussions about how actions are connected to climate change were also partially happening during field trips to the local Outdoor Education Center, which was a common

field trip destination. I visited the Outdoor Education Center twice as part of a Grade 4 field trip related to wetlands and a Grade 6/7 field trip related to the fur trade. Staff at the center indicated they wanted to include more CCE in their programming (*meaning*) but that they were not sure *how* (*competence*). One staff member also mentioned she planned to discuss ideas for how to connect their programming more to CCE (*meaning*) with Teacher 2. The partial connection to how actions were described as connected to climate change in the Outdoor Education center's activities I observed are mentioned below.

The Grade 4 field trip began with a PowerPoint presentation and video (*materials*) about the First Nations people living in that area and the history of the fur trade before the students participated in an outdoor activity that reenacted the fur trade. During the presentation portion of the field trip, one of the PowerPoint slides mentioned, "humans began to warm the climate" due to increased production related to the popularity of fur hat fashion. The speaker also mentioned that with increased trading, carbon footprints increased, but that he would not discuss carbon footprints since they were not in high school. I was later told that the slide on climate change was added because they knew I was coming. The fur trade was framed as being beneficial for settlers and First Nations people and was not connected to colonization (*competence*).

The Grade 4 wetlands activity used by the Outdoor Education Center was designed by a local high school. In advance of the field trip, the Grade 4 students received a letter (*material*) about a planned Disney theme park near the Outdoor Education Center from the town mayor. The field trip began with two high school students (from the high school that designed the program) dressed up in costumes (*material*) as Glo Bal Warming and Paul Lution to tell the students about the planned Disney theme park (*meaning*). High school students were paired with Grade 4 students to catch wildlife in the nearby wetlands with nets (*materials*). On the way down to the wetlands, I noticed several signs (*material*) about the area, but there was no mention of climate change on the signs I saw. At the end of the field trip, the high school students asked the Grade 4 students if they wanted Disney to build a theme park in that area, to which they said no. The high school students also talked about the importance of biodiversity, but no connections were made to climate change (*competence*). During the Grade 6/7 fur trade field trip, one of the staff members mentioned they were

running another program about biodiversity and animals in the wetlands that was indirectly related to climate change. Presumably, he was talking about the field trip I had just observed.

While there was some inclusion of Indigenous knowledge at the school, including in relation to climate change mitigation, and climate justice, this was rare.[22] Practice elements related to Indigenous knowledge and climate justice were labelled as partially and not yet connected since discussions of both were either absent or largely absent at the school.

Reflecting on the overall inclusion of Indigenous knowledge (*competence*) at the school, Teacher 10 mentioned, "it would be better to have more Indigenous input on ways we could be making more of a connection with the Earth." To this I asked, "Would you say that there's some [Indigenous inclusion] but could be more, or is it present but not connected to climate change?" Teacher 10 responded, "I think there's very little. We just don't have a lot of input from Indigenous people. We just don't." Providing further context, Teacher 1 explained the history of Indigenous knowledge inclusion at the school:

> Well [Indigenous knowledge wasn't] really here in the past…It's an interesting thing. I mean we live so close to [First Nations band] and yet – I guess if you go way back in the past, way back. I've been here for 22 years so that's way back. Kids from [First Nations Band] used to come here. Right? And so, there was that closer connection with that group and with that culture. And that has changed now because of economics, more or less, right? They've decided that instead of trying to run buses to three different schools because they had kids that wanted to go to three different places, they're just taking them all to the same place now. So, we've lost that connection that we used to have with the First Nations group.

That is, since First Nations students no longer attended the school due to costs related to busing (*material*), there was even less focus on the inclusion of Indigenous knowledge, as opposed to recognizing and prioritizing Indigenous knowledge as relevant for Indigenous and non-Indigenous students (*competence* and *meaning*).

While there was some evidence that Indigenous knowledge was included at the school, few teachers made the connection that Indigenous knowledge is CCE (*competence*). For instance, during the teacher's focus group, Teacher 9 mentioned inviting a First Nations guest speaker to discuss the importance of water to their culture (*meaning*) as an example of CCE at the school. Teacher 2 asked Teacher 9 how inviting a First Nations guest speaker was

[22] NB: A specific question about climate justice was not asked, so it is possible that some discussions about climate justice may occur at the school.

related to CCE, and Teacher 9 replied that First Nation peoples are water keepers. While the connection between Indigenous knowledges and climate change was clear for Teacher 9, it appeared to not be immediately apparent to Teacher 2.

During Teacher 6's interview, she described a children's book about residential schools (*material*) that she reads to her classes (see Figure 4.10). I asked if the book was connected to climate change, and she replied:

> No, it's more about being informed and being sensitive and being open and understanding, giving an understanding of the troubles that First Nations people experience, about the ongoing fight for land claims, about their reconciliation, our part historically of isolating First Nations people. The big picture. So no, it's not related to climate change.

That is, while Teacher 6 acknowledged the connection between residential schools and colonialism, she did not acknowledge the connection between colonial practices and climate change (*competence*).

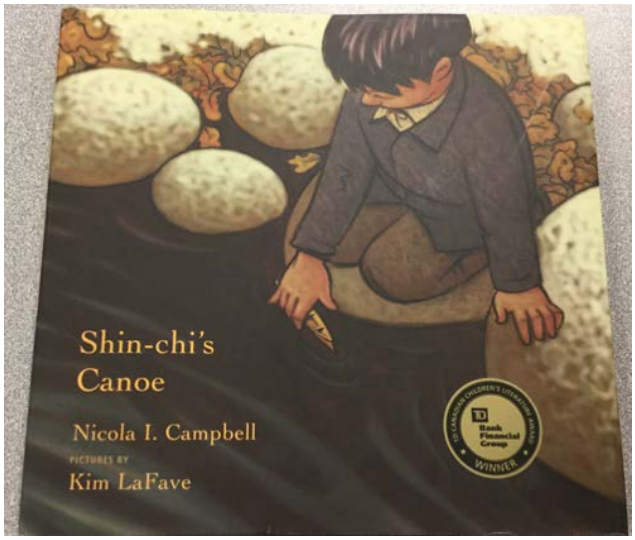


Figure 4.10. *Picture of the Book Read in Teacher 6's Classes*. *Note.* This is the book read in Teacher 6's classes that discussed residential schools.

While Indigenous knowledge was not often included at the school in relation to CCE, there was some indication that teachers felt it would be valuable (*meaning*). For example, when asked about the inclusion of Indigenous knowledge in relation to CCE, Teacher 5 mentioned, "Indigenous perspectives [sic] – that was one area that we didn't explore [in relation to climate change] but would have been beneficial to explore."

In addition, while some students were familiar with climate justice (*competence*), this was not the norm. For instance, the 3% Project speaker asked students during the presentation if they had heard of climate justice, and only a few of the almost 80 students in attendance raised their hand. Also, while the Fridays for Futures climate strikes (*material*) were discussed in several classes, the students were not protesting. That said, Teacher 2 mentioned that in the fall they held an assembly, at which it was discussed how climate change, jobs, and justice were interrelated, with a banner that said, "Rise for Climate, Jobs, and Justice" (*material*). Reflecting on how knowledge related to justice is missing at the school, Teacher 2 mentioned:

> One big flaw at our school is we're very homogenous in culture, pretty homogenous economically, we're just a pretty homogenous group here. And think it would be really great to start seeing climate change from a social justice point of view. We do some work on that, but that's an area that still needs lots of exploring from the social justice piece, from the economic justice piece. What it means to be poor and experience climate change compared to what it means to have wealth and experience climate change. So, I think to be a lot broader in our scope, and we're not quite there yet.

While there was some acknowledgement that climate justice should be included more at the school (*meaning*), the overall extent of inclusion was minimal. No mention of just transitions was found.

Table 4.6

Key Practice Elements and their Connections Related to CCE Content

		Within and Across Domains			
		H	P	C	N
Competences (e.g., knowledge, understanding skills)	How to include climate change in all subjects	X			
	CCE is supported by provincial curriculum	X		X	
	Pre-identify CCE curriculum connections	X		X	
	How to create 'tactical teaching opportunities' for CCE			X	
	How actions are related to climate change		X		
	How climate change is related to activities at the Outdoor Education Center		X		
	Colonization is related to fur trade and climate change				X
	How biodiversity is related to climate change				X

	Inclusion of Indigenous knowledge at the school		X		
	Indigenous knowledge is for all students		X		
	Indigenous knowledge is CCE		X		
	Colonization is implicated in climate change				X
	Familiarity with climate justice		X		
Meanings (e.g., ideas, emotions, aspirations, symbolic meaning)	Creativity	X			
	Cross-curricular CCE enables students to see climate change had meaning in their lives	X			
	CCE is supported by provincial curriculum	X		X	
	Secondary student idea to have a climate change class				X
	Important to know how actions are connected to climate change		X		
	Idea that the school should plant more trees				X
	Excitement		X		
	Idea to use more computers so less paper is used				X
	Idea to have more fun climate change activities and projects				X
	Interest in/ideas for connecting Outdoor Education Center programming to CCE		X		
	Idea for a Disney theme park				X
	Indigenous knowledge should be included for Indigenous and non-Indigenous students		X		
	Importance of water to Indigenous cultures		X		
	Indigenous knowledge is beneficial for CCE		X		
	Climate justice should be included		X		
Materials (e.g., objects, tools, technologies, place, body)	Provincial cross-curricular initiative (M)	X			
	Provincial curriculum connections to CCE (M)	X		X	
	Field trips, guest speakers, and assemblies			X	
	Focus group picture about planting more trees				X
	Climate change extravaganza newsletter		X		
	Soil, YouTube video about soil, and computer lab		X		
	Whiteboard, index cards, and hula hoops		X		

	Focus group picture about using more computers instead of paper				X
	Focus group picture about fun climate change activities and projects				X
	Artificial Intelligence		X		
	Fur trade activity, PowerPoint, and video		X		
	Letter from Disney, costumes, wetlands, and fishing nets, signs at the Outdoor Education Center		X		
	Costs related to busing		X		
	Book about residential schools				X
	Climate protests				X
	Rise for Climate, Jobs, and Justice banner		X		

Note. Green = practice elements related to the sub-theme of cross-curricular emphasis at the school. Orange = practice elements related to the sub-theme of understanding how actions are related to climate change. Blue = practice elements related to the sub-theme related to the limited inclusion of Indigenous knowledge and climate justice. Practice elements in this table may also be connected to other practices. This table and similar tables that follow in subsequent sections are not an exhaustive list but a heuristic to illustrate key practice elements and their connections within and across domains. H = harmonious connections. P = partial connections. C = contentious connections. N = elements that are not yet connected or that are no longer connected. Elements that also serve as motivations are indicated with a M.

4.2.3 CCE Methods/Skills

There were several *competences*, *meanings*, and *materials* related to teaching methods and skills discussed by participants, which were harmoniously partially, contentiously, and not yet connected (see Table 4.7). Relevant practice elements and their connections are described below in relation to five emergent sub-themes, which were that teachers should model climate action and be facilitators of knowledge, students should teach and mentor other students, teaching methods related to 'good' CCE pedagogy, the importance of a whole institution approach as a method of CCE, and how to deal with emotions related to climate change.

A common understanding (*competence*) at the school in relation to CCE was that teachers should act as facilitators versus telling students precisely what they should do or think. Practice elements related to this theme were harmoniously connected within the domain of Teaching and Learning and across the domain of Overall Governance. In describing how I should act if I were to come into the classroom the next day for her, Teacher 9 mentioned in her interview:

> Well, I think what *I* would do, and what I hope *you* would do is be more of a facilitator. Take a step back and be more of a guide. So, you're going to guide them in the direction of where their resources are. And if you see them kind of going off the path, then guide them back on.

Similarly, in describing classrooms visits, Administrator 1 mentioned:

> As soon as you walk in the room, kids will, *could* just turn to you and want an answer. And you have to be good, like a teacher, at deflecting it and saying, 'Actually, hey I've got an opinion, but my opinion, it matters just as much as yours matters'… You can be part of that discussion without dominating it. You can contribute to it. You can help guide it but being present is big.

Teacher 7 also attempted to act as a facilitator when teaching CCE but mentioned she struggles with not being biased because climate change is a topic about which she was very passionate (*meaning*). She mentioned, "So, I think the hard part about teaching this is not having those biases and allowing children to come to their own conclusions and their own ideas and their own thoughts towards stuff."

Related to the importance of facilitating knowledge was the understanding that teachers should model climate actions themselves (*competence*), both within and outside the school. Teacher 8 mentioned, "I'm making the conscious effort to make sure that I'm not using paper and little things – I'm not being wasteful because the students are watching."[23] Modelling was also mentioned as important to ensure that students felt that the information they were told was authentic (*meaning*). Teacher 10 mentioned, "It helps a lot if you're living it yourself. Then it's not false information you're telling the kids: 'here's what you should do, but I'm not doing it myself.' It helps a lot if you're actually living it yourself." Teacher 7 also mentioned that she does not eat meat (*material*), and that while she does not push that value onto the students (*meaning*), when they asked her about her food choices, it gave her an opportunity "to explain myself and share what I'm doing in my own personal life with the kids so that they can see, well this isn't just something we do in school, this is something that's happening all around us."

Another common understanding found circulating at the school was the notion that students should teach other students about climate action (*competence*). Practice elements

[23] I also found myself 'watching' my own actions to make sure I was being as environmentally responsible as possible.

related to this sub-theme were connected harmoniously within the domain of Teaching and Learning and across the domain of Overall Governance.

The value of student mentorship (*meaning*) was seen in the descriptions of school programs and activities, as well as individual teacher practices. Related to the school's Simply Living Simply program, Administrator 1 mentioned the program "puts the responsibility on kids to present to kids, as opposed to us just telling them what to do." As part of this program, students recited daily morning announcements related to the monthly theme, and they presented their research about that month's theme to other students at monthly assemblies (*materials*).

It was also very apparent that the school valued community building activities among students (*meaning*), including in relation to CCE. For instance, another commonly used school activity that also involved students teaching/mentoring each other was called Small and Tall in the Hall (*material*). This activity involved pairing an older Grade 7-12 (Tall) student with a younger Grade K-6 (Small) student to complete an activity and had been used for CCE. During a Small and Tall in the Hall CCE activity, the students created a cube to visualize 350 parts per million of Carbon Dioxide (*material*). The cubes were hung in the hallway as a representation of the time they spent together (see Figure 4.11). Teacher 2 described the activity as "a way of building community in school. It's a way of mentoring for the older kids about a very important topic."

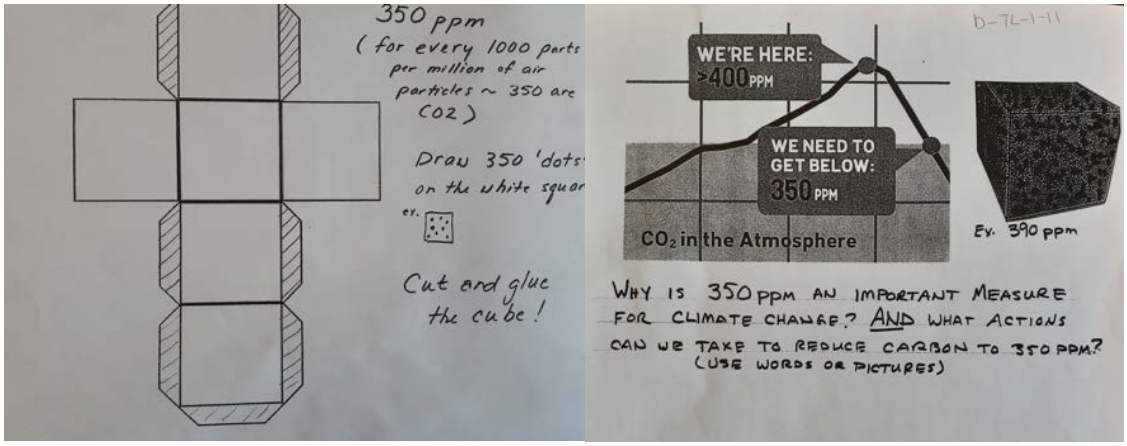


Figure 4.11. *Small and Tall in the Hall 350 Parts per Million Cube Activity*. *Note.* This is a picture of the worksheet students used to create the 350 parts per million cubes for the Small and Tall and Hall activity.

Several teachers also included the teaching method of students teaching students as class assignments. For instance, Teacher 7 assigned a rant (*material*) for her SDG class where students "stood up in the middle of lunch or burst into a classroom and ranted for about a minute to two minutes on something that they are passionate about, tying [the rant] into their global goal" that they were researching. Some of these rants were related to SDG 13 on climate action. Teacher 9 also used this method of students teaching students in her Grade 2/3 class in relation to CCE. For this assignment, her Grade 3 students made a diorama (*material*) to illustrate how the earth is affected by climate change and then had to explain their diorama to her Grade 2 students.

Teaching methods related to 'good' CCE pedagogy were also found circulating at the school. In particular, methods related to inquiry-based, place-based, problem-based, and action-oriented teaching methods were found. Instances of teachers framing climate change in locally relevant ways was also identified. Practice elements related to these methods were harmoniously, partially, contentiously, and not yet connected.

Knowledge and skills (*competences*) related to inquiry-based methods[24] for CCE were used to teach students to ask critical questions, to assist student selection of projects, and were used by teachers as a teaching tool. When using inquiry-based methods, it was common that teachers gave mini-lectures about a broader topic related to CCE, and then supported students to select sub-topics about which they were passionate (*meaning*). Student research would then culminate in debates, presentations, events, and/or action projects (*materials*). For instance, to help students develop ideas for their climate change month (SDG 13), Teacher 5 started with a Q-chart, which she described as a "way of asking questions that can then prompt our research or drive our research in a certain way" (*material*). Example questions that they worked through as a group were "who is climate change impacting the most? How would I, as a student, do something for climate change?" They first used the Q-charts to discuss the overall theme of climate change as a class. The students then formed small groups around climate change topics they were interested in and completed Q-charts for their sub-topic to help them identify some good questions that they were in interested in learning more about

[24] Practice elements related to inquiry-based teaching methods were harmoniously connected.

related to climate change. From there, students went to the computer lab to research the answers to their questions.

It was also apparent that the skill of asking critical questions (*competence*) also extended to students during a Grade 5/6 class where the students presented about eco-homes. Following the presentations, one student inquired why one of the houses was using propane because it is a greenhouse gas, and another student asked why one of the houses was using fans because they are made out of plastic.

When using inquiry-based methods, teachers often showed students videos (*material*) to support their thinking around a topic. For instance, Teacher 6 showed her students a YouTube video of a Greta Thunberg interview to support what they were working on/thinking about in their sketch books for a Grade 9/10 Art class related to climate change solutions. Teacher 11 also mentioned showing the film *Blue Gold*[25] to a Grade 11/12 class to support their thinking for research projects that later led to a class debate related to climate change.

Teachers also used questions as a teaching tool to help students make the connection to how actions were related to climate change. This method was observed in several classroom observations (such as the Grade 3 class example mentioned above related to the relationship between soil and climate change). Another example of this teaching method was seen during an observation of a Grade 5/6 Art class, which was using recycled paper from an old phone book to make art. Teacher 2 asked the students, "What does recycling an old phone book have to do with climate change?" Student 11 said, "paper is old and won't always be there." Student 12 said, "using old phone books means we're not cutting down more trees." Teacher 2 told them, "you're getting closer. We're building on ideas," and asked Student 12 to call on another student. She called on Student 13 who said, "trees produce oxygen and take in carbon dioxide, and it's good for the environment." Teacher 2 asked, "If I had to pick Oxygen or Carbon Dioxide, which is a greenhouse gas?" Student 13 replied, "Carbon Dioxide is a greenhouse gas." Teacher 2 then asked, "what's the problem with greenhouse gases? Student 14 replied that, "it takes in heat and melts glaciers and hurts habitats for animals." Teacher 2 made the final connection for them between recycling phone books and climate

[25] This is a documentary film about the world's dwindling water supply. The film suggests that future wars will be fought over water and highlights the actions of water activists around the world.

change by saying, “trees take in Carbon Dioxide and when trees are cut down, they release Carbon Dioxide,” which increases climate change.

Knowledge and skills (*competences*) related to place-based and outdoor education[26] were also commonly used for CCE. These methods were used for trips and regular teaching activities. In addition to the Algonquin trip mentioned above, another annual event related to outdoor education was their Footprints conference, which was free for all secondary students at the school because it was important to them that money did not prevent student attendance (*meaning*). For this conference, students and teachers visit a nearby national park (*material*) for three days and two nights. During the conference, participants hear from guest speakers and Indigenous storytellers and do various outdoor activities, such as crafts and fishing (*materials*). Teacher 11 mentioned, “We’ve had a whole bunch of great experiences [at the Footprints Conference] that open up those conversations that make it very natural to talk about climate change or sustainable behaviors.” Climate change had also been a conference theme in previous years.

The Footprints conference emerged from the school’s work on the Specialist High School Majors curriculum because an experiential learning component was required. Since the school was already doing much experiential learning, the teachers tried to think of something bigger than what they were currently doing.[27] Originally, the conference was opened to students from all schools in their district, but they eventually scaled back to only include their own students, as the scale of the conference became difficult to manage and fundraise (i.e., the Footprints conference is a *material* that is no longer connected for all district schools).

Teachers were also using outdoor and place-based methods within their courses as part of field trips and regular teaching activities, wherein beyond just going outside, place was used to teach CCE. For instance, Teacher 3 described field trips to Killarney where “floating bog mats…are levitated by the accumulation of methane.” He mentioned, the floating bog mats (*material*) allowed “an opportunity to talk about the release of methane from the

[26] Practice elements related to these teaching methods were usually harmoniously connected. When they are not, this is indicated parenthetically.

[27] This practice also connects to the theme mentioned in the Overall Governance section about doing the ‘extra.’

permafrost and how that affects the various ways carbon is sequestered in different forms in the atmosphere." Teacher 3 also mentioned he discusses soil carbon sequestration (*material*) with students at Killarney.

Similarly, Teacher 4 recounted when a scientist came to the school and walked with the students down to the water (about a 5-minute walk from the school) where they talked about the depth and the temperature of the water (*material*) in relation to past trends. Several teachers also discussed how the seasons are related to climate change and how that can be brought into the classroom. For instance, Teacher 2 mentioned:

> Spring is a great time to study climate change I would say…spring or fall in our climate where either it's harvest time, and you can see the local food movement piece fitting in, or it's springtime when you can see a renewal and what that does. We've come through winter, a period of death, and what does renewal look like and how we can tie that into climate change?

There was also evidence of knowledge and skills (*competences*) related to problem-based learning for CCE at the school. A school assembly (*material*) was held to address two problems at the school related to climate change, which were cross-contamination of waste and recycling in the cafeteria and having the school garden tended to in the summer months.[28] For this event, they invited community members to work with students to come up with potential solutions. The students presented their solutions at the event's conclusion.

At the time of the research visit, the school was still having a problem with cross-contamination in the cafeteria (the event described above had taken place the previous year). Since cross-contamination was still an issue, the school was considering introducing a slop bucket (i.e., a new *material* that was not yet connected) the following school year to see if that would alleviate the problem. At the eco-team meeting, the students and Teacher 2 discussed who at the school would be responsible for implementing this new *material* for waste management practices. Reflecting on the event from the previous year at the eco-team meeting, one of the students mentioned he was surprised they still had a problem with cross-contamination, because he thought that once people 'knew more' that they would act differently. That is, it became apparent to him that knowledge (*competence*) about proper

[28] It is common knowledge at the school that proper waste management and local food production are related to climate change mitigation due to their potential to reduce greenhouse gas emissions.

waste management and the presence of the necessary *materials* (e.g., compost and recycling bins) was not enough to change the practice for everyone.[29] This may be related to a missing meaning (e.g., proper waste management is an important activity to spend time doing) or an incongruent meaning (e.g., proper waste management takes too much time to do properly) for some students.

Knowledge and skills (*competences*) related to action-based teaching methods were also utilized at the school in relation to CCE. For some teachers, it was important to always include an action component to every CCE lesson (partially connected *meaning)*. Reflecting on the necessity to always include an emphasis on action when discussing CCE, Teacher 2 mentioned, "to me it is meaningless if you don't consider the hand [i.e., the action] piece...there's no sense in keeping this in your mind intellectually. It has to lead to action."

The focus on action was more apparent for some subjects. Teacher 4 mentioned, "Civics is [a subject] where you're educating students to take action." For instance, for an assignment in her Grade 10 Civics class, students were asked to prepare a letter about a topic of interest to send to government leaders. She mentioned that students often selected climate change and would sometimes elect to send the letters - sending the letters was not a requirement of the assignment (partially connected *material*). Teacher 7's SDG class described above was also oriented towards preparing students to act.

Knowledge of and skills related to (*competences*) the framing of CCE to match the audience were also found at the school.[30] This technique was especially important since the school was located in a conservative area, and they sometimes received pushback from parents related to CCE (*meaning*). Teacher 5 mentioned:

> I think you need to be aware that we live in an area that can be quite conservative sometimes…I think you'll use that knowledge to kind of drive *your* planning and how you present the topic and what *materials* you do show to the kids or videos or sub-topics (emphasis added).

Related to framing information for different perspectives, Teacher 4 also described an activity she had used in her History classes that is an adaptation of de Bono's Six Thinking

[29] Practice elements related to proper waste management were labelled as partially connected since they were connected for some but not all students.

[30] Practice elements related to the framing of CCE were labelled as contentiously connected as they were necessary to avoid conflict and/or were used when teachers encountered resistance to teaching CCE.

Hats activity (*material*).[31] For this activity, she brought in different colored hats (*materials*) to represent different perspectives, and students had to discuss a particular issue from the point of view associated with their hat color. She also mentioned when students say something against climate change, she will ask them, "'which hat are you wearing today, and which one are you talking from?' And we'll talk about different perspectives." The different colored hats were used to help students analyze issues from different points of view and were sometimes used when Teacher 4 faced resistance to CCE.

Another approach used to teach CCE at the school was a whole institution approach.[32] The use of a whole institution approach at the school appeared to be influenced by their EcoSchool status, UNESCO ASPnet school designation and Simply Living Simply programs all of which had targets, programs, and resources aimed at all domains of a whole institution approach. A whole institution approach is designed to encourage a culture of climate action (*meaning*) that is self-sustaining even in the face of resistance. For instance, when discussing how to respond to a student who says they do not believe in climate change, Teacher 4 mentioned she hopes the school will be able to educate them through their practices.

The use of a whole institution approach as a teaching method for CCE was described by several participants in relation to different activities. For instance, though not explicitly described as using a whole institution approach, the climate change assembly mentioned above (to address the problems of cross-contamination and taking care of the garden in the summer), combined student learning (i.e., Teaching and Learning) with community experts (i.e., Community Partnerships) to plan for and address (i.e., Overall Governance) two problems in the domain of Facilities and Operations, and as such, this event engaged harmoniously with all four whole institution domains in relation to CCE. Similarly, in the SDG class described above, part of the assignment involved students connecting with a community member to obtain feedback on their ideas and/or obtain additional information to support project implementation. Thus, all projects in the SDG class engaged with at least two domains (i.e., Teaching and Learning and Community Partnerships). Depending on the action project students developed for the SDG class, the potential also existed for students to engage

[31] The "Six Thinking Hats" activity is a critical thinking tool that enables one to look at a decision from different points of view (de Bono, 1985).

[32] Practice elements related to a whole institution approach were labelled as harmoniously connected.

with one or more additional domains (e.g., Overall Governance if they developed a policy related to an SDG and/or Facilities and Operations if they focused on getting solar panels installed at the school). Teacher 1 described a more informal use of a whole institution approach for CCE saying:

> I think it will be easy for you to point to something physical in the room, and say, 'This is why we do this.' Right? This is an important piece of the way that we're working to try to cut down on climate change and reduce our impact, and so having those things very much front and center at all times…means that you don't have to spend time explaining anything because they've heard it, and they know how this works.

That is, she is bringing in physical objects related to the domain of Facilities and Operations (e.g., a light timer) into a classroom lesson (i.e., the domain of Teaching and Learning).

There was also evidence at the school of differing opinions regarding how to deal with emotions/opinions related to climate change, and as such practice elements related to this theme were categorized as contentiously connected. Before discussing these skills, the most common emotions related to climate action and climate change observed at the school are summarized.

Discussions related to taking climate action were usually associated with positive emotions (*meanings*). For instance, Teacher 2 made a point to emphasize "the joyfulness of coming together to do [climate action] activities." When negative emotions were described at the school, it was usually in relation to fear, anger, overwhelm, exhaustion, and frustration felt by students in relation to climate change (e.g., the students at the 3% Project seminar who indicated they were scared about the future of the planet). Teacher 5 also mentioned students can feel angry when they realize how little government agencies are doing to address climate change. Additionally, Teacher 1 mentioned that it felt to her that by the time students were in Grade 10, they were "climate tired," often giving her an eye roll any time climate change was mentioned.

Feelings of frustration (*meaning*) surfaced in the Grade 9 focus group activity as well as several interviews. Student 15 lamented that teachers only present one side of the argument related to climate change, and if a student disagrees with the argument presented, the student's opinion is not respected and is automatically shut down. While the context surrounding this student's statements was not clear, comments from Teacher 12's interview

may illuminate part of the context surrounding Student 12's comments. Teacher 12 (a former student at the school) mentioned:

> I know I was raised on a farm. And sometimes it feels that – when you're in an occupation where your whole home income is based on, say a beef farm, sometimes students can actually feel attacked when everyone says, stop eating meat. Whereas sometimes, that's not the message that should be getting across…So just recognizing that, but then having the discussion that, 'No it's not that we're against farmers and against your operation, because it's a really important part of our community, but maybe the emphasis of buying local or something like that, instead of buying from a big chain grocery store where it's not really helping our community.'

A similar sentiment was also expressed by another participant[33] who owns a farm and mentioned that they feel alienated (*meaning*) sometimes from the other staff members because they own a farm (*material*). They mentioned that while they know they are not causing climate change, they feel as though some of the blame is placed on them, even though they are just trying to support their family. It appears some students and staff feel frustration with some aspects of how climate change is discussed at the school.

Various understandings (*competences*) about how to address negative emotions related to climate change were described by teachers. Teacher 2 described the importance of considering how she feels about climate change before teaching CCE in an Interview to the Double question:

> Then the heart piece for yourself before you ever get started is how do you feel about all of this? What's the emotion behind it, and where do you draw hope? Do you draw hope? When you teach it to students, what are you going to portray to them?

That is, Teacher 2 reflected on her own emotions in relation to climate change before teaching CCE to her students, with an emphasis on identifying pockets of hope. No evidence at the school was identified of teachers allowing space for students (or teachers) to express/discuss their own emotions about climate change (and then helping each other work through those emotions) as a precursor to climate change lessons.[34] Instances described where teachers did help students work through their emotions appeared to come *after* having a climate change lesson during which students showed indications they were upset.

[33] The role and gender identity of this participant is intentionally kept vague to further protect their identity.

[34] A specific question about whether or not students were given space to communicate their emotions about climate change was not asked. So, it may be possible that such instances do occur at the school.

To address the negative emotions related to climate change, most teachers indicated they would have a one-to-one conversation with the student, wherein they mentioned hopeful (if not also vague and broad) messages, such as "one person can change the world. Maybe you're that person" (Teacher 9). They also mentioned statements that were meant to be hopeful but put the onus on the student's generation, such as "I think you could encourage them that their generation is our future. They're the ones that are going to make an impact" (Teacher 5). Teacher statements to students also relied on human creativity, with Teacher 10 recounting she recently told a student who mentioned they felt hopeless about addressing climate change, that she "see[s] a lot of creativity in young students and in people in general, and it's our creativity that's going to get us out of this mess. Not by doing maybe what's been done in the past, but by creating a new way of being in this world" (Teacher 10).

Taking a different approach to negative emotions, Teacher 4 mentioned that when students discount the existence of anthropogenic climate change it can stir the emotions of those who do believe in climate change and cause them to be more passionate about climate action. She mentioned:

> Often, you need that one person arguing with them rather than just compliance because as soon as you have that compliance where everyone's on the same page, well, sometimes you don't get the reactions because it's like, 'Oh well, everyone else is doing it. I don't need to bother. I don't need to bother being passionate about it because everyone else is.' So, it's kind of good when sometimes someone says, 'climate change isn't happening,' or 'who cares about the polar bears. We don't have them here.'

Teachers often mentioned that when they see a student is scared or worried about climate change, they emphasized actions they could take to mitigate climate change. For instance, Teacher 1 mentioned:

> It's such an easy topic to be negative about. And it's important *I* think when you're demonstrating your passion [about climate change] to demonstrate your passion [*meaning*] in a positive manner, instead of standing on your soap box and going 'we're all going to die!'

She mentioned instead it is important to focus on, "OK [rubs hands together] let's talk about what we're going to do." Focusing on potential actions was particularly important when teachers realized students were feeling fearful about climate change. Several teachers also mentioned validating student's fears about climate change before discussing actions that can

be taken. For instance, when Teacher 8 encounters a student that is scared about climate change, she says, "'yeah this is scary, but we're going to do things. We're going to take action and you can take action.' It's about showing them that 'yeah, it is scary, *but* we can turn this into a positive.'" Teacher 2 also mentioned:

> I don't think it's wrong to show kids some I guess despair or down times about it. This is serious stuff. The only thing is, I don't think you can leave it there. You have to bring it back around to, 'It's ok to be low sometimes. It's ok to get discouraged, and it's through action and community that you can find a path out again.'

The focus on climate action was also seen in class observations. For instance, the Grade 8 History lesson (with the hula hoops and index cards) described above ended with a discussion of Project Drawdown's top ten actions that can be taken to reduce climate change.

Finally, while most teachers at the school indicated they tried to help students work through their emotions about climate change when they surfaced, Teacher 3 mentioned if a student looks angry about climate change, that they should be told to "control [their] emotions." In stark contrast, Teacher 2 mentioned:

> If a student's angry I want them to talk about it. No matter what the reason for their anger. Say, 'I can see that you are upset right now' and I might not label it as anger necessarily, but say, 'I can see that you're upset right now. Tell me about your thinking.' And then I want them to articulate what they're thinking. And then have a dialogue around it. And acknowledge those feelings, 'This is a big topic that causes a lot of emotion. And I can see this is troubling you. And it's ok to sit in your strong emotion just don't live in that house forever, move out, vacate after awhile.'

Table 4.7

Key Practice Elements and their Connections Related to CCE Methods

		Within and Across Domains			
		H	P	C	N
Competences (e.g., knowledge, understanding skills)	Teachers should model climate action and be facilitators of knowledge	**X**			
	Students should teach/mentor students	**X**			
	Knowledge and skills related to 'good' CCE pedagogy (inquiry-based, place-based, outdoor education, problem-based, and action-based education)	**X**			
	How to ask critical questions	**X**			
	Knowledge of proper waste management		**X**		

	Knowledge and skills related to framing CCE for the audience			X	
	Whole institution CCE	X			
	How to deal with climate change emotions			X	
Meanings (e.g., ideas, emotions, aspirations, symbolic meaning)	Passionate about CCE	X			
	CCE should feel authentic	X			
	Valued meatless diets	X			
	Valued student mentorship and community building activities	X			
	Student passion/ideas	X			
	Outdoor learning should be free for students	X			
	Proper waste management is a worthwhile endeavor to spend time doing		X		
	CCE is meaningless without action		X		
	Conservative area/disbelief in climate change			X	
	Culture of climate action	X			
	Emotions of joy, fear, anger, overwhelm, being "climate tired," frustration			X	
	Frustration with how climate change is discussed at the school/feeling alienated			X	
Materials (e.g., objects, tools, technologies, place, body)	Climate change resources	X			
	Meatless diet	X			
	Simply Living Simply announcements and presentations	X			
	Small and Tall in the Hall	X			
	350 parts per million of CO_2 cubes	X			
	SDG 13 rants	X			
	Climate change dioramas	X			
	Debates, presentations, and action projects	X			
	Q-charts and computer lab	X			
	YouTube videos and movies	X			
	Art sketchbooks	X			
	Old phone books	X			
	Nearby national park and outdoor activities (e.g., crafts, fishing)	X			
	Footprints conference for all district schools				X

	Floating bog mats and soil carbon sequestration at Killarney	X			
	Local lake and seasons	X			
	School assembly to address to waste management and gardening	X			
	Slop bucket				X
	Waste management tools (e.g., compost and recycling bin)		X		
	Letters to government officials		X		
	CCE materials and videos that align with appropriate audience framings			X	
	Six thinking hats activity and hats			X	
	EcoSchool status, UNESCO ASPnet designation, and Simply Living Simply program	X			
	School assembly to address waste contamination and garden	X			
	Physical objects in classes (e.g., light timers)	X			
	Local farms			X	

Note. Green = practice elements related to the sub-theme that teachers should model climate action practices and be facilitators of knowledge. Orange = practice elements related to the sub-theme that students should teach and mentor other students. Blue = practice elements related to the sub-theme of teaching methods related to 'good' CCE pedagogy. Yellow = practice elements related to the sub-theme of the importance of a whole institution approach. Teal = practice elements related to the sub-theme of how to deal with emotions related to climate change. Practice elements in this table may also be connected to other practices. This table and similar tables that follow in subsequent sections are not an exhaustive list but a heuristic to illustrate key practice elements and their connections within and across domains. H = harmonious connections. P = partial connections. C = contentious connections. N = elements that are not yet connected or that are no longer connected. Elements that also serve as motivations are indicated with a M.

4.2.4 Feedback and Monitoring

The forms of feedback and monitoring related to CCE observed in the domain of Teaching and Learning were informal and related to measurable results, self-monitoring, conversations, motivation and engagement in activities, and research.

While formal mechanisms of feedback and monitoring were not mentioned, measurable results were often mentioned as indicators of how teachers knew whether CCE was effective and/or how they knew students understood what was taught. In terms of 'what' teachers considered important to measure, teachers mentioned they knew CCE was effective

if: students understood the connection between initiatives and climate change (Teacher 1; Teacher 7), students were teaching parents (Teacher 10), *materials* for the CCE month were prepared well (e.g., presentation, website information, sharing video links) (Teacher 1; Teacher 5), visual representations of CCE work were present (e.g., posters) (Teacher 5), daily climate change-related announcements were done (Teacher 5), and if students were highlighting areas in need of improvement in relation to climate change at the school (Teacher 8).

Conversations were also mentioned as informal monitoring and feedback used at the school. For instance, Administrator 1 mentioned he used a technique he called Management by Walking Around (MBA) wherein he walks around to classrooms to engage with students in conversations about the topics they are discussing (I also observed this on my first day at the school). Teacher 2 mentioned the importance of feedback loops in relation to conversations for monitoring and feedback related to CCE:

> I think you should have a feedback loop along the way of other teachers giving you feedback about—'I know you think that we already learned about the greenhouse gasses, but when I talk with my class, they don't get it.' Or I think a common one we find is staff and students mistakenly think pollution in and of itself is climate change-related. And it can be, but I think we have to keep homing in on, 'What's it got to do with climate change?'

Teacher 2 mentioned that within the school, the feedback loop is usually informal with conversations often happening in the staff room, particularly at lunch time.

Conversations were also mentioned as how teachers measured if CCE was effective or if students understood what is taught (Teacher 4; Teacher 5; Teacher 6; Teacher 7; Teacher 9). For instance, Teacher 5 mentioned:

> I think you will know just based on conversations with them and you can ask them questions about you know, 'Why should I stop using plastic? Why should I buy local? What is the benefit? Why should I go and plant trees?' and they should be able to answer that very easily and make the connection to climate change.

Teachers also mentioned they knew CCE was effective if students were talking about climate change on their own (Teacher 10), the descriptions they were using to discuss climate change were accurate (Teacher 11), and if older students were teaching younger students about climate change (Teacher 10).

Teachers also mentioned they knew CCE was effective if students were motivated to participate in activities (Administrator 1; Teacher 5; Teacher 7; Teacher 8; Teacher 9; Teacher 10). For instance, Teacher 7 mentioned:

> If the kids are not engaged, they're not going to get anything out of it and then there's no point doing it… and the students [should be] having fun. The students are passionate about what they're doing. That's the whole key to it.

Evidence that CCE was motivating and engaging included students going home excited and talking to their parents about what they learned (Teacher 10), having activities that included actions in the community (Administrators 1; Teacher 8), and having different types of activities to ensure lessons are appropriate for different learning styles (e.g., presentations, announcements, outdoor activities) (Teacher 9).

Teachers also mentioned that they knew that CCE was effective if they saw student's knowledge of climate change grow over the years they were at the school. Several secondary teachers praised the elementary teachers for their work on CCE because by the time the students came to their classes, they were very knowledgeable about climate change. There was also acknowledgement that students' and staffs' increased climate change knowledge and action was partly a reflection of what was happening in society. For instance, Teacher 2 mentioned, "I don't think anyone in society 10 years ago was as deeply committed or understanding [of climate change]. I think it's been a reflection of what goes on in society. It's reflected back in the school and vice versa."

Finally, it became apparent that research was an important form of informal monitoring and feedback and motivator for CCE that contributed to the emergence and perseverance of climate action practices at the school. During my research visit, two teachers told me they changed their planned lessons to include a focus on climate change after hearing I was at the school. Also, as mentioned above, the Outdoor Education Center added a slide on climate change because they knew I was coming for the Fur Trade field trip. While many climate change-related lessons were planned before the teachers or community partners knew of my visit, it appears my presence as a researcher also influenced the climate action practices at the school and Outdoor Education Center.

Research also appeared to affect new climate action practices at the school board. While I was visiting the school, the school board invited Teacher 2 and Administrator 1 to

present about the Simply Living Simply project (presentation also mentioned above). Following the meeting, Teacher 2 was invited to join a committee tasked with making the school board building more climate friendly. Teacher 2 mentioned she thought my presence at the school affected the school board's decision to ask for a presentation about the Simply Living Simply program, and their decision to invite her to join the board committee. Teacher 2 mentioned that prior to my visit, they had discussed the Simply Living Simply program with the school board, but this was the first time the program was received with such celebration and excitement. While it is impossible to know the extent to which my presence affected these practices at the school board, it appears there may be a correlation, as the school board was aware I was at the school (due to my school board ethics application).

Research also appears to have the potential to influence the perseverance of climate action practices. Several teachers told me that the focus group activity I facilitated was beneficial for them to reflect on what they do in relation to CCE and how to talk about it. In particular, Teacher 2 mentioned that she had been trying for a while to get the other teachers to realize the role they play in CCE, and mentioned she felt the focus group was an effective tool to help them come to that realization. They also mentioned that the focus group activity helped them to realize that it is not just one person involved in this work. Instead, they all are playing an active role in CCE at the school.

4.3 Community Partnerships

All interview participants mentioned practices in at least two domains. One of those domains was always Community Partnerships, and the second domain was always Teaching and Learning. As such, activities in the Teaching and Learning domain often overlap with those in the Community Partnerships domain and vice versa. Examples mentioned in the Teaching and Learning section that also involved community partners are not duplicated here; instead, themes more closely related to Community Partnerships are mentioned. That said, there is inevitably some overlap with other domains, as the school relies heavily on their community partners for all aspects of school operation.

Within the domain of Community Partnerships, several key *competences*, *meanings*, and *materials* were identified and connected harmoniously, contentiously, and not yet (see Tables 4.8-4.10). Practice elements were connected within the domain of Community

Partnerships and across the other domains (Overall Governance, Teaching and Learning, and Facilities and Operations). These connections are described below in relation to three themes, which included the immense support (e.g., donations of time and money) the school receives for CCE from the local, regional, and provincial community (with some exceptions), the importance of partnering with everyone (e.g., at the school, community, board) for CCE, and the importance of bringing people into the school as well as the importance of carrying work related to CCE out into the community (i.e., a 2-way flow of information/activities). Key practitioner motivations to engage in CCE (or not) included: 1) the influence of local and campus community support, 2) resource availability (e.g., time, money, supplies), and 3) the influence of the school's climate action practices on staff's personal practices. These motivations are discussed within their related theme and are also identified as such in Tables 4.8-4.10.

4.3.1 Support for the School from the Local, Regional, and Provincial Community

It was very apparent how much support (monetary and otherwise) the school receives from the local, regional, and provincial community (with a few exceptions) for CCE. The practice elements related to this theme were harmoniously and contentiously connected (see Table 4.8) within the domain of Community Partnerships and across the other domains (Overall Governance, Teaching and Learning, and Facilities and Operations).

It was understood that CCE was supported (*meaning* and *competence*) by the local community, staff, local media, school board, as well as the local and provincial government.[35] In general, the local community, including local businesses and organizations, were "eco-friendly" and largely supportive of the school's CCE activities. This support was often visible in their donations of time and money (*materials*) for CCE initiatives. For instance, t-shirt donations from a local thrift store enabled the school to make t-shirt bags, which were later donated to the local grocery store to hand out to customers to reduce the number of plastic bags[36] used during the tourist season. Community members have also donated their time to help sew the t-shirt bags. Other schools in the area had also contacted the school I visited to

[35] Practice elements related to this sub-theme were usually labelled as harmoniously connected. Instances of contentious connections are indicated below.

[36] It is common knowledge at the school that plastic bags are related to climate change because they are made using petroleum, and that reducing the use of plastic bags contributes to climate change mitigation.

find out how they established the practice of the grocery store handing out t-shirt bags, so that they could replicate it in their setting.

Community members had also contributed to the development of new climate action practices at the school through grant applications and donations of money. For instance, the school council chair's (a parent) successful application for a Farm to Cafeteria grant (*material*) allowed the school to have a salad bar on Tuesdays, which was partially stocked with vegetables from the school garden (see Figure 4.12).[37] After the salad bar was established, someone from the community anonymously donated $3,000 so the school could offer the salad bar to students and staff for free for the remainder of the school year.

Figure 4.12. *School Salad Bar with Sprouts from the School Garden*. *Note.* The picture on the left is of several vegetables included on the school's salad bar. The picture on the right is of sprouts grown in the school garden.

The local and school community had also contributed to removing plastic cutlery from the school. The cutlery program at the school began because Teacher 7 was bothered by how much plastic was used in the cafeteria (*meaning*). Teacher 7 mentioned she asked parents and community members to donate metal cutlery, and they were very willing to do so. The cafeteria staff also worked with the school to ensure they were following health regulations. To ensure the cutlery is clean, her students collect the dirty cutlery each day, wash it, and then return it the next day. The whole school and local community members worked together to ensure the cutlery program was a success.

[37] It is common knowledge at the school that local food production is related to reduced greenhouse gas emissions.

There was some evidence that when CCE projects engaged with and received support from the community, they were more likely to persevere. For instance, the local farmer's market (*material*) was started several years prior by former students, involved various vendors from the community, and continued to operate at the time of the research visit. Additionally, when discussing the Outters program and related trip to Algonquin park (*materials*) during the teacher focus group, the teachers mentioned the Outter's program continued to run no matter who teaches that course (since the program began 50 years prior, about 8 different teachers have taught the course). The teachers mentioned that the community values and supports (*meanings*) the Outter's program and hosts dinners to help raise money (*material*) for the program. Teacher 2 mentioned students know, "my grandpa, my mom took this course. It's generational. It pumps it up." That CCE activities are generational appears to motivate practitioners to continue carrying them.

The school had also partnered with several local businesses and the community, to deliver their Footprints conference, which was run solely on volunteers and donations. Teacher 11 (one of the original co-founders of the Footprints conference) explained, "Every year, we send out letters to the community…so we beg for money, and we sometimes pick up garbage for donations." She also mentioned:

> Every year it's a big deal to figure out how we're going to pay for [the Footprints conference] because one of our objectives is to make it zero dollars for our kids. So, we would never want anyone to not be able to go. I think it aligns perfectly with our UN mandate [*material*] here in the school.

Teacher 1 also mentioned that the Footprints Conference was in danger of disappearing if the staff cutbacks continued, as they would no longer have the time to raise the necessary funds needed to put on the conference.

Staff members at the school had learned how to be strategic in not only forming community partnerships but in asking for money from the community to support their initiatives (*competence*). Teacher 11 mentioned, "We like to do everything big. So, everything we do is going to cost money unless someone will do it for free." She went on to mention "because we are an economically depressed community…we have to be really strategic in who we ask for money and how we ask for it and when we ask for it." I asked her if they were ever not able to do a project because of money, and to this question she replied, "No, we've

been extremely fortunate. We've just got really good at asking, as well, and our local media [*material*] has been fantastic in promoting the things we do." Teacher 11 also mentioned the school had been successful in applying for several grants (*material*) to support their activities.

In relation to funding (*material*), the school board and the provincial ministry of education had supported the school, especially for their annual Footprints conference, but also for broader CCE activities. For instance, when the school participated in the curriculum writing for the Specialist High School Major in the Environment, there was provincial funding attached to that work, which was used to partially fund the first Footprints conference. According to Administrator 1, the provincial funding also served as a partial motivator for the school's participation in the curriculum writing process. The first Footprints conference was also supported financially by a provincial Lighthouse Grant and school board Student Success funding. Since the inaugural Footprints conference, the school board had continued to support the school to deliver the conference by donating between $1,500 and $5,000 each year depending on what the school was able to secure through community donations (which was usually between $2-3,000) or other grant applications. It was apparent that several teachers at the school were skilled in grant writing (*competence*). In relation to funding received for other CCE activities, Administrator 1 mentioned that the school also received provincial Remote and Rural funding, which recognized the school is located in a remote and rural area. He mentioned:

> So, that money we can use to buy things that support curriculum that support climate change. So, in a roundabout way the money's not for environmental change or climate education. But we can use it to buy resources, so you have to be creative [*competence*].

It was also clear, however, that not all parents were supportive of CCE at the school and that parents who are supportive, are not always as enthusiastic as the school staff (*meaning*).[38] For instance, Teacher 1 mentioned:

> Some [parents] understand that this is something that needs to change, and they understand what those things are, and it affects them in their lives now because of where they work and what they do. But they're not as passionate. They're not always as enthusiastic as we are.

[38] Practice elements related to this idea were labelled as contentiously connected.

Teacher 1 also mentioned support for the school's activities related to CCE often depended on whether parents' livelihoods (*material*) were climate harmful. In cases where parent's livelihoods are climate harmful, she mentioned that parents can get defensive if asked to change their practices, and that this attitude (*meaning*) often also surfaced in students. Teacher 4 also mentioned some parents are less accepting because they see that the local area is still beautiful, and they know they still have multiple snow days each year (*competences*), so it is difficult for them to believe climate change is occurring (*meaning*). To address parent conflict related to CCE, Teacher 10 mentioned she invites them to come to the school so that they can see what is happening for themselves. She mentioned, "It's different when you're actually here, than if it's just hearsay from somebody. They're welcome any time. Come on in!"

Table 4.8

Key Practice Elements and their Connections Related to Support Received from Community

		Within and Across Domains			
		H	P	C	NY
Competences (e.g., knowledge, understanding skills)	Understanding that they are supported by their community	X			
	Know when, how, and from whom to ask for money/donations of time	X			
	Grant writing skills	X			
	Creativity	X			
	Knowledge that their area is still beautiful and still have snow days			X	
Meanings (e.g., ideas, emotions, aspirations, symbolic meaning)	Engagement/support from the campus and local community, including staff, parents, media, school board, local and provincial government, businesses, organizations	X			
	Idea to get rid of plastic cutlery	X			
	Support for generational environmental activities (e.g., Outter's program) (M)	X			
	Value that students should not have to pay for an educational experience	X			
	Some parents are not as supportive of CCE at the school and this attitude also can surface in students/Don't believe in climate change			X	
	Donations of time, money, and materials	X			

Materials (e.g., objects, tools, technologies, place, body)	Grants	**X**			
	Farmer's market	**X**			
	Outter's program and Algonquin trip	**X**			
	UN mandate	**X**			
	Local media	**X**			
	Provincial and school board funding (M)	**X**			
	Climate harmful livelihoods			**X**	

Note. Practice elements in this table may also be connected to other practices. This table and similar tables that follow in subsequent sections are not an exhaustive list but a heuristic to illustrate key practice elements and their connections within and across domains. H = harmonious connections. P = partial connections. C = contentious connections. N = elements that are not yet connected or that are no longer connected. Elements that also serve as motivations are indicated with a M.

4.3.2 Need to Bring Everyone Along on the Journey

There was also an understanding at the school of the importance of bringing everyone (at the school, in the community, and at the school board) along on the journey towards increased climate action. The practice elements related to this theme were harmoniously, contentiously, and no longer connected (see Table 4.9) within the domain of Community Partnerships and across the other domains (Overall Governance, Teaching and learning, and Facilities and Operations).

There was an understanding (*competence*) of the importance of partnering with the school board and staff at the school, as well as the community outside the school.[39] In discussing the importance of partnering with the school board, Administrator 1 mentioned:

> You have to be partners with the board [*meaning*]. You have to work super hard with all levels right down to the IT guys, and simple things like printers that don't work well, waste a ton of paper [*materials*]. So, your IT people, if they can keep things maintained, or you have a good relationship, then they get you the materials that help you do a better job of making everything electronic.

Teacher 2 also mentioned the importance of "bring[ing] all of your staff along" by inviting them (i.e., one of the office managers, one of the custodians, one of the cafeteria staff) to some of the CCE activities at the school (e.g., UNESCO assemblies). In discussing how the cafeteria staff have joined the school's journey towards increased CCE, she mentioned, the

[39] Practice elements related to this idea were usually harmoniously connected. Exceptions are noted below.

cafeteria staff have "started making suggestions, 'What if we do this differently?' They've switched to reusable containers [*material*], and they got rid of straws at our behest [no longer connected *material*]." Teacher 2 also mentioned that the custodians have also joined in by allowing them to do waste audits [*material*] of recycling, garbage, and compost.[40] She mentioned "without the cooperation of your custodial staff, [waste audits] could be a very contentious thing." In relation to the broader community, there was also an emphasis with the Simply Living Simply program on making climate change 'safe' for the community and students to investigate before announcing that the program was really all about addressing climate change (example also mentioned above).

Bringing everyone along also included working with fellow teachers to find appropriate time for CCE activities, as well as being respectful of other teacher's time, especially when teachers were asked to support activities planned by another teacher/class (*meanings*). The need to be conscious of time (contentiously connected *material*) was especially relevant for the secondary teachers and students due to their busy schedules. Lack of time was the only reason mentioned as to why a teacher may not be motivated to have their class participate in a particular CCE activity. In planning how to integrate CCE at the secondary level across subjects, Teacher 2 suggested having a conversation in which you say, "In two months, it is climate change month. Can we talk about a way that you would integrate this into your Art class, your ERM, which is Environmental Resource Management class, your Geography class, your English class?"

While time was mentioned as the most salient barrier to the inclusion of CCE at the secondary level, multiple participants mentioned the importance of and support for ensuring that CCE is happening at the primary and secondary levels, the importance of being respectful and creative in working to make sure that CCE happens across all grade levels, and the potential of cross-curriculum approaches to overcome barriers related to time (*competences* and *meanings*). Bringing everyone along helped to ensure climate action practices were supported by the local and campus community, and this support appeared to motivate the continuation of climate action practices.

[40] Emptying the recycling and compost bins at the school was handled by the students because the custodians' contracts only included removal of garbage.

Table 4.9

Key Practice Elements and their Connections Related to Bringing Everyone Along on the Journey Towards Increased Climate Action

		Within and Across Domains			
		H	P	C	NY
Competences (e.g., knowledge, understanding skills)	Understanding that you need to bring everyone along in relation to climate action	X			
	CCE needs to happen at primary and secondary levels	X			
	Cross-curricula approaches can help overcome barriers related to time	X			
Meanings (e.g., ideas, emotions, aspirations, symbolic meaning)	Important to partner with the school board, school staff, and community for climate action	X			
	Support from staff across domains (M)	X			
	Respect other teacher's time for CCE	X			
	Support for CCE happening at primary and secondary levels	X			
Materials (e.g., objects, tools, technologies, place, body)	Paper, printers, and other electronics	X			
	Reusable containers	X			
	Plastic straws				X
	Waste audits	X			
	Time for CCE (M)			X	

Note. Practice elements in this table may also be connected to other practices. This table and similar tables that follow in subsequent sections are not an exhaustive list but a heuristic to illustrate key practice elements and their connections within and across domains. H = harmonious connections. P = partial connections. C = contentious connections. N = elements that are not yet connected or that are no longer connected. Elements that also serve as motivations are indicated with a M.

4.3.3 Two-Way Flow of Information/Activities for CCE

The final theme related to Community Partnerships was the two-way flow of information and activities related to CCE. That is, community partners came in to share information/do activities with the students, and the students also went out into the community to share information/do activities related to CCE. The practice elements associated with this theme were harmoniously and contentiously connected (see Table 4.10) within the domain of Community Partnerships and across the other domains (Overall Governance, Teaching and Learning, and Facilities and Operations).

Overall, there was an understanding (*competence*) that involving community members in CCE enhanced the overall richness of the experience (*meaning*) both in relation to partners coming into the school and bringing CCE out into the community.[41] Teacher 2 mentioned:

> I think whenever you can engage the community in it; it's for the best. So, it's nice if you can find a couple targets in the community that will tie in with you. Either to bring in experts but also to carry your schoolwork out. (Teacher 2)

Several teachers mentioned that they contact (and are contacted by) community organizations to come to the school for CCE initiatives. Administrator 1 mentioned, "this school has so many connections [*meaning*] to the community that they often bring [CCE initiatives] to you." Similarly in the teacher's focus group, teachers mentioned that several community groups (e.g., the 3% Project, Parks Canada) had reached out to them to present to students about CCE. During the teacher's focus group, the teachers also mentioned that I had contacted them to learn more about what they were doing. Teacher 10 continued, "people like Kristen coming here. We're famous!" Another teacher mentioned, "it's a snowball. It keeps growing." The school also invites local organizations and community members to the school as guest speakers in relation to CCE. For example, there is a community member who owns an electric car (*material*) and had visited the school in the past.

The school also makes a concerted effort to ensure their work is carried out across the school and into the local community. In relation to the school community, the monthly UNESCO assemblies and daily announcements related to CCE, as well as their associated *materials* (e.g., LCD projector, presentations), were mentioned as key tools through which CCE was shared with the school community. A key way teachers shared their work related to CCE with the community was through the Simply Living Simply website (*material*), which included the challenges associated with each monthly theme as well as associated resources. In addition to the website, the local newspaper and social media (*materials*) were also mentioned as crucial to getting word out to the community about their CCE projects. For instance, during the eco-team meeting, an idea surfaced that one of the students on the team could write an article for the local newspaper about the water conservation campaign they were working on with the community partner for his journalism class. Committee

[41] Practice elements related to this sub-theme were usually harmoniously connected. Exceptions are noted below.

membership (*material*) was another tool used by both students and community partners to facilitate the distribution of information about CCE between the school and community. For instance, a community member often joined the eco-team meetings, and one of the students on the eco-team also sat on a committee for a local environmental organization to inform them what was happening at the school, including about actions related to climate change mitigation and adaptation.

Related to carrying CCE work out into the community, several staff members mentioned that they have changed their personal practices because of the school's practices. That is, there appeared to be a shared understanding, aspiration, and motivation (*competence* and *meaning*) at the school among the staff to make their personal practices more climate friendly due to the school's climate action practices. For instance, Teacher 6 mentioned,

> As a staff member, we don't use a dryer [*material*] at my home. We garden [*material*]. We compost [*material*]. There's a lot of things I might do, but because I'm here we just have a lot of discussions at lunch—or in meetings, 'I'm going to try to cut down on my meat consumption [*material*].'

Similarly, Teacher 7 mentioned that when she first came to the school five years prior, "Climate change wasn't on my – it was on my radar but not to the point that it is now, and just personally, I've now taken it to home." She also mentioned being excited (*meaning*) to tell Teacher 2 about a re-fillery (*material*) she found, so that she could reduce her use of plastic at home. Teacher 9, who owned a farm, also mentioned that she had changed some of the practices on her farm (contentiously connected *material*) since coming to the school to be more environmentally friendly. Likewise, Teacher 4 owned a gas station (contentiously connected *material*) in town but was still looking into alternative energy cars because as she mentioned,

> Hopefully, that's where we're going in our life… unfortunately, I have to drive to work, and we put a lot of kilometers on our vehicles because we do travel a lot. But we also acknowledge that we have to make a change and do things if we can.[42]

Table 4.10

Key Practice Elements and their Connections Related to the Two-way Flow of Information/Activities Between the School and Community for CCE

[42] The material elements of owning a farm/gas station were labelled as contentiously connected because there was evidence that they existed among conflicting ideas related to climate friendly practices.

		Within and Across Domains			
		H	P	C	NY
Competences (e.g., knowledge, understanding skills)	2-way flow of information/activities	**X**			
	Understanding among the staff that they need to change personal practices because of the school's practices	**X**			
Meanings (e.g., ideas, emotions, aspirations, symbolic meaning)	Community involvement enriches CCE	**X**			
	Community connections	**X**			
	Aspiration to make personal practices more climate friendly (M)	**X**			
	Excitement about finding ways to be more climate friendly	**X**			
Materials (e.g., objects, tools, technologies, place, body)	Electric car	**X**			
	UNESCO assemblies, announcements, presentations, and LCD projector	**X**			
	Simply Living Simply Website	**X**			
	Social media and local newspaper	**X**			
	Eco-team and environmental organization committees	**X**			
	Don't use dryer at home, garden, compost, reduce meat consumption, re-filleries	**X**			
	Owning farms/gas stations			**X**	

Note. Practice elements in this table may also be connected to other practices. This table and similar tables that follow in subsequent sections are not an exhaustive list but a heuristic to illustrate key practice elements and their connections within and across domains. H = harmonious connections. P = partial connections. C = contentious connections. N = elements that are not yet connected or that are no longer connected. Elements that also serve as motivations are indicated with a M.

4.3.4 Feedback and Monitoring

Informal forms of feedback and monitoring within the domain of Community Partnerships included measurable results related to sharing what was happening at the school with the community (e.g., publishing newspaper articles), as well as conversations at home with parents. For instance, Teacher 2 mentioned that she recently felt as though the school was not doing enough related to CCE; however, an environmentally conscious parent told her that their child still comes home and teaches them new things, which made Teacher 2 change

her mind about the school's CCE work. Similarly, Teacher 10 mentioned that she knows CCE is effective if students are "taking [CCE] home with them and teaching their parents." While it was previously mentioned that several teachers told students that they were not there to change their parent's minds about climate change, it also appeared that students taking CCE home is one way some teachers measure CCE effectiveness. No forms of formal monitoring were identified.

4.4 Facilities and Operations

When practice elements were harmoniously connected across domains, one of the domains was usually the Facilities and Operations domain. Examples mentioned in previous sections are not duplicated here; instead, themes more closely related to Facilities and Operations are described.

Within the domain of Facilities and Operations, several practice elements (i.e., *competences*, *meanings*, and *materials*) were identified. Practice elements were connected harmoniously, partially, contentiously, not yet, and no longer (see Tables 4.11-4.13) within the domain of Facilities and Operations and across domains (Overall Governance, Teaching and Learning, Community Partnerships). These connections are described below in relation to three emergent themes, which included that taking climate action and ideas for further climate action at the school often included Facilities and Operations activity, the effect *materials* can have on climate action practices and culture (especially practices related to waste management, drinking, and teaching), and how connection to food helps build the community necessary at the school for collaborative CCE. Key practitioner motivations to engage in climate action (or not) included: 1) resource availability (e.g., time and money), and 2) other priorities (e.g., health and safety). These motivations are discussed within their related theme and are also identified as such in Tables 4.11-4.13.

4.4.1 Taking Climate Action Often Meant Facilities and Operations-related Action

Participants were asked what it meant to take climate action at the school. The responses given usually referred to taking Facilities and Operations-related actions (*meaning* and *competence*).[43] While responses to what it meant to take climate action at the school also

[43] Practice elements related to this sub-theme were usually harmoniously connected. Exceptions are noted below.

included statements related to having climate change knowledge (Teacher 1, 3, & 4), "actually doing something about it" (Teacher 12), being passionate about climate action (Teacher 7), and a comment that climate action is a "fundamental element" of the school (Teacher 9), half of the teacher participants also mentioned taking Facilities and Operations related actions. Teacher 1 summarized many of the actions described by other teachers:

> Well, it means that we recycle [*material*]. It means that we compost [*material*]. It means that we encourage people to use or purchase things second hand with some of the exchange things that we do with the Me to We Closet [*material*] that we have. So, that if you need clothes and you're missing something, you can go and get them. It means that when I put on a play, I don't buy all brand-new materials. I try to recycle as much stuff as I have from previous shows and donations [*material*] that have been made to the school. It means that if somebody donates a musical instrument to me, I never say no. I find a way to fix it so that we can use it. There's always that re-purposing of materials, right? It's, 'Oh, I need to photocopy a bunch of stuff? I'm going to use this G.O.O.S. [Good on One Side] paper [*material*].'

Similarly, students usually mentioned Facilities and Operations-related activity when describing what the school is currently doing for climate action (e.g., recycling, composting, gardening).

Ideas for future climate action practices from students, teachers, and parents were often related to Facilities and Operations activity.[44] During the student focus groups, students mentioned ideas (*meanings*), such as planting more trees and installing skylights, as future CCE actions the school should take (see Figure 4.13). Similarly, after the second 3% Project meeting, students were placed into small groups to brainstorm ideas for future climate action projects. Most ideas (*meanings*) generated during this meeting were related to Facilities and Operations activity, such as reusable cups in the cafeteria and serving smaller portions in the cafeteria to reduce food waste (*materials*). Suggestions from teachers and parents for climate actions were also usually related to Facilities and Operations activity. For instance, it had been a parent's idea (harmoniously connected *meaning)* to give away t-shirt bags (harmoniously connected *material*) to the local grocery store to reduce plastic bag use. Building on that idea, Teacher 2 suggested the Shop class build a bench with bins on either side to hold their t-shirt bags and reusable water bottles (*material*), which was being built during the research visit. Ideas for future climate actions (*meanings*) related to Facilities and

[44] Practice elements related to ideas for future climate action were labelled as not yet connected.

Operations activity also surfaced during a Grade 9-10 Art classroom observation with Teacher 6. The assignment prompt (harmoniously connected *material*) asked students to create images in their sketchbook of actions to stop climate change, however, most of the suggested actions were Facilities and Operations-related (see Figure 4.14). While it was noted that students could come up with additional ideas, only suggesting actions related to Facilities and Operations may have structured student's thinking regarding potential actions.

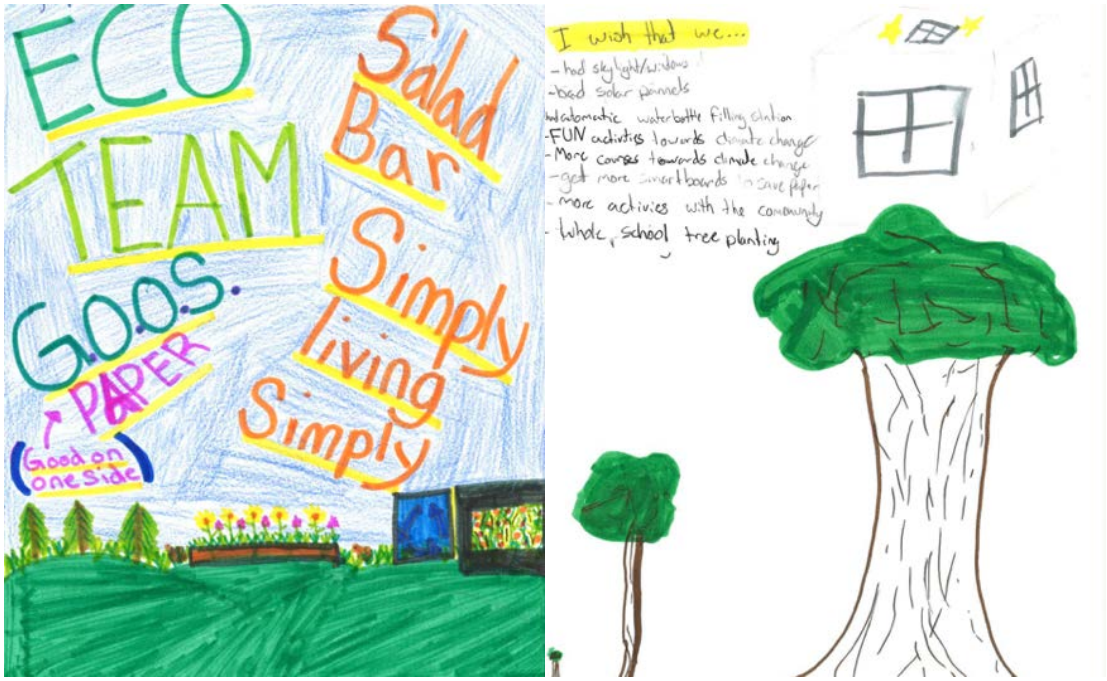
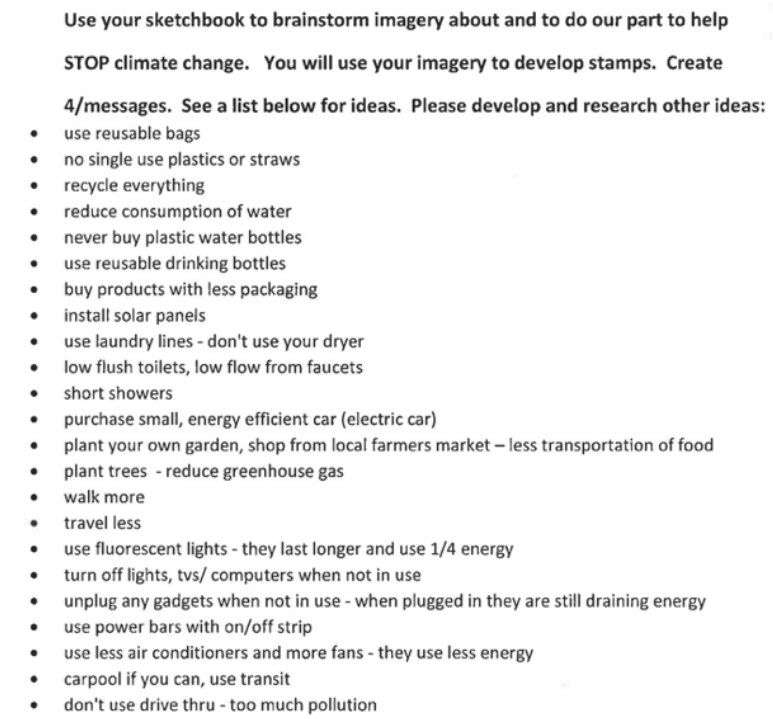


Figure 4.13. *Pictures from the Grade 5/6 and Grade 9 Focus Groups. Note.* The picture on the left is from the Grade 5/6 focus group about actions currently happening at the school. The picture on the right is from the Grade 9 focus group about climate actions they wished to see at the school.



Use your sketchbook to brainstorm imagery about and to do our part to help

STOP climate change. You will use your imagery to develop stamps. Create

4/messages. See a list below for ideas. Please develop and research other ideas:

- use reusable bags
- no single use plastics or straws
- recycle everything
- reduce consumption of water
- never buy plastic water bottles
- use reusable drinking bottles
- buy products with less packaging
- install solar panels
- use laundry lines - don't use your dryer
- low flush toilets, low flow from faucets
- short showers
- purchase small, energy efficient car (electric car)
- plant your own garden, shop from local farmers market – less transportation of food
- plant trees - reduce greenhouse gas
- walk more
- travel less
- use fluorescent lights - they last longer and use 1/4 energy
- turn off lights, tvs/ computers when not in use
- unplug any gadgets when not in use - when plugged in they are still draining energy
- use power bars with on/off strip
- use less air conditioners and more fans - they use less energy
- carpool if you can, use transit
- don't use drive thru - too much pollution

Figure 4.14. *Assignment Prompt used for a Grade 9/10 Art Class*. *Note.* This figure illustrates a climate change-related Grade 9/10 Art class assignment prompt with suggested actions to stop climate change that were all facilities and operations-related.

Finally, a common idea for future climate action (*meaning*) was also that the school should install solar panels (*material*). It was also a common understanding (*competence*) that installing solar panels was a climate action that the school should take. Teacher 2 mentioned one of their former high school students had previously gone to the school board to ask about having solar panels installed at the school; however, it was discovered the roof was not strong enough to support solar panels. The school researched installing ground-mounted solar panels, but the school board would not reapprove the solar panels according to Teacher 2. Teacher 1 and 2 both mentioned that there are other schools in their school board with solar panels, but they are all newly built schools. Teacher 1 mentioned they often had ideas, such as those related to solar panels, that were not implemented for one reason or another, “but that doesn’t mean that we put them away. It just means that we let them rest a bit before we try again.”

Table 4.11

Key Practice Elements and their Connections Related to Taking Climate Action Often Meant Facilities and Operations-related Action

		Within and Across Domains			
		H	P	C	NY
Competences (e.g., knowledge, understanding skills)	Climate action is facilities and operations-related action	X			
	Need to use recycled materials for all projects	X			
	Understanding that installing solar panels is a climate action the school should take	X			
Meanings (e.g., ideas, emotions, aspirations, symbolic meaning)	Climate action usually means taking facilities and operations related action	X			
	Idea to plant more trees/to use skylights				X
	Idea to use reusable cups in the cafeteria and have smaller cafeteria portions				X
	Idea to give t-shirt bags to grocery store	X			
	Idea to build a bench for t-shirt bags and reusable water bottles				X
	Idea to install solar panels/School board approval				X
Materials (e.g., objects, tools, technologies, place, body)	Recycle and compost bins, Me to We Closet	X			
	Donated materials and time	X			
	G.O.O.S. (Good On One Side) paper	X			
	Planting more trees and skylights				X
	Reusable cups and smaller portions in the cafeteria				X
	T-shirt bags	X			
	Bench with bins for t-shirt bags and reusable water bottles				X
	Assignment prompt with facilities and operations-related actions	X			
	Solar panels				X

Note. Practice elements in this table may also be connected to other practices. This table and similar tables that follow in subsequent sections are not an exhaustive list but a heuristic to illustrate key practice elements and their connections within and across domains. H = harmonious connections. P = partial connections. C = contentious connections. N = elements that are not yet connected or that are no longer connected. Elements that also serve as motivations are indicated with a M.

4.4.2 The Effect Materials Can Have on Practices

The effect *materials* can have on facilities and operations-related practices related to CCE was evident during the research visit. Practice elements related to this theme were connected harmoniously, partially, contentiously, and not yet (see Table 4.12) within the domain the of Facilities and Operations and across domains (Overall Governance, Teaching and Learning, and Community Partnerships).

While teachers were aware of the effect *materials* could have on climate action practices, this understanding did not appear to be held by the custodians and had previously led to a conflict about the necessary size of the school's waste and recycling bins (*competence* and *material*).[45] The teachers had fought to reduce the size of the classroom garbage bin because they wanted the size of the bins to be a visual representation that would make people stop and think, "Hmm is this [item I want to throw away] really garbage because the garbage bin is so tiny. I guess there must not be much going in it" (Teacher 2). According to Teacher 2, the only trash items at the school are "single use plastic, nails, wood, heavy metal, Styrofoam, string, tape, pencils and markers, and Tim Horton's cups" (*competence*, see Figure 4.4). The teacher's initially had the idea to use a small cardboard box as their garbage bin (*meaning*), but this was disallowed by the school custodians who felt the bins would need changing more frequently and were worried about health and safety (*competence*). That is, the custodians were not motivated to carry this climate action practice due to health and safety concerns. Ultimately it was decided that the garbage and recycling bins (*materials*) would be the same size. The teachers felt that making the bins the same size was a step in the right direction that may still change over time, especially since the school now produces more recycling than garbage.

Practices related to waste management *materials* persisted alongside a range of emotions to which they were connected. For instance, during the Teacher's focus group, sad and happy emotion stickers were placed on the cafeteria (see Figure 4.15, contentiously connected *meanings*). When asked about this, the teachers said that the happy emotions were

[45] Practice elements related to the size of waste and recycling bins were labelled as contentiously connected.

related to the removal of single use plastic (*material*)[46] in the cafeteria, and the sad emotions were related to cross-contamination of the recycling with food waste (*material*).[47] Teacher 5 mentioned how the students in charge of the recycling will become angry if they see that the recycling bin is cross-contaminated. Also agreeing, Teacher 10 mentioned, "Oh yea, they'll preach to your class if you're being bad." Also related to waste management, Teacher 2 mentioned the "custodian hates (*meaning*) leaving the garbage (*material*) over a 24-hour period [for waste audits] and tells her every time, but she doesn't prevent it from happening, and she lets us use her mechanical room (*material*). She could make that difficult if she chose."[48] Waste management practices, including waste audits, persisted in spite of (and through) conflict as well as negative emotions.

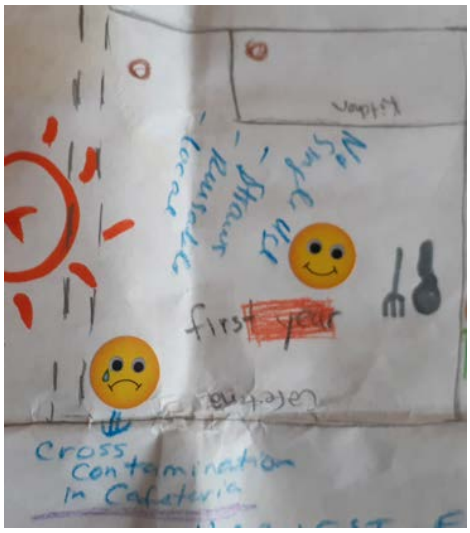


Figure 4.15. *Excerpt from Teacher's Focus Group Map*. *Note.* This figure is an excerpt from the climate action practice mapping exercise where teacher's placed happy and sad emotions on the cafeteria.

There was also evidence that the presence (or not) of particular *materials* significantly affected drinking practices related to CCE at the school. For instance, water and pop bottles (*materials*) had been banned several years prior, and as such, were missing elements at the

[46] The practice elements related to the removal of single use plastic were labelled as contentiously connected because during the Teacher's focus group, it was revealed that students were upset (*meaning*) that the Snapple bottles in the cafeteria are now plastic instead of glass (*material*).

[47] The practice elements related to cross-contamination were labelled as partially connected because some practitioners at the school are sorting waste correctly and some are not.

[48] The practice elements related to waste audits were labelled as contentiously connected due to the conflict with which they were associated.

school that often made visitors ask, "where's your pop machine [*material*]" (Teacher 1)? To which they would reply, "We don't have one. There's a water fountain [*material*] right there. I'll get you a reusable bottle [*material*]" (Teacher 1).[49] The school wanted to be a community where everyone uses reusable water bottles (*meaning*); however, they found that for the students to actually use the water fountains, they needed to be refrigerated. That is, the students valued cold water (*meaning*), so the staff ensured that *material* change was made. After refrigerated water fountains were installed, the staff asked the community for reusable water bottle donations (*material*) so that every student could be given a water bottle because the staff did not want parents to have to buy water bottles (*meaning*).

To further cement the practice of being a 'reusable water bottle school,' the staff also wanted to have a water bottle fountain installed at the school (*meaning* and *material*).[50] Water bottle fountain installation was challenging because the district plumber was on limited time (*material*), and by the time he drove to the school, he had to turn around. That is, the plumber was not motivated to carry this practice due to a lack of time. About this battle, Administrator 1 mentioned, "It's been two years. But it will happen. That's were I come in as the one who has to keep pushing, and pushing, and pushing, and making connections." Administrator 1 also mentioned it was important to know when/how much to push for climate actions otherwise the answer will be no (contentiously connected *competence*).

Having facilities and operations-related *materials* all around the school also made it easier to use those *materials* as teaching moments related to climate change mitigation and adapation since the teachers knew how those materials were related to climate change (*competence*).[51] Discussing this, Teacher 1 mentioned that she was able to, "grab [something] and say, 'Oh you want to learn about this. Let's talk about this.'" She also said that because they were able to have these types of conversations all the time, it meant that they did not have to explain the basics about climate change as often because students were already

[49] Practice elements related to the school's identity of being a reusable water bottle school were labelled as harmoniously connected. Practice elements related to the absence of plastic soda and water bottles were labelled as no longer connected.

[50] Practice elements related to the water bottled fountain were labelled as not yet connected.

[51] Practice elements related to using materials as teaching moments for CCE were labelled as harmoniously connected.

familiar with the topic. This familiarity allowed them to have more meaningful conversations about climate change (*meaning*).

Materials (related to Facilities and Operations) and the teachers at the school also appeared to mutually enact culture related to CCE.[52] The ability of *materials* to direct climate action practices was evident during the Teachers' focus group, during which I noted the teachers had mapped many climate action practices from the Facilities and Operations domain. Explaining why this was the case, Teacher 10 explained these types of practices are "so embedded into the building [*meaning*]. No matter what room you go into. You accept the roles of that place." Also describing how *materials* help create the culture of climate action at the school, Teacher 1 mentioned in her interview:

> I think it's become so ingrained in what we do on a daily basis that we don't even really think about it. We've got compost bins [*materials*]. We've got recycling bins [*materials*]. We've got light bulbs that are CFLs [*materials*]. And we've got the light switch things [*materials*] that turn off the lights when there's nobody in the room or even if we sit still enough the lights will go out in this room…it's always the first step that we go to is, 'Do we have something that already exists that we can use to fill this need or to provide us with the materials that we need so that we don't have to go and buy anything new?' And I think that sort of mentality for the staff anyway is always there [*competence*].

There was also evidence that teachers did not just accept the roles dictated by *materials*, but that they also actively contributed to the continuation of a climate action culture. For instance, it was a common practice for classrooms to only have on one row of lights to conserve electricity (*material*). This practice existed not only because it was possible to only turn on one row of lights but because teachers made the choice to do so. Similarly, it was also common practice to use G.O.O.S. paper at the school (*material*, see Figure 4.16). This practice was possible not only due to an abundance of paper meeting this criteria, but the choice of teachers to use it.

[52] Practice elements related to how materials and teachers enacted culture at the school were labelled as harmoniously connected.

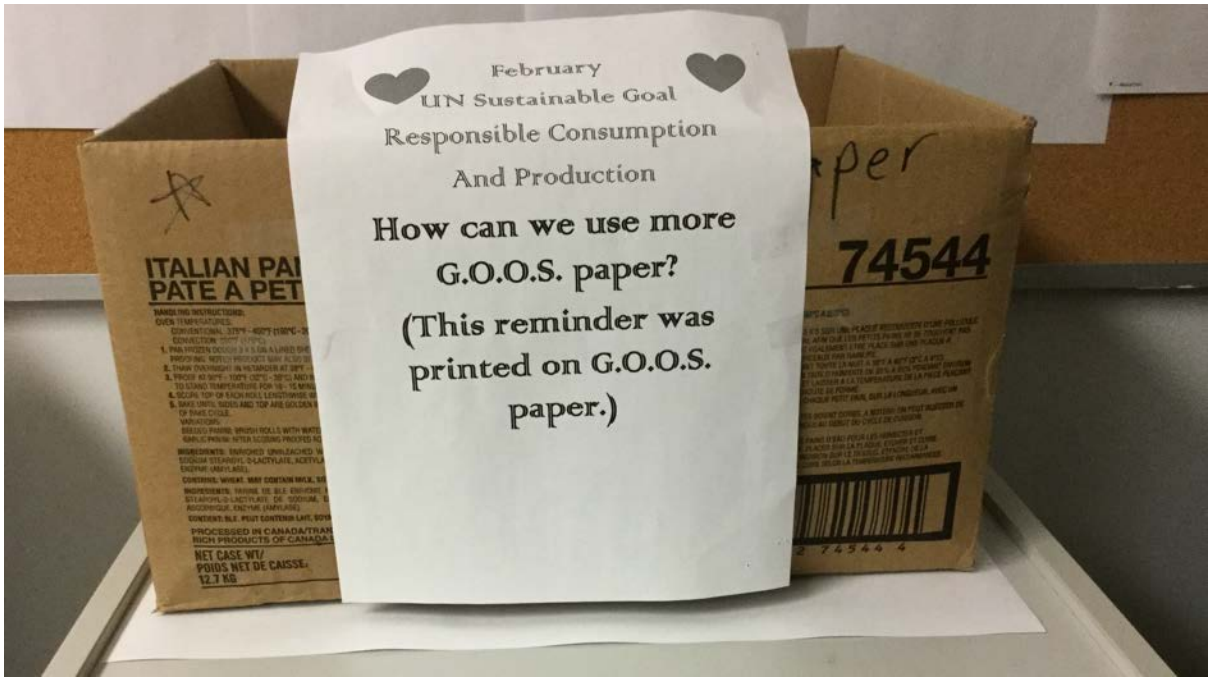


Figure 4.16. *Picture of a Reminder to use G.O.O.S. Note.* This is a picture of a reminder to use G.O.O.S. paper, which was printed on G.O.O.S. paper.

Table 4.12

Key Practice Elements and their Connections Related to the Effect Materials Can Have on Practices

		Within and Across Domains			
		H	P	C	NY
Competences (e.g., knowledge, understanding skills)	Understanding about the necessary size for recycling and waste bins/Understanding that few items are trash			X	
	Knowledge of health and safety related to waste management (M)			X	
	Need to know how/when to push for climate actions			X	
	Knowledge of how materials are related to climate change mitigation and adaptation	X			
	How to take climate friendly actions (e.g., not buy new materials, 1 row of lights on)	X			
	Idea to use a cardboard box for garbage			X	

Meanings (e.g., ideas, emotions, aspirations, symbolic meaning)	Emotions related to waste management in cafeteria			X	
	Frustration related to waste audits			X	
	Identity as a reusable water bottle school	X			
	Value cold water	X			
	Should not have to buy reusable water bottles	X			
	Idea to have a water bottle fountain				X
	Meaningful climate change conversations	X			
	Facilities and operations related practices are embedded in the building	X			
Materials (e.g., objects, tools, technologies, place, body)	Recycling and garbage bins that are the same size			X	
	Picture of what is garbage			X	
	No single use plastic in cafeteria/Plastic Snapple bottles in cafeteria			X	
	Cross-contamination of waste		X		
	Waste audit garbage/Mechanical room			X	
	Plastic water & pop bottles were banned/Pop machine				X
	Refrigerated water fountain/Reusable water bottles/Donations	X			
	Water bottle fountain				X
	Plumber's time (M)				X
	Compost bins, recycling bins, CFL light bulbs and light timers	X			
	Recycled materials	X			
	One row of lights and G.O.O.S. paper	X			

Note. Practice elements in this table may also be connected to other practices. This table and similar tables that follow in subsequent sections are not an exhaustive list but a heuristic to illustrate key practice elements and their connections within and across domains. H = harmonious connections. P = partial connections. C = contentious connections. N = elements that are not yet connected or that are no longer connected. Elements that also serve as motivations are indicated with a M.

4.4.3 Food Helps Build the Community Necessary for Collaborative CCE

It was evident that food helped to create the community necessary for collaborative CCE at the school. Practice elements related to this theme were harmoniously, contentiously, and not yet connected (see Table 4.13) within the domain of Facilities and Operations and across domains (Overall Governance, Teaching and Learning, and Community Partnerships).

Food played a significant role in building the community at the school necessary for CCE (*material* and *meaning*)[53] and was especially apparent during the teachers' focus group. When talking about the positive emotions associated with the staff room, Teacher 2 mentioned, "Friday lunches [*material*] are a *big* factor in people coming together." To this, Teacher 5 said, "It's such a food school." Teacher 2 agreed, and then Teacher 5 mentioned, "that's such a cultural thing." To this Teacher 2 said, "but I almost think that it's evolutionary. It's something that is touching us deeply and then when you eat with someone, you feel comfortable, and you feel attached to them and next thing you're having conversations and hugging [*meanings*]." On multiple occasions Friday lunches were mentioned as a key connection point between teachers where they could share ideas and ask questions related to CCE.

Several teachers also mentioned the role of food in helping overcome what was the most salient barrier for CCE at the school – time (contentiously connected *meaning*). For instance, Teacher 2 mentioned that "time is always a barrier." However, the teachers always had a day-long meeting in the summer to plan the next year, and they "try to make it pleasant and have food and beverages [*materials*]" (Teacher 2). Teacher 1 also discussed the challenge of having enough time to do climate change mitigation and adaptation related activities at the end of the year at the secondary level. When asked how to overcome that barrier, she jokingly said "Coffee, donuts [*materials*]." However, I also got the sense that she was only half-joking. Food appeared to be a partial motivator for the continuation of CCE at the school. Due to my realization of the importance of food at the school during the research visit, I decided to offer snacks at the teacher's focus group during, which I had not planned to do initially.

The importance of food was also evident in conversations with students. For instance, while making solar ovens (*material*) for a Grade 4 Science class, the students were most excited (*meaning*) about the food they were going to make in their ovens (see Figure 4.17). Also, during the student focus groups, the students talked about the garden (*material*) more than any other school initiative (see Figure 4.18). In terms of future climate actions, the students commonly suggested having more gardens (Grade 5/6 focus group) and bigger

[53] Practice elements related to how food helps build the community necessary for collaborative CCE were usually harmoniously connected. Exceptions are noted below.

gardens, and more access to the food produced in the garden (Grade 9 focus group) (not yet connected *meanings*). The connection students felt to the garden among the students also surfaced in the teacher's focus group when Teacher 10 mentioned, "Kids love eating stuff out of the garden. They get the connection [*meaning*]. They love getting their hands dirty." Across conversations about the garden there were also discussions about how gardening and local food production are related to climate change mitigation through decreased emissions related to food transportation (*competence*).

Figure 4.17. *Student-made Solar Ovens*. *Note.* Both pictures are of student-made solar ovens.

Figure 4.18. *School Garden and Plants to be Planted in the Spring. Note.* The picture on the left is of the school garden. The picture on the right is of plants that would be planted in the garden in the spring.

Table 4.13

Key Practice Elements and their Connections Related to Food Helping to Build the Community Necessary for Collaborative CCE

		Within and Across Domains			
		H	P	C	NY
Competences (e.g., knowledge,	Local food production reduces emissions	**X**			

understanding skills)					
Meanings (e.g., ideas, emotions, aspirations, symbolic meaning)	Community-building related to food	**X**			
	Time			**X**	
	Excited about making food in solar oven	**X**			
	Connection to the garden/food	**X**			
	Ideas to have more gardens, a bigger garden and/or more garden access				**X**
	Connection to the garden/food	**X**			
Materials (e.g., objects, tools, technologies, place, body)	Food – especially Friday lunches (M)	**X**			
	Solar ovens	**X**			
	Garden	**X**			

Note. Practice elements in this table may also be connected to other practices. This table and similar tables that follow in subsequent sections are not an exhaustive list but a heuristic to illustrate key practice elements and their connections within and across domains. H = harmonious connections. P = partial connections. C = contentious connections. N = elements that are not yet connected or that are no longer connected. Elements that also serve as motivations are indicated with a M.

4.4.4 Feedback and Monitoring

Processes of feedback and monitoring within the domain of Facilities and Operations were informal and related to measurable results, self-monitoring, and conversations.

When asked how teachers knew CCE was effective or that students understood what was taught, mentions of measurable results in relation to Facilities and Operations activities were often mentioned in relation to behavior changes (Teacher 1; Teacher 2; Teacher 11). For instance, Teacher 2 mentioned:

> So, I think there are measurable things like, what do the lunch kits look like now? Are straws being used? What does our waste management look like? Are people turning off the lights when they're not in the room? I think you have to look for some measurable things like that.

The influence of self-monitoring was also apparent in relation to Facilities and Operations activities. For instance, teachers self-monitored to make sure they used G.O.O.S. paper, only kept on one row of lights, and recycled as much as possible.

Conversations were also an important informal monitoring and feedback mechanism. For instance, the staff were always sharing new ideas they found to reduce their climate impact. Teacher 7 mentioned, "We actually celebrate those things around here. I'm trying

this. This isn't working. I noticed that you're doing an electric car – we just kind of build off each other in that way." It also became apparent to them how much they were doing when visitors came into the school. Teacher 1 mentioned visitors will ask:

> What are these blue bins all over the place? And why's there food in this one?' They just don't know. They have no idea. Things that now are second nature to us and to our students are not so much second nature to—the gap is very clear when people come here to say, 'Oh, you do this?' They've never seen that before.

Chapter 5: Discussion

The use of Shove and colleagues' (2012) version of practice theory to examine climate action practices at a K-12 school aimed to decenter the individual and focus instead on the collective interactions of practitioners, practice elements (i.e., materials, competences, meanings), and other practices. A whole institution (i.e., Overall Governance, Teaching and Learning, Community Partnerships, and Facilities and Operations) lens was used to describe the practices observed, which also enabled a focus on what was happening across the school versus focusing on any one practitioner. This description has implications for CCE practice, policy, and research, which are related to a whole institution approach to CCE, practice connections, practice elements, and practice theory overall.

5.1 Whole Institution Approach to CCE

There were several implications from the analysis for a whole institution approach to CCE overall, as well as for each of the four domains (i.e., Overall Governance, Teaching and Learning, Community Partnerships, and Facilities and Operations). Related to a whole institution approach to CCE overall, this research points to implications for how to start a whole institution approach, in general, as well as the potential of using a whole institution approach for CCE (also see Hargis & McKenzie, 2021; Hargis et al., 2021; Mathie & Wals, 2022; Wals & Mathie, 2022). The whole institution approach at the school was put in place largely due to the school's Simply Living Simply Project, as well as their designations as an EcoSchool and a UNESCO ASPnet school, which are programs that have targets, programs, and resources aimed at all domains of a whole institution approach. While one of the challenges related to eco-certification programs, such as EcoSchools Canada, is maintaining commitment to environmentally friendly practices post-certification (Goldman et al., 2018), both EcoSchools Canada and UNESCO ASPnet schools must complete annual tasks to maintain their designation (see EcoSchools Canada, 2022; UNESCO, 2018) and have been recognized as effective mechanisms for reducing a school's greenhouse gas emissions (Enerlife Consulting Inc, 2017) and promoting whole institution approaches (Shultz et al., 2009), respectively. Schools looking to implement a whole institution approach to CCE may want to create their own program (e.g., the Simply Living Simply program) and/or join other

certification programs, which have environmental and climate action targets and resources across one or more domains (e.g., EcoSchools Canada, UNESCO ASPnet schools).

A whole institution approach requires working with individuals from across all domains of school activity. While working with so many different people could have been a barrier to climate action, the school's focus on bringing everyone along, whereby they invited all staff to CCE assemblies, framed messages about climate change according to their audience, shared resources, and supported each other, helped to ensure uptake of CCE. In particular, the school's focus on framing climate change messages in relation to the community's priorities likely contributed significantly to their success, as such framings have been found to have a positive effect on climate change engagement (Callison, 2014; Li & Su, 2018) and capable of shifting climate change views (Goldberg et al., 2021). The importance of collaboration, not adversarial arguments, has also been emphasized in environmental conflict management research (Walker & Daniels, 2019), in general, as well as climate change communication, in particular (Marshall, 2014).

Through their collaboration with practitioners across whole institution domains, the school created their own mini-network in which they worked not only with practitioners at the school but also the community. The potential of networking for climate action is also illustrated in prior work (see Hargis et al., 2021). Due to their collaborative and community-driven approach to CCE, the school faced minimal backlash, despite their location in a conservative area. My participants did not describe in detail what they meant when they referred to their area as being 'conservative.' They did mention that it referred to politicians and community members who either did not believe in climate change or who did not believe climate change was an issue deserving of serious and urgent action. For instance, the area has been represented by conservative Members of Parliament (MP) since 2005, with the current MP, Alex Ruff, having been criticized for his party's 'lukewarm' response to climate change (Butler, 2022). In an interview, Ruff also expressed the neoliberal sentiment that "Market driven common sense" should be used to end fossil fuel subsidies, not legislation (The Sustainability Project, 2022). Implications for future practice and research include the potential for a whole institution approach that actively involves and works with the school and local community to overcome prior differences of opinion. By working together and

supporting each other, a whole institution approach can create a culture of climate action *with* not in opposition to existing practices.

In relation to Overall Governance, the importance of distributed leadership is a key implication for future CCE practice and research from this research. According to Harris (2003), "distributed leadership is characterised as a form of collective leadership in which teachers develop expertise by working collaboratively" (p. 11). While distributed leadership can be implemented 'naively' if practitioners do not know how to lead, do not want to lead, or are prevented from leading (McKenzie & Locke, 2014), when done effectively, distributed leadership is "more than the sum of the component parts or practices" rather it is "a system of practice comprised of a collection of interacting components: leaders, followers, and situation" (Spillane, 2005, p. 15). Distributed leadership is not merely the accumulation of more and more leaders but is concerned with "increasing leadership quality and capability," and depends on "relational trust" (Harris, 2013, p. 551).

It was very apparent at the school that the teachers and staff had a great degree of relational trust and worked well together in collaboration. While there was one person at the school who was seen as the overall driving force of CCE at the school, all teachers, staff, and administrators were involved in supporting CCE. For example, all the elementary teachers took turns being responsible for the Simply Living Simply program's monthly themes. Often so integrated was the collaboration of the school community that they did not even realize how much they were doing to support climate action at the school, as evidenced by my observations at the school, as well as comments I received after the teacher's focus group mentioned above.

Past research has emphasized the importance of champions in relation to EE (Wood et al., 2016); however, EE and now CCE had endured at the school for the past 50 years not so much because of individual champions but because of collective efforts to take environmental action among all practitioners at the school, including in relation to their entanglement with various *meanings* and *materials*. Indeed, when climate action practices rely on champions, they disappear when those champions leave (McKenzie & Aikens, 2021). It also appeared that the degree to which the level of distributed leadership was hidden may have contributed to its success, potentially because by being hidden, the type of distributed leadership used at

the school departed from a "heroics of leadership" discourse, which sees leadership as reliant on one person versus those involved in a community of practice, as well as various tools, and structures (Spillane, 2005). Distributed leadership also aligns well with a whole institution approach, which seeks collaboration across all domains of school activity, and practice theory, which shifts the focus from individuals to collaborative practices. Future research could include a focus on how distributed forms of leadership (as opposed to 'champion' models) support the longevity of CCE practices.

Related to distributed leadership are the national and international designations with which the school was affiliated (e.g., EcoSchool, UNESCO ASPnet school), which were key practice elements that constituted CCE practices at the school and which also 'distributed' leadership at the school through their requirements and guidance. For instance, the UNESCO (2016) ASPnet Getting Climate-Ready guide gave guidance for implementing a whole institution approach to CCE. That is, the direction of the school toward CCE was led not only by those physically present at the school but by the *material* manifestation of the designations themselves. The influence of such forms of distributed leadership for CCE, which are influenced by *material* programs, represents a potential topic for future research, which also aligns with assumptions among educational theorists of practice who are united in their belief that practices are, at minimum, mediated by material objects (Orlikowski, 2007; Schatzki, 2001).

Several implications for practices within the domain of Teaching and Learning also emerged from this research, which included cross-curricular approaches to CCE to overcome barriers related to time, the degree to which CCE should be driven by students' and teachers' interest, how to deal with emotions related to CCE, and the potential to connect more topics to climate change mitigation and adapatation (e.g., Indigenous knowledge, colonialism, justice, and biodiversity), and the successful use of 'good' CCE approaches.

The most commonly mentioned barrier at the school for CCE was time. That said, teachers, especially at the elementary level, often overcame this barrier by integrating CCE across subjects. Cross-curricular approaches to environmental and sustainability education and CCE are variously supported in the literature. Proponents of cross-curricular approaches for CCE have highlighted their potential to illustrate that multiple disciplines have a role to

play in addressing climate change (Field et al., 2019; Hargis & McKenzie, 2020; Hargis et al., 2021). Critics of cross-curricular approaches have highlighted the large amounts of time and support needed to embed a topic with which teachers are not overly familiar with across subjects as significant barriers (Dyment & Hill, 2015; Hill & Dyment, 2016; Nicholls & Thorne, 2018). Some have also argued that CCE should be a discipline in and of itself versus being addressed cross-curricularly, mentioning that no empirical research has demonstrated the successful implementation of a cross-curricular approach to CCE (Eilam, 2022). As such, the present study represents one of the first empirical studies illustrating the potential of cross-curricular approaches for CCE (also see Hargis et al., 2021). While not dismissing prior findings regarding how lack of time and support may impede the successful implementation of a cross-curricular approach to CCE, the present case illustrates that the support the teachers gave each other at the school enabled them to overcome barriers related to time and to ensure that CCE surfaced across all subjects. Policy implications include the importance of ensuring climate change mitigation and adaptation outcomes and directives are included for all subjects in national/regional curriculum frameworks and education sector plans, and that these documents provide the policy support (e.g., funding, professional development, staffing, time) needed for implementation (see Hargis & McKenzie, 2020; MECCE Project & NAAEE, 2022).

A salient theme at the school at the primary level was that CCE should be driven by students' *and* teachers' interests. That is, educational spaces at the school often operated outside/between the traditional dichotomy which places student-centered learning on one side and teacher-centered learning at the other (Komatsu et al., 2021). Instead, there was evidence that teachers and students engaged in what Bergdahl and Langmann (2021) have termed 'pedagogical publics' in which they engaged in "slow thinking and immediate action" on climate change *together* (p. 3). For instance, students and teachers discussed climate change together and decided what climate actions to take for the Simply Living Simply monthly challenges.

At the high school level, however, a much higher focus was placed on CCE being student-led than at the primary level. It is possible that the secondary teachers are relying too much on students' interests related to climate change, particularly in the classes where climate

change is only mentioned if the topic is brought up by students. Komatsu and colleagues (2021) have also criticized student-centered learning as being rooted in an individualistic ontology and connected to unsustainability. That is, individuals in ontological individualistic societies assume they are free to pursue their own interests even when those interests run counter to what is beneficial for society. Those living in such a society "are more prone to ignoring social and environmental problems, seeing them as unrelated to themselves" (Komatsu et al. 2021, p. 10). In this case, student-centered learning could mean that climate change is not addressed if not mentioned by students. Opportunities for future research could include researching additional alternatives (beyond 'pedagogical publics') to the student/teacher-centered dichotomy of learning, which may be able to better support the societal changes needed to address climate change (see Mascolo, 2009 regarding learning as guided participation in socio-cultural activity). Further research regarding how formal education can create 'pedagogical publics' would also be beneficial considering the potential of such spaces to facilitate the appropriate balance between the considered thought and immediacy needed to address climate change together.

Another implication for future practice and research within the domain of Teaching and Learning is how to deal with emotions related to climate change within educational contexts. This is important because climate grief and anxiety is increasingly affecting youth around the world, with a recent study finding 45% of the 10,000 respondents (aged 16-25) mentioned "their feelings about climate change negatively affected their daily life and functioning" (Hickman et al., 2021, p. e863).[1] At the school, it was apparent that different approaches to dealing with emotions related to climate change were used with some teachers attempting to help students work through and process their emotions and others telling students to control their emotions. Current research suggests that rather than ignoring emotions related to climate change, CCE should be "accompanied by exercises that explicitly acknowledge student's emotions and provide tools and strategies for coping with these emotions (Dooley et al., 2021, p. 87; also see Bright & Eames 2022; Rousell & Cutter-Mackenzie-Knowles, 2020)." Such approaches build emotional resilience wherein the goal is

[1] Also see Patel et al., (2021) regarding how these emotions are compounded for Black, Indigenous, and People of Color communities who have also dealt with decades of environmental racism.

not to eliminate negative emotions but to support the healthy processing of emotions so that they do not 'stick' and cause additional mental and health issues (Bristow et al., 2022; Dooley et al., 2021). According to Davenport, the goal for climate anxiety intervention is to expand an individual's "zone of resilience" because:

> When people are pushed outside of this zone of resilience — by being overwhelmed by the impacts of a climate disaster on their life, for example, or even by reading a particularly dire news article about the crisis — they may either "lash out" (become angry and upset) or "numb out" (become disengaged and avoidant). The goal of intervention work, then, is to expand this zone of resilience to be able to tolerate and exist with more (as cited in Dooley et al., 2021, p. 46).

Fostering emotional resilience is also connected to spiritual practices, such as those related to mindfulness and meditation within Buddhist traditions (Wang et al., 2019), as well as Indigenous spirituality and spiritual practices (e.g., ceremony and traditional practices that have a sacred or symbolic meaning, Ontario Human Rights Commission, n.d.). Within a K-12 context, this could mean teaching students mindfulness practices so that they are not only more aware of their emotions/thoughts related to climate change but also supported to reduce the potential stress and anxiety related to those emotions/thoughts (Koot, 2020). Inviting Indigenous elders to teach students spiritual practices that emphasize interconnectedness with Mother Earth is not only a way to decolonize education but can also support spiritual, emotional, mental, and physical health and wellbeing (First Nations Health Authority, 2022).

Another common approach at the school related to climate emotions was to focus on actions students can take to address feelings of anxiety. Focusing on climate action has been found to help individuals deal with climate anxiety (Bouman et al., 2020; Bright & Eames, 2022; Brosch, 2021). Climate action, however, should not be presented as a solve-all; instead, emotional resilience must be fostered in conjunction with action, otherwise emotions related to climate change may just be ignored, which can lead to additional mental and health concerns (Dooley et al., 2021). Mentioning actions students could take at the school often came after students were already showing signs of anxiety. Recommendations for future practice include attempting to build emotional resilience among students *before* signs or anxiety present themselves (see Bristow et al., 2022; Dooley et al., 2021; Verlie, 2021).

Future research related to CCE emotions could include the design and testing of psycho-social competencies[2] related to climate change mitigation and adaptation separated by grade level, which could then be incorporated into national/regional curriculum frameworks. Policies can also be developed to support teacher professional development in this area, including through funding, staffing, and time for lesson planning, which would help ensure teachers are prepared to support students to build climate emotional resilience and to take climate action.

Finally, while the school had done much work to connect many topics to climate change, there are several key topics which they have not yet connected to climate change mitigation and adaptation (e.g., Indigenous knowledges, colonialism, justice, and biodiversity). Referring back to practice element connections, practices can change when different types of elements are connected (i.e., *materials*, *competences*, *meanings*), and when the same types of elements are expanded to include more topics and ideas (e.g., expanding *competences* related to colonialism to include *competences* related to the cause of climate change) (Shove et al., 2012).

While there was some mention of bringing Indigenous guest speakers into the school and some discussion of colonialism observed at both the school and the Outdoor Education Center during the research visit, only once was a brief connection made to Indigenous knowledges and climate change mitigation, No connections were made between colonialism and the presence of anthropogenic climate change, nor was the relationship between colonialism and the disproportionate distribution of climate change impacts on Indigenous land and peoples mentioned. There was also an indication that Indigenous knowledges used to be more commonly integrated into classes when more Indigenous students went to the school. Implications for future practice, policy, and research include the importance of acknowledging that Indigenous knowledges are important for Indigenous and non-Indigenous students (Antoine et al., 2018; Kapyrka & Dockstator, 2012; Vizina, 2018), that Indigenous land-based education is CCE (Wilson in UNESCO, 2021a), and that colonialism is directly related to current climate change (Funes, 2022; Sultana, 2022).

[2] Competencies are also competences. The word competency was used to indicate how this research can practically impact the designing of educational competencies, such as curriculum frameworks, which indicate what students should know and be able to do by then end of each grade level.

There were also limited discussions of climate justice at the school. While Teacher 2 mentioned that the school had hosted an event called "Rise for Climate, Jobs, and Justice," this was the only mention of climate justice during the research visit. The topic of climate justice, however, is very relevant for this community due to its location in an economically depressed area that is heavily reliant on farming and tourism, both of which could be negatively affected by climate change. It is possible climate justice was mentioned infrequently due to negative connotations associated with the term "justice" for those might have to give up some of their privileges. Research from Climate Outreach has found that conservatives in England preferred the term "fairness" to "justice" because the term justice was associated with matters of concern for left-leaning liberals (Webster & Shaw, 2019). While the choice to discuss climate justice in relation to jobs illustrates another example of how the school frames climate change to appeal to those living in the community, they may want to take this framing a step further and reconsider the use of the word 'justice' in favor of a more neutral term, such as 'fairness,' which may make the topic easier to 'look' at and include in classrooms (see Marshall, 2014; Norgaard, 2011). Implications for practice and policy include not only the importance of including locally relevant discussions of climate justice (Amel et al., 2017; Monroe et al., 2017) but also framing the topic in ways that speak to the target audience (Brownlee et al., 2013; Kahan et al., 2012). As the impacts of climate change increasingly affect local environmental conditions and the human and nonhuman populations who reside there disproportionately, locally relevant discussions of climate justice will become increasingly important.

There was also a missed opportunity to connect climate change adaptation and mitigation to biodiversity during the school field trip to the outdoor education center mentioned above where students learned about the importance of wetlands and the animals who call them home. Connections to climate change that could have been mentioned include how tilling up the soil releases carbon as opposed to no-till farming (Cooper et al., 2021), how wetlands help mitigate the effects of climate change (Were et al., 2019), and how wetlands can be negatively impacted by climate change (Barros & Albernaz, 2014). I also noted during the field trip that there were several signs about the area on the grounds. The center could add information about biodiversity and climate change to their signs (e.g., local impacts of climate

change on the biodiversity, how wetlands mitigate climate change). Research has also found missed opportunities to connect climate change to biodiversity within education policy and curricula (UNESCO, 2021b) even though they are intertwined crises that should be addressed together (European Commission, n.d.; Kapoor, 2021). Implications for policy and practice include the importance of mentioning not only how biodiversity is negatively affected by climate change but also how improving biodiversity can aid in climate change mitigation.

The teachers at the school used a variety of techniques recommended in the literature for 'good' CCE, such as fostering connections to place (Hallar et al., 2011), including a focus on action (Monroe et al., 2017), and using audience appropriate framings (Brownlee et al., 2013). Their successful use of these techniques further strengthens the argument that such approaches are effective for CCE (also see Hargis & McKenzie, 2020). Implications for future policy include mentioning examples of 'good' CCE (and providing the necessary resources) within policies so that teachers are aware of and supported to implement 'good' CCE practices within their classes.

When discussing climate actions at the school, all participants referred to practices in the Community Partnerships domain. Despite living in a remote location, the school was still able to secure multiple partnerships, which were essential to the climate actions occurring at the school. This finding also aligns with prior research which found that rural locations were more likely to have more community partners for environmental and sustainability education (Regier, 2019). No matter their location, schools looking to implement climate action practices should seek out community partners to support them on their journey. Policies could also encourage schools to develop community partnerships for CCE and provide supports for them to do so (e.g., lists of potential partners, guidance for establishing partnerships). Future research could also explore how schools have developed and maintained community partnerships for CCE to support policy guidance and supports.

When practice elements were connected across domains at the school, one of the domains was usually Facilities and Operations. For instance, physical *materials* within the room, such as light timers and recycling and compost bins, which were functioning within the Facilities and Operations domains were also often brought into the domain of Teaching and Learning to discuss how those practices were connected to climate change mitigation, thereby

strengthening and reinforcing both practices. Schools making the transition to climate-friendly Facilities and Operations practices should consider ways to bring those practices into the classroom, which will enable the school to become a living lab and can be used to educate the school and local community about (through) climate action; a possibility which could also be mentioned in education policies (see Hargis & McKenzie, 2020; MECCE Project & NAAEE, 2022; UNESCO, 2016).

Most of the ideas for future climate action practices at the school mentioned by practitioners were related to Facilities and Operations. While necessary and important, there is also potential for new practices in other domains as well (Overall Governance, Teaching and Learning, and Community Partnerships). Policies can support expanded imaginaries of potential actions by suggesting actions schools can take across all domains of school activity (see Hargis & McKenzie, 2020; MECCE Project & NAAEE, 2022).

5.2 Practice Connections

Practices at the school were (dis)connected through (and with) competition, collaboration, and conflict. Mobility was also a key component affecting practice connections at the school as guest speakers were brought in from the local area and from across the country to share practices related to CCE. Considerations related to land/place also affected practice connections at the school (e.g., by making it easier to teach CCE even though they were in a conservative area because CCE is good for the environment). When practices were no longer connected, the reason was usually related to economic considerations.

The majority of the practice elements described in the Chapter 4 were harmoniously connected. Practices were still able to exist, however, even when elements were contentiously connected. Contentious connections indicated instances where there was risk/potential for practices to change. For instance, even though Teacher 4 owned a gas station, she was considering buying an electric car due to her belief in climate change and the need to transition away from fossil fuels. That is, she was considering buying a *material* that would be in competition with her occupation as a gas station owner. Within the classroom, Teacher 4 also mentioned she wanted students to bring conflicting ideas about climate change into the classroom because they stirred up students' passions and enabled students who did believe in climate change to see that they needed to take climate action (versus waiting for someone else

to act). That is, instances of mental conflict (i.e., cognitive dissonance) and contention were important for changing practices.

Implications for CCE research and practice include the importance of "following conflict" to identify teaching moments (for practice) as well as practices that may soon change/be influenceable for change (for practice and research). The potential of using mental conflict, such as that created through cognitive dissonance, as a teaching opportunity is acknowledged by several scholars (Adcock 2012; McFalls & Cobb-Roberts, 2001; McGrath, 2020), including in relation to climate change communication (e.g., Gehlbach et al., 2019; Taylor et al., 2017). The potential to 'use' cognitive dissonance as a tool for CCE to change opinions/practices represents an opportunity for CCE and climate change research by, for example, making students/participants aware of conflicting opinions/practices, and then providing them with the tools and resources to resolve the dissonance.

Following conflict may also reveal opportunities to change contentious practice element connections to harmonious ones. For instance, it became apparent through discussions with participants that the *meaning* that farmers were an important part of the community was not always connected strongly enough for some students and parents when discussing certain climate actions. While the school regularly discussed eating less meat and using local products, it appeared that some students and parents felt these discussions threatened their livelihoods. Emphasizing that farmers are an important part of the community (*meaning*) and discussing what just and fair transitions are (*competence*) and what they *mean* for the local community may be one way to change this contentious connection to a harmonious one. As mentioned above, there was limited evidence that climate justice discussions were happening at the school and no evidence that 'just transitions' were discussed. Of the two primary usages of the term 'just transition,' which are that "the transition to a low-carbon society should be fair to the most vulnerable populations" and that a just transition should protect the "workers and communities who depend on high-carbon industries from bearing an undue burden of the costs of decarbonization," Eisenberg (2019) argued that the later meaning is key to overcoming obstacles related to climate reform (p. 275). By including a focus on workers and communities affected by a transition to low carbon

societies, the conversation can change from one rooted in conflict (i.e., jobs *versus* environment) to one rooted in harmony (i.e., jobs *and* environment) (Eisenberg, 2019).[3]

The presence of practice elements that were not yet or partially connected within and across domains was also identified, which indicated future practice potential. For instance, the idea of getting solar panels (a *meaning*) had been present at the school for many years but had not yet been connected to the support needed from the board (a *meaning*), as well as the knowledge of where to put the solar panels (a *competence*), and the necessary *material* finances. Similarly, practices associated with 'good' CCE were circulating at the school that were only partially connected across domains in some instances, particularly the Community Partnerships domain. For instance, discussions with community members working in the outdoor education center (which students often visit on field trips) highlighted their desire to include more CCE in their programming, but they mentioned they were not sure *how*.[4] In terms of practice element connections, the *competence* of *how* to teach CCE that existed at the school was not yet fully connected to the *meaning* of its importance, which was already present at the Outdoor Education Center. The potential to bring CCE *competences* to the Outdoor Education Center represents future practice potential (see Shove et al., 2012).

Understanding what practice elements exist but are not currently connected can help practitioners, researchers, and policymakers strategize and support the formation of connections among practice elements (Shove et al., 2012). Such an approach builds on the strengths and resources already present to support CCE as opposed to 'deficit' models which focus on what is lacking. Traditional deficit models for CCE have focused on increasing individual scientific literacy about climate change (*competence*) without engaging with the broader psychological and sociological societal contexts (*meanings*) and *materials* that may support or inhibit climate action (see Wibeck, 2014). More is known about the causes and needed solutions to address climate change than ever before; however, current levels of climate action are still insufficient to address the climate crisis (IPCC, 2022). Deficit

[3] Henry and colleagues (2020) also argued that the socio-economic aspects of a just transition are essential but under researched.

[4] Potential connections to CCE that could be made as part of the Outdoor Education Center's programs that were observed include: connecting the fur trading and presentation at the Outdoor Education Center to colonialism, mentioning how beavers can help mitigate climate change (see Sherry & Choi, 2021; Simmons, 2018), and mentioning connections between fast fashion and increased climate change (see Peters et al., 2021).

approaches to CCE that focus on increasing knowledge are ineffective (Hornsey et al., 2016; Kahan et al., 2012; Suldovsky, 2017), dangerous - as we run out of time to address the climate crisis (IPCC, 2018), and prejudiced against marginalized populations who have historically had less access to education (Davis & Museus, 2019; Gladwin, 2021). Focusing on forming connections among elements counters individual-specific, knowledge-oriented approaches to changing climate action practices that have been widely used with little success (Hornsey et al., 2016; Kahan et al., 2012).

When practice elements were no longer connected, the reason was usually related to *material* finances and economics. For instance, at the time of the research visit, neoliberal restructuring and budget cuts in Ontario (Parker, 2017; Sattler 2012) were resulting in increased staff layoffs that would result in the disappearance of key CCE practitioners at the school. Money was not mentioned, however, as a barrier by any of the participants. Instead, the teachers became "really good at asking [for money]" (Teacher 11) from the community and in grant applications. In the spirit of neoliberalism, they had become experts at fundraising (see Winton, 2016). This neoliberal reality of economic disparity was 'normalized' (Hay, 2006; Krzyżanowski, 2020) to the point of being a non-issue. When neoliberalism becomes normalized, other ideas are at risk of not only no longer being connected but also of no longer circulating in the psyche of practitioners. In this case, the idea that higher levels of state funding for education were once available is in danger of disappearing.

The most significant barrier mentioned at the school for CCE was time. If teachers must use their time to find money for projects, then project funding is still a barrier but has been repackaged as time; thereby hiding part of the core barrier. Indeed, Giroux (2019) has argued, "Neoliberalism thrives on the power to distract (p. 37)." Such distractions diminish future practice potential by seeking to eliminate the idea of an alternative reality (*meaning*) and using scarce resources (*materials*) to address barriers that may not have been present before. The ways in which neoliberal restructuring has become normalized and has been used to distract from CCE represents a potential for future research.

Key CCE elements were constantly 'on the move' (Cresswell, 2006). That is, practices at the school were affected by the connections of mobile people, objects, and ideas (see Urry,

2000; Urry, 2007). Urry (2007) outlined five types of interdependent mobilities, which included the corporeal travel of humans, the physical movement of objects, imaginative travel, virtual travel, and communicative travel. During the research visit, evidence of corporeal movement (e.g., guest speakers coming into the school), physical movement of objects (e.g., hanging the 350 Degree math cubes in the hallway), virtual travel (e.g., sending emails with CCE resources), and communicative travel (e.g., discussions in the staff room about CCE) were identified.

The perseverance of CCE at the school was due in part to the corporeal and communicative movement of not only guest speakers but also teachers and students who have attended/worked at the school in the past. That is, the enthusiasm, knowledge, and impact of individuals who used to attend or work at the school still lives on in practitioner's memories (e.g., the farmer's market that was started by a former student). Climate action practices at the school have also spread to other locations in some cases (e.g., making t-shirt bags for local grocery stores). How to better enable CCE/climate action travel and how CCE/climate actions are changed through their movement is a potential topic for future research. Movement related to CCE is especially relevant for some contexts wherein climate change will dictate the actual physical movement of communities (as well as education practices) due to rising sea levels (Oakes, 2019). Additionally, how national and international movement related to CCE may negatively impact the environment through increased emissions should be explored (e.g., guest speaker travel, student exchange programs, see Shields, 2019).

Discussions about climate change were easier at the school because the community felt a strong connection to their local environment. This research further supports the findings of other scholars who have pointed to the importance of place attachment in fostering climate concern and action (e.g., Scannell & Gifford, 2013; Schweizer et al., 2013). Implications for practice include the importance of place and land-based education for CCE (also see Datta et al., 2022; Hallar et al., 2011; Khadka et al., 2021; Littrell et al., 2020; UNESCO, 2021a). Policies should also ensure the necessary professional development training is provided for teachers to implement these teaching methods (MECCE Project & NAAEE, 2022).

5.3 Practice Elements

Several implications for each of the practice elements (i.e., *materials*, *competences*, *meanings*) also surfaced from this research. It was apparent that *materials* were easier to integrate across domains. This may be because objects can physically travel to different locations. For instance, the 350 Degree Math cubes that were created by students during a Small and Tall in the Hall activity were later hung in the halls as a visual representation of their time together. That is, the cubes were a representation of a teaching and learning moment as well as a partnership between two members of the school community (an older and younger student). Schools looking to implement whole institution practices may want to consider what physical objects and/or visual representations may be helpful to merge activity across whole institution domains (also see Chopin et al., 2018; Hargis et al., 2018; UNESCO, 2016).

There were particular *competences* circulating at the school that further indicated that neoliberalism had become normalized at the school (Hay 2006; Krzyżanowski, 2020). These *competences* included the importance of gradual changes as well as the (lack of) *competence* among some practitioners about how to take meaningful action beyond individual behavior changes. That is, it was understood that climate change can be tackled as individuals through 'simple' changes (see Lukacs, 2017). The idea of simple, gradual change was encapsulated most noticeably in the name of their school program: Simply Living Simply, which had been re-packaged over the years to include a number of environmental themes, including climate change. The idea of making 'simple' changes, however, does not properly encapsulate the urgency of necessary climate actions (Sharma, 2021).

The focus on taking climate action gradually may be related to the school's own history in which they gradually began teaching about CCE. For instance, during the first few years of the Simply Living Simply program, they never used the word "climate change" to keep investigation of the topic "safe." Slowly, several staff and students came to see the connection between the program and climate change themselves. While the school's approach of gradual change towards CCE was important to ensure they brought along the school and local community, it may be necessary to have a differentiated approach. That is, gradual change may be important in the beginning (especially in conservative areas), however, once

the school and local community are on board, they may be ready for more radical action. Gradual changes may also be important for practitioners who are holding onto conflicting practices as they transition into different directions (e.g., Teacher 4 who owned a gas station while considering buying an electric car). Future research is needed about the appropriate scale between complex and simple changes, the right pace between slow and fast action, and who gets to decide (see Bergdahl & Langmann, 2021).

There also seemed to be varying levels of knowledge among students about how to take meaningful climate action (*competence*). Protests were discussed in several courses, but there was an understanding among several of the student climate leaders that protests were not effective in their context. The 3% Project that visited the school operated under the idea that it takes 3% of the population to make significant change in society. It is possible that the number of students at the school who believed that protesting was a useful action did not meet that 3% threshold. There also appeared to be varying levels of belief (*meaning*) that students *can* take significant climate actions. This finding also aligns with other work which has found a tendency for student climate activists to be patronized (Verlie & Flynn, 2022), and positioning them as "objects of care or otherwise objectivising their activism" (Bowman & Germaine, 2022, p. 70). In response to this reality, there have been calls to 'reimagine' education in light of climate change, especially in relation to providing youth political engagement skills (White et al., 2022; Verlie & Flynn, 2022).

The importance of the *meanings* element was also evident throughout this research. When practices were connected contentiously, it was often the *meanings* element that held the practice together. For instance, the custodians complained when the eco-team did a waste audit and did not handle the recycling or compost at the school because those components are not included in their school board contract. That said, the custodians did allow activities, such as the waste audit, recycling, and composting, to happen because they care (*meaning*) about what is important to the students. Practices at the school existed not only because practice elements existed but because practitioners were motivated to 'carry' them (Shove et al., 2012). Future practice, policy, and research should include a focus not only on ensuring that *competences* and *materials* related to climate action practices are present but also that the necessary *meanings* are attached to them.

When engaging with practitioners about new practices, it is important to discuss *why* they are important in ways that align with their values, worldview, and perspectives (see Hornsey et al., 2016; Plutzer et al., 2016; Kahan et al., 2012). For instance, there was an idea at the school to introduce slop buckets to address their issues with cross-contamination. That is, they assumed that a missing *material* would change this practice. What was not clear was *why* there was an issue with cross-contamination at the school. If proper waste management practices are missing because students need a container to scrape leftover food into, then the slop buckets may solve the problem. If, however, proper waste management practices are missing at the school due to a missing *meaning* (e.g., whether or not proper waste management is a worthwhile activity to spend time doing), then the addition of the slop buckets is not likely to fix the issue. Knowing what practice elements are missing and/or not connected is important when trying to alter the structure of practices (see Shove et al., 2012).

5.4 Practice Theory

This research also resulted in several implications for practice theory overall. The first implication is that practices evolve/endure in relation to pre-existing practice structures (Kemmis, 2019; Mahon et al., 2017; Shove et al., 2012). That is, several climate action practices at the school existed before they were connected to climate change (see Table 5.1). For instance, the Small and Tall in the Hall activity existed before it was connected to climate change. The school also previously held a whole school event (i.e., the Harvest Festival) with a similar structure to the Climate Change Extravaganza event (i.e., having different rooms across the school the students visited) before the whole school event was connected to climate change. This research is an illustration of how CCE can adapt to similar practices that already exist at a school. Implications for future practice include the need to work *with* existing practices to help ease the uptake and endurance of new practices (also see Kemmis, 2019; Shove et al., 2012). That is, CCE does not have to completely reinvent the wheel; it can morph to fit into/with existing practice structures.

Table 5.1

Practices that Existed at the School that were Later Connected to CCE

Practices	How they were connected to CCE

Small and Tall in the Hall activity	Activities were related to learning about climate change (e.g., 350 Degree cubes)
Simply Living Simply program	One year the program entirely focused on climate change mitigation and adaptation. The next year focused on the SDGs, with one month focusing on SDG 13.
Harvest Festival	This event had a similar structure/setup as the Climate Change Extravaganza event.
Whole school assemblies	These assemblies existed before students began presenting about climate change.
Footprint Conference	One year the theme of the conference was climate change.
EE practices	EE practices existed at the school before they were connected to climate change.

Some practices were also co-dependent on other practices (see Shove et al., 2012). For instance, the idea to get involved with the Specialist High School Majors program was connected to the schools' 50 history with the Outters program at the time. The Footprints conference was also co-dependent on the school's involvement in the SHSM curriculum writing process. The Outters trip (for Grade 10 students) also became codependent to a certain degree on the Footprints Conference (for all secondary students), as the conference served as an advertisement for Grade 9 students of what the Outters trip would involve. The Footprints Conference was also in danger of disappearing if staff cutbacks continued. That is, it became apparent that while co-dependent practices can strengthen each other, the disappearance of one can also affect the other (see Shove et al., 2012). Practitioners may want to develop a plan to make practices independent if/when they are in danger of disappearing. Practitioners may also want to connect new practices with well-established practices at the school to ease/strengthen their uptake, as well as to ensure their longevity.

Also, in relation to co-dependent practices, it became apparent the effect research had on the practices I observed (e.g., some teachers planned CCE lessons because I was there, the addition of a slide about climate change at the Outdoor Education Center). Also, while I tried to remain an outside observer, the longer I was at the school, the more I also became a participant (e.g., during the Global Goals class). Several qualitative scholars have argued that this feeling of moving from "participant observation to observant participation" is what researchers should aim for during their research (e.g., Moeran, 2009, p. 140, also see Creswell & Poth, 2018).

The climate action practices at the school were also affected by the school's historical context. That is, the school had focused more on climate change over time, which was also a reflection of what was happening in society. Similarly, as students progressed through the school, their knowledge of and action on climate change also grew. The practice of CCE at the school was found to be not just enduring but thriving from one grade to the next and was built upon at each grade level. Implications for policy and practice are that as time goes on, policy targets/education outcomes may need to be adjusted to match the growth of practices and practitioners related to climate action, as well as to reflect more accurately what is happening in society. Research regarding the appropriate timing for such adjustments would also be useful.

Most of the feedback and monitoring of climate action practices at the school was done through informal processes. While these informal methods appeared to work well for the school, they may be more likely to disappear without formal procedures to ensure feedback and monitoring processes continue and are improved upon. Implications for future policy and practice include allowing appropriate flexibility in feedback and monitoring processes related to CCE to allow practitioners to implement processes that match the culture of the setting. This may include requiring that some type of feedback and monitoring process is in place, and that it is reported on, without dictating what that process should be.

5.4 Climate Change Education Research

Finally, this study has resulted in several implications for broader CCE education research. As indicated by the literature reviewed above, the majority of CCE research to date has focused on individual qualities (e.g., attitudes, beliefs, behaviors) (Brownlee et al., 2013) despite overwhelming evidence that addressing climate change will require systemic change to collective practices (IPCC, 2018, 2022). Theories of practice are a useful analytical tool for CCE research because they adjust conceptual focus away from individual practitioners to the practices they collectively 'carry,' (un)equally share, and mutually shape (Reckwitz, 2002; Shove et al., 2012).

Currently, CCE research mainly focuses on *materials, meanings, and competences* from one discipline (i.e., Science). Climate change causes, effects, and solutions, however, span all disciplines (Bhasker et al., 2010), and therefore, it is essential that CCE research to

also become more interdisciplinary in its focus. This is important not only because of the effect that research has on practice (as indicated in the results above), but also because it is not possible to benchmark how effectively CCE is responding to the challenge of climate change if CCE research is mainly monodisciplinary in its focus. While interdisciplinarity is often recommended for CCE practice (Dolan, 2022; McCright et al., 2013), it is not often practiced within CCE research as illustrated by the literature reviewed above.

The CCE research reviewed mainly focused on *competences*, which is only one component of CCE practices. Additionally, understanding the climate science does not necessarily result in higher levels of belief in or action on climate change (Kahan et al., 2012; Hornsey et al., 2016). Not including a strong focus on *meanings* and *materials* within CCE research is a missed opportunity to gain a more contextual understanding of how CCE practices can support higher levels of climate belief and action (Shove et al., 2012).

The effect of CCE research on CCE practice would also be useful, including in relation to a whole institution approach to CCE. Prioritizing a whole institution approach within CCE research signals its importance and could result in place-specific recommendations for enactment (see Hargis & McKenzie, 2020).

5.5 Conclusion

The use of Shove and colleagues' (2012) dynamics of practice approach within the proposed research examined how climate action practices emerged, endured, and disappeared within a K-12 school utilizing a whole institution approach to climate action, with implications for CCE practice, policy, and research.

In relation to practice and policy, educators, administrators, and policy makers could utilize the knowledge gained to support CCE practices and policies in relation to the elements of practice (i.e., *materials, competences*, and *meanings*) across all domains. While CCE is not typically addressed in K-12 education policy in Canada (Bieler et al., 2018), this study indicated meaningful entry points at the school level, school division, and ministry of education levels. Practice perspectives to CCE policy acknowledge that "certain policy interventions may increase the chances that more rather than less sustainable ways of life persist and thrive" (Shove et al., 2012, p. 146).

This research also contributes to the larger body of research on CCE. First, CCE has not yet been investigated from a practice theory perspective nor have whole institution approaches to climate action been empirically investigated. Additionally, the literature review found a lack of constructivist framings in K-12 CCE research and, as such, this study contributes to diversifying epistemological and ontological orientations to engaging in CCE research, including in relation to the type of data generated.

Theories of practice harbour the potential to envisage social change regarding the major issues of our time, such as climate change through their focus on everyday practices (Buegger, 2014; Shove, 2010; Shove & Spurling, 2013). The methodological shift from following individuals to "the elements of practice" they carry (Shove et al., 2012, p. 22) enables a departure from traditional knowledge, attitude, and behavior approaches within CCE and research (Brownlee et al., 2013). This shift is necessary because "more knowledge does not necessarily equate with changed actions; but rather…it is practice itself that enables change" (McKenzie & Bieler, 2016, p. 123). By better attending to practical experience, educational approaches can "build the potential for cultural change as a response to the pressing critical issues of our times" (McKenzie & Bieler, 2016, p. 9).

Practice theory research is necessary for CCE because addressing climate change will require changing social practices (Shove et al., 2012). Social theories, such as practice theory, aid this project by framing how "the world is understood and how problems are defined" (Shove et al., 2012, p. 163). Turning towards practice for CCE research is beneficial because, "the likely solution to this global challenge is not a retreat from transformative activity (which would mean the end of human civilization) but a radical change in its purposes and goals" (Stetsenko, 2008, p. 489).

References

Adcock A. (2012) Cognitive dissonance in the learning processes. In N.M. Seel (Ed.), *Encyclopedia of the Sciences of Learning*. Springer, Boston, MA. https://doi.org/10.1007/978-1-4419-1428-6_5

Amel, E., Manning, C., Scott, B., & Koger, S. (2017). Beyond the roots of human inaction: Fostering collective effort toward ecosystem conservation. *Science*, *356*, 275-279.

Amsler, S. & Jeannie, K. (In Press). Challenging complacency in K–12 climate change education in Canada: Decolonial and Indigenous perspectives for designing curricula beyond sustainable development. In M. Lam, C. Skyhar, & A. Farrell (Eds.), *Teaching in the Anthropocene*. Canadian Scholars' Press.

Antoine, A., Mason, R., Mason, R., Palahicky, S., & Rodriguez de France, C. (2018). *Pulling together: A guide for curriculum developers*. Victoria, BC: BCcampus. Retrieved from https://opentextbc.ca/indigenizationcurriculumdevelopers/

Anyanwu, R., Le Grange, L., & Beets, P. (2015). Climate change science: The literacy of Geography teachers in the Western Cape Province, South Africa. *South African Journal of Education*, 35 (3), 1-9. doi: 0.15700/saje.v35n3a1160

Barad, K. (2007). *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Durham, NC: Duke University Press.

Barros, D. F. & Albernaz, A.L.M. (2014). Possible impacts of climate change on wetlands and its biota in the Brazilian Amazon. *Brazilian Journal of Biology, 74* (4), 810-820.

Barth, M. & Thomas, I. (2012). Synthesising case-study research – Ready for the next step? *Environmental Education Research*, *18* (6), 751-764, doi: 10.1080/13504622.2012.665849

Barton, D. & Hamilton, M. (2005). Literacy, reification and the dynamics of social interaction. In D. Barton & K. Tusting (Eds.), *Beyond communities of practice: Language, power and social context* (pp. 14–36). Cambridge: Cambridge University Press.

Bennett, J. (2010). *Vibrant matter: A political ecology of things*. Durham, NC: Duke University Press.

Bergdahl, L. & Langmann, E. (2021). Pedagogical publics: Creating sustainable education

environments in times of climate change. *European Educational Research Journal,* 1-14.

Bieler, A., Haluza-Delay, R., Dale, A., & McKenzie, M. (2018). A national overview of climate change education policy: Policy coherence between subnational climate and education policies in Canada (K-12). *Journal of Education for Sustainable Development*, *11* (2), 63-85.

Bofferding, L. & Kloser, M. (2015). Middle and high school students' conceptions of climate change mitigation and adaptation strategies. *Environmental Education Research*, *21* (2), 275-294, doi: 10.1080/13504622.2014.888401

Bouman, T., Verschoor, M., Albers, C. J., Böhm, G., Fisher, S. D., Poortinga, W., Whitmarsh, L., & Steg, L. (2020). When worry about climate change leads to climate action: How values, worry and personal responsibility relate to various climate actions. *Global Environmental Change*, *62*, 1-11.

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal, 9* (2), 27-40.

Bowman, B. & Germaine, C. (2022). Sustaining the old, or imaging a new one? The transformative literacies of the climate strikes. *Australian Journal of Environmental Education*, *38,* 70-84.

Branthwaite, A. & Lunn, T. (1985). Projective techniques in social and market research. In R. Walker (Ed.), *Applied qualitative research* (pp. 101–28). Aldershot: Gower.

Bright, M. L. & Eames, C. (2022). From apathy through anxiety to action: Emotions as motivators for youth climate strike leaders. *Australian Journal of Environmental Education*, *38*, 13-25.

Brinkmann, S & Kvale, S. (2015). *InterViews: Learning the craft of qualitative research interviewing* (3rd ed.). Thousand Oaks, CA: SAGE.

Bristow, J., Bell, R., & Wamsler, C. (2022). *Reconnection: Meeting the climate crisis inside out*. The Mindfulness Initiative and LUCSUS. www.themindfulnessinitiative.org/reconnection

Brosch, T. (2021). Affect and emotions as drivers of climate change perception and action: A review. *Current Opinion in Behavioral Sciences*, *42*, 15-21.

Browne, A. L. (2015). Can people talk together about their practices? Focus groups, humour and the sensitive dynamics of everyday life. *Area*, *48* (2), 198-205.

Brownlee, M. T. J., Powell, R. B., & Hallo, J. C. (2013). A review of the foundational processes that influence beliefs in climate change: Opportunities for environmental education research. *Environmental Education Research*, *19* (1), 1-20. doi: 10.1080/13504622.2012.683389

Bruce County. (2021, December 9). Bruce County and Saugeen Ojibway Nation finalize settlement agreement. https://www.brucecounty.on.ca/news/2021-dec-09/bruce-county-and-saugeen-ojibway-nation-finalize-settlement-agreement

Buegger, C. (2014). Pathways to practice: Praxiography and international politics. *European Political Science Review*, *6* (3), 383-406.

Büscher, M. & Urry, J. (2009). Mobile methods and the empirical. *European Journal of Social Theory*, *12* (1), 99-116. doi: 10.1177/1368431008099642

Butler, J. (2021, October 12). An open letter to Alex Ruff M.P. https://owensoundhub.org/ottawa-queens-park/12289-an-open-letter-to-alex-ruff-m-p.html

Callison, C. (2014). *How climate change comes to matter: The communal life of facts*. Duke University Press.

Canadian Commission for UNESCO [CCUNESCO]. (2020). Teachers' toolkit: UNESCO Schools Network in Canada. CCUNESCO.

Chang, C. & Pascua, L. (2017). The curriculum of climate change education: A case for Singapore. *The Journal of Environmental Education*, *48* (3), 172-181. doi: 10.1080/00958964.2017.1289883

Chopin, N., Hargis, K. & McKenzie, M. (2018). *Building climate-ready schools in Canada: Towards identifying good practices in climate change education.* Sustainability and Education Policy Network, University of Saskatchewan, Saskatoon, Canada. Retrieved from https://sepn.ca/wp-content/uploads/2018/12/CCUNESCO-ASPnet-Pilot-Project-Data-Driven-Report-NoHLs-2018-12-05-1.pdf

Clayton, S., Manning, C. M., Krygsman, K., & Speiser, M. (2017). *Mental health and our changing climate: Impacts, implications, and guidance*. American Psychological Association & ecoAmerica.

Cook, J., Nuccitelli, D., Green, S. A., Richardson, M., Winkler, B., Painting, R., Way, R., Jacobs, P., & Skuce, A. (2013). Quantifying the consensus on anthropogenic global warming in the scientific literature. *Environmental Research Letters*, *8*, 1-7. doi: 10.1088/1748-9326/8/2/024024

Cook, J., Oreskes, N., Doran, P. T., Anderegg, W. R. L., Verheggen, B., Maibach, E. W., Carlton, J. S., Lewandowsky, S., Skuce, A. G., & Green, S. A. (2016). Consensus on consensus: A synthesis of consensus estimates on human-caused global warming. *Environmental Research Letters*, *11*, 1-7. doi: 10.1088/1748-9326/11/4/048002

Cooper, H. V. (2021). To till or not to till in a temperate ecosystem? Implications for climate change mitigation. *Environmental Research Letter, 16*, 1-15.

Cresswell, T. (2007). *On the move: Mobility in the modern western world.* Routledge.

Creswell, J. W. & Poth, C. N. (2018). *Qualitative inquiry & research design: Choosing among five approaches* (4th ed.). SAGE Publications.

Czarniawska, B. (2007) *Shadowing: And other techniques for doing fieldwork in modern societies*. Liber.

Czarniawska, B. (2008). Organizing: How to study it and how to write about it. *Qualitative Research in Organizations and Management: An International Journal*, *3* (1), 4-20.

Datta, R., Kayira, J., & Datta, P. (2022). Land-based education as climate change resilience: A learning experience from a cross-cultural community garden. In E. M. Walsh (Ed.), *Justice and equity in climate change education: Exploring social and ethical dimensions of environmental education.* (pp. 214-233). Routledge.

Davis, L. P. & Museus, S. D. (2019). What is deficit thinking? An analysis of conceptualizations of deficit thinking and implications for scholarly research. *Currents*, *1*(1), 117-130. http://dx.doi.org/10.3998/ currents.17387731.0001.110

De Certeau, M. 1986. *The practice of everyday life*. University of California Press.

de Bono, Edward (1985). *Six Thinking Hats: An Essential Approach to Business Management*. Little, Brown, & Company

Dijkstra, E. M. & Goedhart, M. J. (2012). Development and validation of the ACSI: Measuring students' science attitudes, pro-environmental behaviour, climate change attitudes and knowledge. *Environmental Education Research*, *18* (6), 733-749, doi: 10.1080/13504622.2012.662213

Dobernig, K., Veen, E, & Oosterveer, P. (2016). Growing urban food as an emerging social practice. In G. Spaargaren, D. Weenink, & M. Lamers (Eds.), *Practice theory and research: Exploring the dynamics of social life* (pp. 153-178). Routledge.

Doherty, T. J., & Clayton, S. (2011). The psychological impacts of global climate change. *American Psychologist*, *66*(4), 265–276. https://doi.org/10.1037/a0023141

Dolan, A. E. (Ed.). (2022). *Teaching climate change in primary schools: An interdisciplinary approach.* Routledge.

Dooley, L., Sheats, J., Hamilton, O., Chapman, D., & Karlin, B. (2021). *Climate change & youth mental health: Psychological impacts, resilience resources & future directions.* https://seechangeinstitute.com/sci_project/climatechangeandyouthmentalhealth/

Dyment, J. E. & Hill, A. (2015). You mean I have to teach sustainability too? Initial teacher education students' perspectives on sustainability cross-curriculum priority. *Australian Journal of Teacher of Education, 40* (3), 21-35.

EcoSchools Canada. (2022). Certification FAQ. https://ecoschools.ca/certify/certification-faq/#managing-your-ecoschools-plan

Education Quality and Accountability Office [EQAO]. (2020a). [School's Name kept anonymous] – Elementary. https://www.eqao.com/report/?id=2316

Education Quality and Accountability Office [EQAO]. (2020b). [School's Name kept anonymous] – Secondary. https://www.eqao.com/report/?id=2363

Eilam, E. (2022). Climate change education: The problem with walking away from disciplines. *Studies in Science Education,* 1-34.

Eisenberg, A. M. (2019). Just transitions. *Southern California Law Review*, *92*(2), 273-330.

Ellingston, L. L. (2009). *Engaging crystallization in qualitative research*. SAGE Publications.

Ellsworth, E. (2005). *Places of learning: Media architecture pedagogy.* Routledge.

Enerlife Consulting Inc. (2017). *Ontario EcoSchools energy performance study 2017*. EcoSchools Canada.

Engeström, Y. (2007). From communities of practice to mycorrhizae. In J. Hughes, N. Jewson, & L. Unwin (Eds.), *Communities of practice: Critical perspectives* (pp. 41–54). Routledge.

Environment Office. Saugeen Ojibway Nation. (2021a). Our history. https://www.saugeenojibwaynation.ca/joint-council-rights

Environment Office. Saugeen Ojibway Nation. (2021b). Saugeen & Nawash community update: Title and Treaty court decision. https://www.saugeenojibwaynation.ca/news/saugeen-nawash-community-update-title-and-treaty-court-decision

Environment Office. Saugeen Ojibway Nation. (2021c). Saugeen Shores and SON finalize settlement agreement. https://www.saugeenojibwaynation.ca/news/saugeen-shores-and-son-finalize-settlement-agreement

European Commission. (n.d.). Climate change and biodiversity loss should be tackled together. *Horizon.* https://ec.europa.eu/research-and-innovation/en/horizon-magazine/climate-change-and-biodiversity-loss-should-be-tackled-together

Fenwick, T. (2012). Matterings of knowing and doing: Sociomaterial approaches to understanding practice. In P. Hager, A. Lee, & A. Reich (Eds.), *Practice, learning and change: Practice theory perspectives on professional learning* (pp. 67-84). Springer.

Fenwick, T., Edwards, R., & Sawchuk, P. (2011). *Emerging approaches to educational research: Tracing the sociomaterial.* Routledge.

Fereday, J. & Muir-Cochrane, E. M. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods, 5* (1), 80-92.

Ferguson, H. (2011). Mobilities of welfare: The case for social work. In M. Büscher, J. Urry, & K. Witchger (Eds.), *Mobile methods* (pp. 72-77). Routledge.

Ferland, N. (n.d.). *This is Indigenous land: An Indigenous land-based approach to climate change education*. Global Environmental Education Partnership.

Field, E., Schwartzberg, P., & Berger, P. (2019). *Formal report for Learning for a Sustainable Future.* York University Printing Services.

First Nations Health Authority. (2022). First Nations perspective on health and wellness. https://www.fnha.ca/wellness/wellness-for-first-nations/first-nations-perspective-on-health-and-wellness

Frankham, J. (2006). Network utopias and alternative entanglements for educational research and practice. *Journal of Education Policy*, *21* (6), 661–77.

Fuller, A. (2007). Critiquing theories of learning and communities of practice. In J. Hughes, N. Jewson, & Unwin, L. (Eds.), *Communities of practice: Critical perspectives* (pp. 17-29). Routledge.

Funes, Y. (2022, April 4). Yes, colonialism caused climate change, IPCC reports. *Atmos.* https://atmos.earth/ipcc-report-colonialism-climate-change/#:~:text=The%20Intergovernmental%20Panel%20on%20Climate,driver%20of%20the%20climate%20crisis.

Gehlbach, H., Robinson, C. D., & Vriesema, C. C. (2019). Leveraging cognitive consistency to nudge conservative climate change beliefs. *Journal of Environmental Psychology, 61,* 134-137.

General Assembly resolution 70/1. (25 September 2015). *Transforming our world: The 2030 Agenda for Sustainable Development*, A/RES/70/1. Retrieved from http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E

Gergen, K. J. (1991). *The saturated self: Dilemmas of identity in contemporary life*. Basic Books.

Gherardi, S. (1995). When will he say: "Today the plates are soft?" The management of ambiguity and situated decision-making.' *Studies in Cultures, Organizations and Societies*, *1* (1), 9–27.

Gherardi, S. (2012). *How to conduct a practice-based study: Problems and methods*. Edward Elgar Publishing Limited.

Ginkel, K. (2017). Making sense of noise: Practice oriented approach. In M. Jonas, B. Littig, & A. Wroblewski (Eds.), *Methodological reflections on practice oriented theories* (pp. 145-160). Springer International Publishing AG.

Gladwin, D. (2021, July 28). Why climate change education needs more empathy. OUPblog. Oxford University Press. https://blog.oup.com/2021/07/why-climate-change-education-needs-more-empathy/

Goeman, M. (2008). (Re)Mapping indigenous presence on the land in native women's literature. *American Quarterly*, *60*(2), 295–302. doi:10.1353/aq.0.0011

Goldberg, M. H., Gustafson, A., Rosenthal, S. A., & Leiserowitz, A. (2021). Shifting Republican views on climate change through targeted advertising. *Nature Climate Change, 11*, 573-577.

Goldman, D., Ayalon, O., Baum, D., & Weiss, B. (2018). Influence of 'green school certification' on students' environmental literacy and adoption of sustainable practice by schools. *Journal of Cleaner Production, 183*, 1300-1313.

Gibbs, A. (2012). Focus groups and group interviews. In J. Arthur, M. Waring, R. Coe, & L. Hedges (Eds.). *Research methods and methodologies in education* (pp. 186-192). SAGE.

Gibbs, G. R. (2007). *Analyzing qualitative data.* SAGE.

Giroux, H. (2017). Neoliberalism and the weaponizing of language and education. *Race & Class*, *61* (1), 26-45.

Godfrey, P. (2012). Introduction: Race, gender, & class and climate change. *Race, Gender and Class*, *19* (1–2), 3–11. https://www.jstor.org/stable/43496857

Godfrey, P., & Torres, D. (Eds.). (2016). *Systemic crises of global climate change: Intersections of race, class, and gender.* Routledge.

González-Gaudiano, E. & Meira-Cartea, P. (2010). Climate change education and communication: A critical perspective on obstacles and resistances. In F. Kagawa & D. Selby (Eds.), *Education and climate change: Living and learning in interesting times* (pp. 13-34). Routledge.

Gray, J. (2003). Open spaces and dwelling places: Being at home on hill farms in the Scottish Borders' places. In S. M. Low & D. Lawrence-Zúñiga (Eds.), *The anthropology of space and place: Locating culture* (pp. 224-244). Blackwell.

Gregersen, T., Doran, R., Böhm, G., Tvinnereim, E., & Poortinga, W. (2020). Political orientation moderates the relationship between climate change beliefs and worry about climate change. *Frontiers in Psychology*, *11*, 1-12.

Greig, A. & Taylor, J. (1999). *Doing research with children*. SAGE Publications.

Grey County. (2020, September 24). Grey County and Saugeen Ojibway Nation reach historic agreement. https://www.grey.ca/news/grey-county-and-saugeen-ojibway-nation-reach-historic-agreement

Guest, G., Namey, E. E., & Mitchell, M. L. (2013*). Collecting qualitative data: A field manual for applied research*. SAGE.

Hager, P. (2012). Theories of practice and their connection to learning: A continuum of more or less inclusive accounts. In P. Hager, A. Lee, & A. Reich (Eds.), *Practice, learning and change: Practice theory perspectives on professional learning* (pp. 17-32). Springer.

Hager, P., Lee, A., & Reich, A. (2012). Problematising practice, reconceptualising learning and imagining change. In P. Hager, A. Lee, & A. Reich (Eds.), *Practice, learning and change: Practice theory perspectives on professional learning* (pp. 1-14). Springer.

Haldrup, M. (2011). Choreographies of leisure mobilities. In M. Büscher, J. Urry, & K. Witchger (Eds.), *Mobile methods* (pp. 54-71). Routledge.

Halkier, B. (2017). Questioning the 'gold standard' thinking in qualitative methods from a practice theoretical perspective: Towards methodological multiplicity. In M. Jonas, B. Littig, & A. Wroblewski (Eds.), *Methodological reflections on practice oriented theories* (pp. 193-204). Springer International Publishing AG.

Hallar, A. G., McCubbin, I. B., & Wright, J. M. (2011). A place-based curriculum for understanding climate change at Storm Peak Laboratory, Colorado. *American Meteorological Society, 92* (7), 909-918.

Hargis, K., Chopin, N., & McKenzie, M. (2018). *Ten Canadian schools' stories of climate action*. Sustainability and Education Policy Network, University of Saskatchewan, Saskatoon, Canada. Retrieved from https://sepn.ca/wp-content/uploads/2018/12/CCUNESCO-ASPnet-Pilot-School-Stories-EN-2018-12-04-1.pdf

Hargis, K. & McKenzie, M. (2021). Responding to climate change education: A primer for K-12 education. Sustainability and Education Policy Network. https://sepn.ca/resources/report-responding-to-climate-change-education-a-primer-for-k-12-education/

Hargis, K., McKenzie, M., & Levert-Chiasson, I. (2021). Whole-institution approaches to climate change education: Towards preparing school systems to be climate-ready. In R. Iyengar & C. Kwauk (Eds.), *Curriculum and learning for climate action: Towards an SDG 4.7 roadmap for systems change* (pp. 43-66). UNESCO-IBE Book Series. Brill Publishers.

Harris, A. (2003). Distributed leadership in schools: Leading or misleading? *SAGE Publications*, *16* (5), 10-13.

Harris, A. (2013). Distributed leadership: Friend or foe? *Educational Management Administration & Leadership, 41,* (5), 545-554.

Hay, C. (2006). The normalizing role of rationalist assumptions in the institutional embedding of neoliberalism. *Economy and Society, 33*, 500-527.

Heidenstrøm, N. & Kvarnlöf, L. (2017). Coping with blackouts: A practice theory approach to household preparedness. *Journal of Contingencies and Crisis Management*, *26* (2), 272-282.

Hein, J. R., Evans, J., & Jones, P. (2008). Mobile methodologies: Theory, technology, and practice. *Geography Compass*, *2* (5), 1266-1285. doi: 10.1111/j.1749-8198.2008.00139.x

Henry, M. S., Bazilian, M. D., & Markuson, C. (2020). Just transitions: Histories and futures in a post-COVID worls. *Energy Research & Social Science, 68,* 1010668.

Hickman, C., Marks, E., Pihkala, P., Clayton, S., Lewandowski, R. E., Mayall, E. E., Mellor, C. & van Susteren, L. (2021). Climate anxiety in children and young people and their beliefs about government responses to climate change: A global survey. *Lancet Planet Health*, *5*, e863-e873.

Hill, A. & Dyment, J. E. (2016). Hopes and prospects for the sustainability cross-curriculum priority: Provocations from a state-wide case study. *Australian Journal of Environmental Education, 32* (3), 225-242.

Ho, L.-C. & Seow, T. (2017). Disciplinary boundaries and climate change education: Teachers' conceptions of climate change education in the Philippines and Singapore. *International Research in Geographical and Environmental Education*, *26* (3), 240-252, doi: 10.1080/10382046.2017.1330038

Holton, M. & Riley, M. (2014). Talking on the move: Place-based interviewing with undergraduate students. *Area*, *46* (1), 59-65, doi: 10.1111/area.12070

Hornsey, M. J., Harris, E. A., Bain, P. G., & Fielding, K. S. (2016). Meta-analyses of the determinants and outcomes of belief in climate change. *Nature: Climate Change*, *6*, 622-626. doi: 10.1038/NCLIMATE2943

Hughes, J., Jewson, N., & Unwin, L. (2007). Introduction. Communities of practice: A contested concept in flux. In J. Hughes, N. Jewson, & Unwin, L. (Eds.), *Communities of practice: Critical perspectives* (pp. 1-16). Routledge.

Ingold, T. (2010). *Bringing things to life: Creative entanglements in a world of materials*. Unpublished manuscript.

Intergovernmental Panel on Climate Change [IPCC]. (2014). *Climate change 2014: Synthesis report*. Contribution of working groups I, II, and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core writing team, R.K. Pachauri & L.A. Meyer (Eds.)]. IPCC, Geneva, Switzerland, 151pp.

Intergovernmental Panel on Climate Change [IPCC]. (2018). *Global warming of 1.5°C*. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [V. Masson-Delmotte, P. Zhai, H. O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, T. Waterfield (eds.)]. In Press.

Intergovernmental Panel on Climate Change [IPCC]. (2022). *Climate change 2022: Impacts, adaptation, and vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S.

Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. In Press.

Kahan, D. M. (2015). Climate-science communication and the *measurement problem. Advances in Political Psychology*, *36*, 1-43.

Kahan, D. M., Peters, E., Wittlin, M., Slovic, P., Ouellette, L. L., Braman, D., & Mandel, G. (2012). The polarizing impact of science literacy and numeracy on perceived climate change risks. *Nature: Climate Change*, *2*, 732-735.

Kanbur, R. (2015). Education for climate justice: The many faces of climate justice: An essay series on the principles of climate justice. Mary Robinson Foundation, Trinity College. http://www.mrfcj.org/pdf/faces-of-climate-justice/Education-for-ClimateJustice.pdf

Kapoor, K. (2021, June 10). Climate change biodiversity loss must be tackled together – Report. *Reuters*. https://www.reuters.com/business/environment/climate-change-biodiversity-loss-must-be-tackled-together-report-2021-06-10/

Kapyrka, J., Dockstator, M. (2012). Indigenous knowledge and Western knowledges in environmental education: Acknowledging the tensions for the benefits of a "two-worlds" approach. *Canadian Journal of Environmental Education, 17,* 97-112.

Karpudewan, M. & Khan, N. S. M. A. (2017) Experiential-based climate change education: Fostering students' knowledge and motivation towards the environment. *International Research in Geographical and Environmental Education*, *26* (3), 207-222, doi: 10.1080/10382046.2017.1330037

Kemmis, S. (2019). *A practice sensibility: An invitation to the theory of practice architectures*. Springer.

Khadka, A., Li, C. J., Stanis, S. W., & Morgan, M. (2021). Unpacking the power of place-based education in climate change communication. *Applied Environmental Education & Communication. 20* (1), 1-15.

Knappett, C., & Malafouris, L. (2008). *Material agency: Towards a non-anthropocentric approach*. Springer. doi: 10.1007/978-0-387-74711-8

Koot, Y. I. (2020). *A spiritual classroom: Rethinking climate change education:*

Exploring Buddhist virtues and teachings about nature for the development of creative (Publication No. GEO-80436) [Master's thesis, Wageningen University].

Komatsu, H., Rappleye, J., & Silova, I. (2021). Student-centered learning and sustainability: Solution or problem? *Comparative Education Review*, *65*(1), 6-33.

Körfgen, A., Keller, L., Kuthe, A., Oberrauch, A., & Stötter, H. (2017). (Climate) Change in young peoples' minds – From categories towards interconnections between the anthroposphere and natural sphere. *Science of the Total Environment*, *580*, 178-187. doi: 10.1016/j.scitotenv.2016.11.127

Krueger, R. A. (1994). *Focus groups: A practical guide for applied research* (2nd ed.). SAGE.

Krzyżanowski, M. (2020). Normalization and the discursive construction of "new" norms and "new" normality: Discourse in the paradoxes of populism and neoliberalism. *Social Semiotics, 30* (4), 431-448.

Kusenbach, M. (2003). Street phenomenology: The go-along as ethnographic research tool. *Phenomenology in Ethnography* [Special issue]. *Ethnography*, *4* (3), 455-485.

Latour, B. (2000). When things strike back: A possible contribution of 'science studies' to the social sciences. *British Journal of Sociology*, *51* (1), 107-125.

Latour, B. (2005). *Reassembling the social: An introduction to actor-network-theory*. Oxford University Press.

Laube, S. (2017). White-collar bodywork: Practice centrism and the materiality of knowledge work. In M. Jonas, B. Littig, & A. Wroblewski (Eds.), *Methodological reflections on practice oriented theories* (pp. 93-106). Springer International Publishing AG.

Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.

Law, J. & Urry, J. (2004). Enacting the social. *Economy and Society*, *33* (3), 390-410. doi: 10.1080/0308514042000225716

Lawson, D. F., Stevenson, K. T., Peterson, M. N., Carrier, S. J., Strnad, R. L., & Seekamp, E. (2019). Children can foster climate change concern among their parents. *Nature Climate Change*, *9*, 458-462.

Lee, J. & Ingold, T. (2006). Fieldwork on foot: Perceiving, routing, socializing. In S. Coleman & P. Collins (Eds.), *Locating the field: Space, place and context in*

anthropology (pp. 67-86). Berg Publishers.

Lee, T. M., Markowitz, E. M., Howe, P. D., Ko, C.-Y., & Leiserowitz, A. A. (2015). Predictors of public climate change awareness and risk perception around the world. *Nature: Climate Change*, *5*, 1014–1020. https://doi.org/10.1038/nclimate2728

Li, N. & Su, L. Y-F. (2018). Message framing and climate change communication: A meta-analytical review. *Journal of Applied Communications*, *102* (3), 1-14.

Lincoln, Y. S., Lynham, S. A., & Guba, E. G. (2011). Paradigmatic controversies contradictions, and emerging confluences, revisited. In N. K. Denzin & Y. S. Lincoln (Eds.), *The SAGE handbook of qualitative research* (Vol. 4) (pp. 97-128). SAGE.

Littig, B. & Leitner, M. (2017). Combining methods in practice oriented research. In M. Jonas, B. Littig, & A. Wroblewski (Eds.), *Methodological reflections on practice oriented theories* (pp. 161-176). Springer International Publishing AG.

Littrell, M. K., Tayne, K., Okochi, C., Leckey, E., Gold, A. U., & Lynds, S. (2020). Student perspectives on climate change through place-based filmmaking. *Environmental Education Research, 26* (4), 594-610.

Lukacs, M. (2017). Neoliberalism has conned us into fighting climate change as individuals. *The Guardian.* https://www.theguardian.com/environment/true-north/2017/jul/17/neoliberalism-has-conned-us-into-fighting-climate-change-as-individuals

Mahon, K., Francisco, S., & Kemmis, S. (2017). *Exploring education and professional practice: Through the lens of practice architectures.* Springer.

Marshall, G. (2014). *Don't even think about it: Why our brains are wired to ignore climate change*. Bloomsbury: London.

Mascolo, M. F. (2009). Beyond student-centered and teacher-centred pedagogy: Teaching and learning as guided participation. *Pedagogy and the Human Science*, *1*, 3-27.

Mathie, R. G. & Wals, A. E. J. (2022). *Whole school approaches to sustainability: Exemplary practices from around the world*. Education & Learning Sciences/Wageningen University.

Mbah, M., Ajaps, S., & Molthan-Hill, P. (2021). A systematic review of the deployment of Indigenous knowledge systems toward climate change adaptation in developing world contexts: Implications for climate change education. *Sustainability*, *13*, 4811.

McCright, A. M., O'Shea, B. W., Sweeder, R. D., Urquhart, G. R., Zeleke, A. (2013). Promoting interdisciplinarity through climate change education *Nature Climate Change*, *3* (8), 713-716.

McFalls, E. L., & Cobb-Roberts, D. (2001). Reducing resistance to diversity through cognitive dissonance instruction: Implications for teacher education. *Journal of Teacher Education*, *52* (2), 164-172.

McGrath, A. (2020). Bringing cognitive dissonance theory into the scholarship of teaching and learning: Topics and questions in need of investigation. *Scholarship of Teaching and Learning in Psychology*, *6*, (1), 84-90.

McKenzie, K. B. & Locke, L. A. (2014). Distributed leadership: A good theory but what if leaders won't, don't know how, or can't lead? *Journal of School Leadership*, *24*, 164-188.

McKenzie, M. & Aikens, K. (2021). Global education policy mobilities and subnational policy practice. *Globalisation, Societies, and Education. 19*, 311-325.

McKenzie, M. & Bieler, A. (2016). *Critical education and sociomaterial practice: Narration, place, and the social*. New York: Peter Lang.

McKenzie, M. & Kwauk, C. (2021). Intertwined states of emergency: Education in the time of COVID-19 and the climate crisis. In W. Brehm, E. Unterhalter, & M. Oketch (Eds.), *States of Emergency: Education in the Time of Covid-19* (pp. 138-140). *Norrag Special Issue 06.*

Moeran, B. (2009). From participant observation to observant participation. In S. Ybema, D. Yanow, H. Wels, & F. Kamsteeg (Eds.), *Organizational ethnography: Studying the complexities of everyday life* (pp. 139-155). Sage.

Monitoring and Evaluating Climate Communication and Education Project [MECCE] Project & the North American Association for Environmental Education (NAAEE). (2022).

Mapping the landscape of K-12 climate change education policy in the United States. MECCE Project & NAAEE.

Monroe, M. C., Plate, R. R., Oxarart, A., Bowers, A., & Chaves, W. A. (2017). Identifying effective climate change education strategies: A systematic review of the research. *Environmental Education Research*, 1-22. doi: 10.1080/13504622.2017.1360842

Müller, S. M. (2017). Beyond the body's skin: Describing the embodiment of practices. In M. Jonas, B. Littig, & A. Wroblewski (Eds.), *Methodological reflections on practice oriented theories* (pp. 127-144). Springer International Publishing AG.

Nesterova, Y. (2020). Rethinking environmental education with the help of Indigenous ways of knowing and traditional ecological knowledge. *Journal of Philosophy of Education*, *54* (4), 1047-1052.

Nicholls, J. & Thorne, M. (2018). Queensland teachers' relationship with the sustainability cross-curriculum priority. *Australian Journal of Environmental Education, 33* (3), 189-200.

Nicolini, D. (2009). Articulating practice through the interview to the double. Management Learning, *40* (2), 195-212.

Nicolini, D. (2013). *Practice theory, work, and organization: An introduction.* Oxford, United Kingdom: Oxford University Press.

Nicolini, D. (2017). Practice theory as a package of theory, method, and vocabulary: Affordances and limitations. In M. Jonas, B. Littig, & A. Wroblewski (Eds.), *Methodological reflections on practice oriented theories* (pp. 19-34). Springer International Publishing AG.

Niebert, K. & Gropengiesser, H. (2013). Understanding and communicating climate change in metaphors. *Environmental Education Research*, *19* (3), 282-302, doi: 10.1080/13504622.2012.690855

Niewöhner, J. & Beck, S. (2017). Embodying practices: The human body as matter (of concern) in social thought. In M. Jonas, B. Littig, & A. Wroblewski (Eds.), *Methodological reflections on practice oriented theories* (pp. 63-78). Springer International Publishing AG.

Norgaard, K. M. (2011). *Living in denial: Climate change, emotions, and everyday life*. MIT

Press.

Oakes, R. (2019). Culture, climate change and mobility decisions in pacific small island developing states. *Population and Environment, 40,* 480-503.

Ojala, M. (2015). Hope in the face of climate change: Associations with environmental engagement and student perceptions of teachers' emotion communication style and future orientation. *The Journal of Environmental Education*, *46* (3), 133-148. doi: 10.1080/00958964.2015.1021662

Ontario Human Rights Commission. (n.d.). Indigenous spiritual practices. https://www.ohrc.on.ca/en/policy-preventing-discrimination-based-creed/11-indigenous-spiritual-practices#:~:text=In%20this%20policy%2C%20%E2%80%9CIndigenous%20Spirituality,faith%20traditions%2C%20such%20as%20Christianity.

Orlikowski, W. J. (2007). Sociomaterial practices: Exploring technology at work. *Organization Studies*, *28* (9), 1435-1448.

Parker, L. (2017). Creating a crisis: Selling neoliberal policy through the rebranding of education. *Canadian Journal of Educational Administration and Policy, 183,* 44-60.

Patel, S. S., Robb, K., Pluff, C., Maldonado, E., Tatar, G., & Williams, T. (2021). Elevating mental health disparities and building psychosocial resilience among BIPOC children and youth to broaden the climate and health discourse. *Journal of Applied Research on Children: Informing Policy for Children at Risk*, *12* (1), 1-21.

Peters, G., Li, M., & Lenzen, M. (2021). The need to decelerate fast fashion in a hot climate - A global sustainability perspective on the garment industry. *Journal of Cleaner Production*, *295,* 126390.

Pink, S. (2008). An urban tour: The sensory sociality of ethnographic place-making. *Ethnography*, *9* (2), 175-196.

Pink, S. (2009). *Doing sensory ethnography*. Los Angeles, CA: SAGE.

Plutzer, E., McCaffrey, M., Hannah, A. L., Rosenau, J., Berbeco, M., & Reid, A. H. (2016). Climate confusion among US teachers: Teacher's knowledge and values can hinder climate education. *Science*, *351*(6274), 664–665. https://doi.org/10.1126/science.aab3907

Powell, K. (2010). Making sense of place: Mapping as a multisensory research method. *Qualitative Inquiry*, *16* (7), 539-555.

Prosser, J. (2011). Visual methodology: Toward a more seeing research. In N. K. Denzin & Y. S. Lincoln (Eds.), *The Sage handbook of qualitative research* (Vol. 4) (pp. 479-496). SAGE.

Randall, R. (2009). Loss and climate change: The cost of parallel narratives. *Ecopsychology*, *1*(3), 118–129. https://doi.org/10.1089/eco.2009.0034

Reckwitz, A. (2002). Toward a theory of social practices: A development in culturalist theorizing. *European Journal of Social Theory, 5*(2), 243-263.

Regier, R. L. (2019). *Teachers' experiences in engagement with partners in environmental and sustainability education* [Master's thesis, University of Saskatchewan]. HARVEST.

Rief, S. (2017). 'Mobile practices', 'Mobile methods' and beyond: Studying railway mobility using Lefebvre's theory of space. In M. Jonas, B. Littig, & A. Wroblewski (Eds.), *Methodological reflections on practice oriented theories* (pp. 235-250). Springer International Publishing AG.

Román, D. & Busch, K. C. (2016) Textbooks of doubt: Using systemic functional analysis to explore the framing of climate change in middle-school science textbooks. *Environmental Education Research*, *22* (8), 1158-1180 doi: 10.1080/13504622.2015.1091878

Rousell, D. & Cutter-Mackenzie-Knowles, A. (2020). A systematic review of climate change education: Giving children and young people a 'voice' and a 'hand' in redressing climate change. *Children's Geographies, 18* (2), 191-208.

Rowling, M. (2019, September 24). UN climate summit exposes struggle to ditch fossil-fuel 'status quo.' *Reuters*. https://www.reuters.com/article/us-climate-changesummit-policy/u-n-climate-summit-exposes-struggle-to-ditch-fossil-fuel-statusquo-idUSKBN1W924R

Saldaña, J. (2016). *The coding manual for qualitative researchers.* Los Angeles, CA: SAGE.

Sattler, P. (2012). Education governance reform in Ontario: Neoliberalism in context. *Canadian Journal of Education Administration and Policy, 128*. 1-28.

Saugeen Ojibway Nation. (2019, May 1). Saugeen Ojibway Nation land & Aboriginal title claim trial set to begin. *The Bruce Peninsula Press*. https://brucepeninsulapress.com/2019/05/01/saugeen-ojibway-nation-land-aboriginal-title-claim-trial-set-to-begin/

Scannell, L. & Gifford, R. (2013). Personally relevant climate change: The role of place attachment and local versus global message framing in engagement. *Environment and Behavior, 45* (1), 60-85.

Schäfer, H. (2017). Relationality and heterogeneity: Transitive methodology in practice theory and actor-network theory. In M. Jonas, B. Littig, & A. Wroblewski (Eds.), *Methodological reflections on practice oriented theories* (pp. 35-46). Springer International Publishing AG.

Schatzki, T. R. (2001). Practice theory. In T. R. Schatzki, K. Knorr-Cetina, & E. von Savigny (Eds.), *The practice turn in contemporary theory* (pp. 1–14). Routledge.

Schatzki, T. R., Knorr Cetina, K., & Savigny E. V. (Eds.). (2001). *The practice turn in contemporary theory*. Routledge.

Schmidt, R. (2017). Sociology of social practices: Theory or modus operandi of empirical research? In M. Jonas, B. Littig, & A. Wroblewski (Eds.), *Methodological reflections on practice oriented theories* (pp. 19-34). Springer International Publishing AG.

Schweizer, S., Davis, S., & Thompson, J. L. (2013). Changing the conversation about climate change: A theoretical framework for place-based climate change engagement. *Environmental Communication*, *7* (1), 42-62.

Sedlačko, M. (2017). Conducting ethnography with a sensibility for practice. In M. Jonas, B. Littig, & A. Wroblewski (Eds.), *Methodological reflections on practice oriented theories* (pp. 47-62). Springer International Publishing AG.

Sharma, R. (2021). Learning to recycle isn't enough: Youth-led climate activism and climate change education in the UK. In R. Iyengar & C. T. Kwauk (Eds.), *Curriculum and learning for climate action: Toward an SDG roadmap for systems change*. Brill.

Sheller, M. & Urry, J. (2006). The new mobilities paradigm. *Environment and Planning A*, *38*, 207-226.

Shepardson, D. P., Niyogi, D., Roychoudhury, A., & Hirsch, A. (2012) Conceptualizing climate change in the context of a climate system: Implications for climate and environmental education. *Environmental Education Research*, *18* (3), 323-352, doi: 10.1080/13504622.2011.622839

Sherry, J. & Choi, M. (2021, July 1). How the eager beaver helps protect the planet. *Natural Resources Defense Council*. https://www.nrdc.org/experts/jennifer-sherry/how-eager-beaver-helps-protect-planet

Shields, R. (2019). The sustainability of international higher education: Student mobility and global climate change. *Journal of Cleaner Production, 217,* 594-602.

Shove, E., Pantzar, M., & Watson, M. (2012). *The dynamics of social practice: Everyday life and how it changes.* Sage.

Shove, E., & Spurling, N. (Eds.). (2013). *Sustainable practices: Social theory and climate change*. Routledge.

Shultz, L., Guimaraes-Iosif, R., Chana, T., & Medland, J. (2009). *The impact of becoming a UNESCO ASPnet school in Alberta and Manitoba, Canada*. Alberta Teachers' Association.

Simmons, D. (2018, November 13). Beavers can help combat global warming. *Yale Climate Connections*. https://yaleclimateconnections.org/2018/11/beavers-can-help-combat-global-warming/

Spaargaren, G., Lamers, M., & Weenink, D. (2016). Theoretical and methodological contributions to practice theories. In G. Spaaragaren, D. Weenink, & M. Lamers (Eds.), *Practice theory and research: Exploring the dynamics of social life.* (pp. 3-27). Routledge.

Spillane, J. P. (2005). Distributed leadership. *The Educational Forum*, *69* (2), 143-150.

Stake, R. E. (1995). *The art of case study research*. SAGE Publications.

Stein, S. (2019). The ethical and ecological limits of sustainability: A decolonial approach to climate change in higher education. *Australian Journal of Environmental Education*, *35*, 198-212.

Stetsenko, A. (2008). From relational ontology to transformative activist stance on development and learning: Expanding Vygotsky's (CHAT) project. *Cultural Studies of Science Education*, *3*, 471-491. doi: DOI 10.1007/s11422-008-9111-3

Suldovsky, B. (2017). The information deficit model and climate change communication. *Oxford Research Encyclopedia of Climate Science.* https://doi.org/10.1093/acrefore/9780190228620.013.301

Sultana, F. (2022). The unbearable heaviness of climate coloniality. *Political Geography,* 1-2638.

Tanyanyiwa, V. I. (2019). Indigenous knowledge systems and the teaching of climate change in Zimbabwean secondary schools. *SAGE Open*, *9* (4), 1-11.

Taylor, M. R., Lamm, A. J., & Lundy, L. K. (2017). Using cognitive dissonance to communicate with hypocrites about water conservation and climate change. *Journal of Applied Communications*, *101* (3), 1-14.

The Sustainability Project. (2022). Election report cards on climate action. https://thesustainabilityproject.ca/news/local-candidate-report-cards-on-climate-action

Thomson, P. & Hall, C. (2017). *Place-based methods for researching schools.* London: Bloomsbury.

United Nations. (2019). Climate justice. https://www.un.org/sustainabledevelopment/blog/2019/05/climate-justice/

United Nations Development Programme [UNDP]. (2018). Goal 13: Climate action. Retrieved March 26, 2018 from http://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-13-climate-action.html

United Nations Educational, Scientific, and Cultural Organization [UNESCO]. (2010). *The UNESCO climate change initiative: Climate change education for sustainable development*. UNESCO.

United Nations Educational, Scientific, and Cultural Organization [UNESCO]. (2015). *Global citizenship education: Topics and learning objectives*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000232993

United Nations Educational, Scientific, and Cultural Organization [UNESCO]. (2016). *Getting climate ready: A guide for schools on climate action*. UNESCO.

United Nations Educational, Scientific, and Cultural Organization [UNESCO]. (2018). *UNESCO Associated Schools Network: Guide for national coordinators*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000261994

United Nations Educational, Scientific, and Cultural Organization [UNESCO]. (2019). *Educational content up close: Examining the learning dimensions of education for sustainable development and global citizenship education*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000372327?posInSet=1&queryId=52ab3d5c-5ed9-468b-be8c-ffae750221f6

United Nations Educational, Scientific, and Cultural Organization [UNESCO]. (2021a, June 21). Land as teacher: Understanding Indigenous land-based education. https://en.ccunesco.ca/idealab/indigenous-land-based-education

United Nations Educational, Scientific, and Cultural Organization [UNESCO]. (2021b). *Learn for our planet: A global review of how environmental issues are integrated in education.* UNESCO.

United Nations Educational, Scientific and Cultural Organization [UNESCO] & United Nations Framework Convention on Climate Change [UNFCCC]. (2016). *Action for climate empowerment: Guidelines for accelerating solutions through education, training and public awareness*. UNESCO.

United Nations Framework Convention on Climate Change [UNFCCC]. (2015). *Adoption of the Paris Agreement. 21st Conference of the Parties*. United Nations. Retrieved December 1, 2017 from https://unfccc.int/resource/docs/2015/cop21/eng/l09.pdf

Urry, J. (2000). Sociology beyond societies: *Mobilities for the twenty-first century.* Routledge.

Urry, J. (2007) *Mobilities*. Polity Press.

Verlie, B. (2021). *Learning to live with climate change: From Anxiety to transformation*. Routledge.

Verlie, B. & Flynn, A. (2022). School strike for climate: A reckoning for education. *Australian Journal of Environmental Education, 38,* 1-12.

Viswanathan, L. (2020). Indigenous land-based learning: A way to take action on climate change. Indigenous Climate Hub.

https://indigenousclimatehub.ca/2020/09/indigenous-land-based-learning-a-way-to-take-action-on-climate-change/

Vizina, Y. N. (2018). *Indigenous knowledges and sustainability in post-secondary education* [Doctoral dissertation, University of Saskatchewan]. HARVEST.

Waldron, F., Ruane, B., Oberman, R., & Morris, S. (2016). Geographical process or global injustice? Contrasting educational perspectives on climate change. *Environmental Education Research*, 1-17. doi: 10.1080/13504622.2016.1255876

Walker, G. B. & Daniels, S. E. (2019). Collaboration in environmental conflict management and decision-making: Comparing best practices with insights from collaborative learning work. *Frontiers in Communication*, *4* (2), 1-12.

Wals, A. E. J. & Mathie, R. G. (2022). Whole school responses to climate urgency and related sustainability challenges. In M.A. Peters & R. Heraud (Eds.), *Encyclopedia of Educational Innovation* (pp. 1-8). Springer Nature.

Wang, J., Geng, L., Schultz, W., Zhou, K. (2019). Mindfulness increases the belief in climate change: The mediating role of connectedness with nature. *Environment and Behavior*, *51* (1), 3-23.

Webster, R. & Shaw, C. (2019). *Broadening engagement with just transition: Opportunities and challenges.* Climate Outreach

Were, D., Kansiime, F., Fetahi, T., Cooper, A., & Jjuuko, C. (2019). Carbon sequestration by wetlands: A critical review of enhancement measures for climate change mitigation. *Earth Systems and Environment, 3,* 327-340.

White, P. J., Ferguson, J. P., Smith, N. O., & Carre, H. O. (2022). School strikers enacting politics for climate justice: Daring to think differently about education. *Australian Journal of Environmental Education, 38*, 26-39.

Wibeck, V. (2014). Enhancing learning, communication and public engagement about climate change – Some lessons from recent literature. *Environmental Education Research*, *20* (3), 387-411, doi: 10.1080/13504622.2013.812720

Wilson, S. (2008). *Research is ceremony: Indigenous research methods*. Fernwood.

Winton, S. (2016). The normalization of school fundraising in Ontario: An argumentative discourse analysis. *Canadian Journal of Education Administration and Policy, 180,* 202-233.

Wood, B. E., Cornforth, S., Beals, F., Taylor, M. & Tallon, R. (2014). Sustainability champions? Academic identities and sustainability curricula in higher education. *International Journal of Sustainability in Higher Education, 17* (3), 342-360.

Yin, R. K. (2014). *Case study research: Design and method (5th ed.)*. Sage.

Appendix A

Recruitment Materials

Informational Letter about Observations, Focus Groups, and Interviews

Hello,

My name is Kristen Hargis, and I am a graduate student in the School of Environment and Sustainability at the University of Saskatchewan. I will be visiting [Name of the school] to conduct research as part of my PhD dissertation on climate change education. My study is called 'Practicing Change: A Study of Practice and Climate Action in a K-12 School' and explores climate action practices occurring at a K-12 school in Canada.

I am currently looking for participants to help me answer my research question, which is: How do climate action practices develop and change within the four domains of a whole institution approach: Overall Governance, Teaching and Learning, Community Partnerships, and Facilities and Operations.

If you are interested in participating, there are a couple of different ways you could become involved. As part of my research, I will be:

- **Observing classes, field trips, and school meetings that include a focus on climate change.**
    - Observations will last for the duration of the class, field trip, and/or meeting and would include between 1-3 classes/meetings, depending on availability.
- **Conducting interviews to learn more about climate change education as well as climate action practices at the school.**
    - Participants will pretend the researcher is going to switch places with them to plan and carry out a month focused on climate action at their school. They will be asked to tell the researcher everything she needs to know so that she is not un-masked. Participants can bring any pictures or objects they would like to the interview to help tell their story. They can also stand up or walk around the room/school if they feel as though parts of their story are better told through movement. The interview would last up to an hour.
- **Conducting focus groups with teachers and students to learn more about climate change education as well as climate action practices at the school.**
    - Looking for teachers interested in participating in a focus group discussion.
        - This discussion will involve mapping climate action practices occurring at the school and talking about how those actions affect what occurs within classes. The meeting would last about an hour after school.
    - Looking for teachers interested in allowing me to facilitate a focus group with students during their class time.
        - Students will discuss what climate change means to them. They will also talk about climate action practices currently occurring at their

school and future possibilities. Some of the activities will involve drawing. The meeting would last about an hour.

If you choose to participate, your comments are confidential. In the final report, no identifying information will be included. Your choice to participate will have no effect on your position (e.g., employment, standing as a teacher and employee, access to services) or how you will be treated. Your participation is voluntary. You can choose to answer only those questions with which you are comfortable or knowledgeable. You may withdraw from the research project for any reason at any time without explanation or penalty of any sort.

If you are interested in participating in any of the above listed research activities (i.e., classroom observations, interviews, and/or focus groups), please email me at: Kbh719@usask.ca

Kind Regards,
Kristen Hargis

Recruitment Flyer

School of Environment and Sustainability
University of Saskatchewan

PARTICIPANTS NEEDED FOR RESEARCH ABOUT CLIMATE CHANGE EDUCATION

Looking for volunteers to take part in a stud about climate chan e education and climate actions at [redacted]

HERE IS HOW YOU CAN GET INVOLVED!

- **Observations of classes, field trips, and meetings that include a focus on climate change.**
  - Observations will last for the duration of the class, field trip, and/or meeting and would include between 1-3 classes/meetings, depending on availability.
- **Interviews to learn more about climate actions at the school.**
  - Participants will pretend the researcher is going to switch places with them to plan and carry out a month focused on climate action at their school. They will be asked to tell the researcher everything she needs to know so that she is not un-masked. The interview will last up to an hour.
- **Focus groups with teachers and students to learn more about climate change education and climate actions at the school.**
  - Looking for teachers interested in participating in a focus group discussion.
    - This discussion will involve mapping climate actions occurring at the school and talking about how those actions affect what occurs within classes. The meeting would last about an hour after school.
  - Looking for teachers interested in allowing me to facilitate a focus group with students during their class time.
    - Students will discuss what climate change means to them. They will also talk about climate actions currently occurring at their school and future possibilities. The meeting would last about an hour.

For more information or to volunteer for this study, please contact:
Kristen Hargis, School of Environment and Sustainability at kbh719@usask.ca or 306-241-7933.

This study has been reviewed by, and received approval through, the Research Ethics Office, University of Saskatchewan.

UNIVERSITY OF SASKATCHEWAN | usask.ca

Parent Notices about Research

UNIVERSITY OF SASKATCHEWAN

28 Campus Drive Saskatoon, SK,
S7N 0X1, Canada
Kbh719@mail.usask.ca
306-241-7933

Dear [redacted] Parent,

My name is Kristen Hargis, and I am a Ph.D. student in the School of Environment and Sustainability at the University of Saskatchewan. I will be visiting [redacted] to conduct research as part of my PhD dissertation on climate change education. I am writing this letter to request your child's participation in my project, which is titled, "Practicing Change: A Study of Practice and Climate Action in a K-12 School." The purpose of this project is to describe practices at your child's school that address climate change as well as how those practices develop and change. This research will help to better understand how to support climate action practices at kindergarten to grade 12 schools. If you are interested in your child participating in this research, please review and sign the attached consent form. Should you have any questions or concerns pertaining to this research project, please contact me using my information above.

Kind Regards,
Kristen Hargis

UNIVERSITY OF SASKATCHEWAN

28 Campus Drive Saskatoon, SK,
S7N 0X1, Canada
Kbh719@mail.usask.ca
306-241-7933

Dear [redacted] Parent,

My name is Kristen Hargis, and I am a Ph.D. student in the School of Environment and Sustainability at the University of Saskatchewan. I will be visiting [redacted] to conduct research as part of my PhD dissertation on climate change education. I am writing this letter to request your child's participation in my project, which is titled, "Practicing Change: A Study of Practice and Climate Action in a K-12 School." The purpose of this project is to describe practices at your child's school that address climate change as well as how those practices develop and change. This research will help to better understand how to support climate action practices at kindergarten to grade 12 schools. If you are interested in your child participating in this research, please review and sign the attached consent form. Should you have any questions or concerns pertaining to this research project, please contact me using my information above.

Kind Regards,
Kristen Hargis

www.usask.ca Research Notice Letter to Parents

Appendix B

Informed Consent and Assent Forms

Informed Consent Form for Classroom Observations (Teachers)

Project Title: Practicing Change: A Study of Practice and Climate Action in a K-12 School

Researcher: Kristen Hargis, Graduate Student, School of Environment and Sustainability, University of Saskatchewan, (306) 241-7933, kbh719@mail.usask.ca

Supervisor: Dr. Marcia McKenzie, Department of Educational Foundations; Director, Sustainability Education Research Institute, University of Saskatchewan, 306-966-2319, marcia.mckenzie@usask.ca

Purpose(s) and Objective(s) of the Research:
This study seeks to:

- Describe climate action practices occurring at a K-12 school in Canada
- Understand how climate action practices develop and change within the four domains of a whole institution approach: Overall Governance, Teaching and Learning, Community Partnerships, and Facilities and Operations

Procedures:

- Classes that include a focus on climate action practices will be observed to understand current climate action practices within the domain of Teaching and Learning.
- The observation will last for the duration of the class.
- Between 1 to 3 classes per teacher would be observed.
- The student researcher will observe and take notes on climate action practices observed, practiced, and/or discussed. Students' reactions, comments, and engagement with the material will also be noted.

Funded by: Social Sciences and Humanities Research Council

Potential Risks:

- Information not related to the research question may be overheard.
- Risk(s) will be addressed by:
    - Only including information related to the research question in the researcher's field notes.

Potential Benefits:

- Contribution to an emerging field of research as few studies have examined whole institution approaches to climate action practices at K-12 schools.
- Interested participants will be provided with a summary of the final results

Confidentiality:

- Your comments are confidential
- In the final report, no identifying information will be included
- Storage of data:
    - The data will be stored on a password-protected computer. Any printed documents will be stored in a locked file cabinet
    - The data will be kept for up to five years and will be destroyed when no longer required
- Your choice to participate will have no effect on your position (e.g., employment, standing as a teacher and employee, access to services) or how you will be treated
- In order to ensure confidentiality, consent forms will be stored separately from data.

Right to Withdraw:

- Your participation is voluntary.
- You may withdraw from the research project for any reason at any time without explanation or penalty of any sort.
- Should you wish to withdraw, your data will be destroyed
- Your right to withdraw will apply up until the results have been disseminated. After this date, it may not be possible to withdraw your data. Results are expected to be disseminated by August 31, 2020.

Follow Up:

- To obtain results from this study, please indicate your interest in the observation or by email and these results will be emailed to you.

Questions or Concerns:

- If you have any questions, please contact the researcher, using the information at the top of page 1
- This research project has been approved on ethical grounds by the University of Saskatchewan Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office ethics.office@usask.ca, (306) 966-2975. Out of town participants may call toll free (888) 966-2975.
- [Name of the District] Administrative Council has granted permission for this research proposal to be conducted at your school
- The information collected through this research is done so under the authority of Board Policy BP 2401-D and the Municipal Freedom of Information and Protection of Privacy Act. Users of this information will be the Administrative Council
- Inquires pertaining to the collection of this information may be made to the Superintendent of Education responsible for research requests
- Participants will receive a copy of this consent form for their records.

Signed Consent:

Your signature below indicates that you have read and understand the description provided; I have had an opportunity to ask questions and my/our questions have been answered. I consent

to participate in the research project. A copy of this Consent Form has been given to me for my records.

_____	_____	_____
Name of Participant	*Participant's Signature*	*Date*

_____	_____
Researcher's Signature	*Date*

A copy of this consent will be left with you, and a copy will be taken by the researcher.

Informed Consent Form for Classroom Observations (Parents)

UNIVERSITY OF SASKATCHEWAN

Project Title: Practicing Change: A Study of Practice and Climate Action in a K-12 School

Researcher: Kristen Hargis, Graduate Student, School of Environment and Sustainability, University of Saskatchewan, (306) 241-7933, kbh719@mail.usask.ca

Supervisor: Dr. Marcia McKenzie, Department of Educational Foundations; Director, Sustainability Education Research Institute, University of Saskatchewan, 306-966-2319, marcia.mckenzie@usask.ca

Purpose(s) and Objective(s) of the Research:
This study seeks to:

- Describe climate action practices occurring at a K-12 school in Canada
- Understand how climate action practices develop and change within the four domains of a whole institution approach: Overall Governance, Teaching and Learning, Community Partnerships, and Facilities and Operations

Procedures:

- Classes that include a focus on climate action practices will be observed to understand current climate action practices within the domain of Teaching and Learning.
- The observation will last for the duration of the class.
- Between 1 to 3 classes per teacher would be observed.
- The student researcher will observe and take notes on climate action practices observed, practiced, and/or discussed. Students' reactions, comments, and engagement with the material will also be noted.

Funded by: Social Sciences and Humanities Research Council

Potential Risks:

- Information not related to the research question may be overheard.
- Risk(s) will be addressed by:
    - Only including information related to the research question in the researcher's field notes.

Potential Benefits:

- Contribution to an emerging field of research as few studies have examined whole institution approaches to climate action practices at K-12 schools.
- Interested participants will be provided with a summary of the final results

Confidentiality:

- All information collected will be kept in strict confidence and the students will not be identified individually

- In the final report, no identifying information will be included
- Storage of data:
    - The data will be stored on a password-protected computer. Any printed documents will be stored in a locked file cabinet
    - The data will be kept for up to five years and will be destroyed when no longer required
- Your choice for your child to participate will have no effect on your position (e.g., employment, access to services) or how you will be treated
- In order to ensure confidentiality, consent forms will be stored separately from data.

Right to Withdraw:

- Your child's participation is completely voluntary
- Your child may withdraw from the research project for any reason at any time without explanation or penalty of any sort.
- Should you or your child wish to withdraw, your child's data will be destroyed
- If you chose for your child to not participate in this research, data will not be collected on your child's comments or reactions during the classroom observation.
- Your child's right to withdraw will apply up until the results have been disseminated. After this date, it may not be possible to withdraw your child's data. Results are expected to be disseminated by August 31, 2020**.**

Follow Up:

- To obtain results from this study, please indicate your interest by email and these results will be emailed to you.

Questions or Concerns:

- If you have any questions, please contact the researcher, using the information at the top of page 1.
- This research project has been approved on ethical grounds by the University of Saskatchewan Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office ethics.office@usask.ca, (306) 966-2975. Out of town participants may call toll free (888) 966-2975.
- [Name of the District] Administrative Council has granted permission for this research proposal to be conducted at your child's school
- The information collected through this research is done so under the authority of Board Policy BP 2401-D and the Municipal Freedom of Information and Protection of Privacy Act. Users of this information will be the Administrative Council
- Inquires pertaining to the collection of this information may be made to the Superintendent of Education responsible for research requests
- Participants will receive a copy of this consent form for their records.

Signed Consent:

Your signature below indicates that you have read and understand the description provided; I have had an opportunity to ask questions and my/our questions have been answered. I consent

to participate in the research project. A copy of this Consent Form has been given to me for my records.

_____	_____	_____
Name of Participant	*Participant's Signature*	*Date*

_____	_____
Researcher's Signature	*Date*

A copy of this consent will be left with you, and a copy will be taken by the researcher.

Research Assent Form for Classroom Observations

UNIVERSITY OF SASKATCHEWAN

Your class is participating in a research project on climate change education in Canada. I am going to spend a few minutes telling you about our project, and then I am going to ask you if you are interested in taking part in the project. Your parents have been informed about your participation and they are also welcome to ask me any questions about this research.

What is a research study?
Research studies help us learn new things. We can test new ideas. First, we ask a question. Then we try to find the answer. This paper talks about my research and the choice that you have to take part in it. I want you to ask me any questions that you have. You can ask questions any time.

Important things to know…

- You get to decide if you want to take part.
- You can say 'No' or you can say 'Yes'.
- No one will be upset if you say 'No'.
- If you say 'Yes', you can always say 'No' later.
- You can say 'No' at anytime

Why am I doing this research?
I am doing this research to find out more about climate change education and climate change actions at your school.

What would happen if I join this research?
If you decide to be in this research, I would:

- Observe between 1-3 of the lessons that you attend at school about climate change.
- Take notes on climate action practices observed, practiced and/or discussed, as well as your reactions, comments, and engagement with the material.

Are there any risks if I join this research?

- During the classroom observation, I may hear some things that are not related to my research. If this happens, I will not write down this information.

Are there any benefits if I join this research?

- Research about climate change education can help make it better for you and for other students like you. This is an opportunity to help students in your school and in other schools have better climate change education.
- If you are interested, you can also see a summary of the results when the study is finished.

Do you have to be in this study?

- If you don't want to be in the study, you don't have to be.

- It is also OK to say yes and change your mind later. You can stop being in the research at any time. If you want to stop, please let the student researcher know and your data will be destroyed.
- If you choose not to participate, you may still see me in your classroom, but I will not take notes about your comments or reactions during the lesson.
- Your data can be deleted until I share the results. I expect to share these results by August 31, 2020.

What else should you know about this study?

- The researcher will not share anything you say or do during the observation with anyone else.
- When the final report is written, your name will not be included.
- The data collected will be kept in a safe place and will be deleted when no longer needed.
- Your choice to be in this study will not affect how you are treated or your position as a student in any way.
- To make sure your data is kept confidential, this form will be stored separately from the data collected.

Do you have any questions?

- You can ask questions any time. Take the time you need to make your choice.
- This research project has been approved on ethical grounds by the University of Saskatchewan Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office ethics.office@usask.ca, (306) 966-2975. Out of town participants may call toll free (888) 966-2975.

****

If you don't want to be in this study, don't sign this form.

If you want to be in this study, please write and sign your name below.
If you sign here, it means you agree to participate in this study.

Student's Name _____

Student's Signature _____

Printed Name of Researcher _____

Signature of Researcher _____

_____
Date

A copy of this consent will be left with you, and a copy will be taken by the researcher.

Informed Consent Form for Eco-Team/Climate Action Team Observations (School teachers and staff)

UNIVERSITY OF SASKATCHEWAN

Project Title: Practicing Change: A Study of Practice and Climate Action in a K-12 School

Researcher: Kristen Hargis, Graduate Student, School of Environment and Sustainability, University of Saskatchewan, (306) 241-7933, kbh719@mail.usask.ca

Supervisor: Dr. Marcia McKenzie, Department of Educational Foundations; Director, Sustainability Education Research Institute, University of Saskatchewan, 306-966-2319, marcia.mckenzie@usask.ca

Purpose(s) and Objective(s) of the Research:
This study seeks to:

- Describe climate action practices occurring at a K-12 school in Canada
- Understand how climate action practices develop and change within the four domains of a whole institution approach: Overall Governance, Teaching and Learning, Community Partnerships, and Facilities and Operations

Procedures:

- School meetings will be observed to understand current climate action practices within the domain of Overall Governance.
- The observation will last for the duration of the meeting.
- Between 1 to 3 meetings would be observed.
- The student researcher will observe and take notes on climate action practices observed, practiced, and/or discussed, as well as participants' reactions, comments, and engagement with the discussion.

Funded by: Social Sciences and Humanities Research Council

Potential Risks:

- Information not related to the research question may be overheard.
- Risk(s) will be addressed by:
    - Only including information related to the research question in the researcher's field notes.

Potential Benefits:

- Contribution to an emerging field of research as few studies have examined whole institution approaches to climate action practices at K-12 schools.
- Interested participants will be provided with a summary of the final results

Confidentiality:

- All information collected will be kept in strict confidence and the participants will not be identified individually
- In the final report, no identifying information will be included

- Storage of data:
    - The data will be stored on a password-protected computer. Any printed documents will be stored in a locked file cabinet
    - The data will be kept for up to five years and will be destroyed when no longer required
- Your choice to participate will have no effect on your position (e.g., employment, your standing as a teacher and employee, access to services) or how you will be treated
- In order to ensure confidentiality, consent forms will be stored separately from data.

Right to Withdraw:

- Your participation is completely voluntary
- You may withdraw from the research project for any reason at any time without explanation or penalty of any sort.
- Should you wish to withdraw, your data will be destroyed
- If you chose to not participate in this research, data will not be collected on your comments or reactions during the observation.
- Your right to withdraw will apply up until the results have been disseminated. After this date, it may not be possible to withdraw your data. Results are expected to be disseminated by August 31, 2020.

Follow Up:

- To obtain results from this study, please indicate your interest by email and these results will be emailed to you.

Questions or Concerns:

- If you have any questions, please contact the researcher, using the information at the top of page 1.
- This research project has been approved on ethical grounds by the University of Saskatchewan Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office ethics.office@usask.ca, (306) 966-2975. Out of town participants may call toll free (888) 966-2975.
- [Name of the District] Administrative Council has granted permission for this research proposal to be conducted at your school
- The information collected through this research is done so under the authority of Board Policy BP 2401-D and the Municipal Freedom of Information and Protection of Privacy Act. Users of this information will be the Administrative Council
- Inquires pertaining to the collection of this information may be made to the Superintendent of Education responsible for research requests
- Participants will receive a copy of this consent form for their records.

Signed Consent:

Your signature below indicates that you have read and understand the description provided; I have had an opportunity to ask questions and my/our questions have been answered. I consent to participate in the research project. A copy of this Consent Form has been given to me for my records.

_____	_____	_____
Name of Participant	*Participant's Signature*	*Date*

_____	_____
Researcher's Signature	*Date*

A copy of this consent will be left with you, and a copy will be taken by the researcher.

Informed Consent Form for Eco-Team/Climate Action Team Observations (Parents)

UNIVERSITY OF SASKATCHEWAN

Project Title: Practicing Change: A Study of Practice and Climate Action in a K-12 School

Researcher: Kristen Hargis, Graduate Student, School of Environment and Sustainability, University of Saskatchewan, (306) 241-7933, kbh719@mail.usask.ca

Supervisor: Dr. Marcia McKenzie, Department of Educational Foundations; Director, Sustainability Education Research Institute, University of Saskatchewan, 306-966-2319, marcia.mckenzie@usask.ca

Purpose(s) and Objective(s) of the Research:
This study seeks to:

- Describe climate action practices occurring at a K-12 school in Canada
- Understand how climate action practices develop and change within the four domains of a whole institution approach: Overall Governance, Teaching and Learning, Community Partnerships, and Facilities and Operations

Procedures:

- Eco-team meetings will be observed to understand current climate action practices within the domain of Overall Governance.
- The observation will last for the duration of the meeting.
- Between 1 to 3 meetings would be observed.
- The student researcher will observe and take notes on climate action practices observed, practiced, and/or discussed, as well as students' reactions, comments, and engagement with the discussion.

Funded by: Social Sciences and Humanities Research Council

Potential Risks:

- Information not related to the research question may be overheard.
- Risk(s) will be addressed by:
    - Only including information related to the research question in the researcher's field notes.

Potential Benefits:

- Contribution to an emerging field of research as few studies have examined whole institution approaches to climate action practices at K-12 schools.
- Interested participants will be provided with a summary of the final results

Confidentiality:

- All information collected will be kept in strict confidence and the students will not be identified individually
- In the final report, no identifying information will be included

- Storage of data:
    - The data will be stored on a password-protected computer. Any printed documents will be stored in a locked file cabinet
    - The data will be kept for up to five years and will be destroyed when no longer required
- Your choice for your child to participate will have no effect on your position (e.g., employment, access to services) or how you will be treated
- In order to ensure confidentiality, consent forms will be stored separately from data.

Right to Withdraw:

- Your child's participation is completely voluntary
- Your child may withdraw from the research project for any reason at any time without explanation or penalty of any sort.
- Should you or your child wish to withdraw, your child's data will be destroyed
- If you chose for your child to not participate in this research, data will not be collected on your child's comments or reactions during the classroom observation.
- Your child's right to withdraw will apply up until the results have been disseminated. After this date, it may not be possible to withdraw your child's data. Results are expected to be disseminated by August 31, 2020.

Follow Up:

- To obtain results from this study, please indicate your interest by email and these results will be emailed to you.

Questions or Concerns:

- If you have any questions, please contact the researcher, using the information at the top of page 1.
- This research project has been approved on ethical grounds by the University of Saskatchewan Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office ethics.office@usask.ca, (306) 966-2975. Out of town participants may call toll free (888) 966-2975.
- [Name of the District] Administrative Council has granted permission for this research proposal to be conducted at your child's school
- The information collected through this research is done so under the authority of Board Policy BP 2401-D and the Municipal Freedom of Information and Protection of Privacy Act. Users of this information will be the Administrative Council
- Inquires pertaining to the collection of this information may be made to the Superintendent of Education responsible for research requests
- Participants will receive a copy of this consent form for their records.

Signed Consent:

Your signature below indicates that you have read and understand the description provided; I have had an opportunity to ask questions and my/our questions have been answered. I consent to participate in the research project. A copy of this Consent Form has been given to me for my records.

_____	_____	_____
Name of Participant	*Participant's Signature*	*Date*

_____	_____
Researcher's Signature	*Date*

A copy of this consent will be left with you, and a copy will be taken by the researcher.

Research Assent Form for Eco-Team/Climate Action Team Observation

UNIVERSITY OF SASKATCHEWAN

Your class is participating in a research project on climate change education in Canada. I am going to spend a few minutes telling you about our project, and then I am going to ask you if you are interested in taking part in the project. Your parents have been informed about your participation and they are also welcome to ask me any questions about this research.

What is a research study?
Research studies help us learn new things. We can test new ideas. First, we ask a question. Then we try to find the answer. This paper talks about my research and the choice that you have to take part in it. I want you to ask me any questions that you have. You can ask questions any time.

Important things to know…

- You get to decide if you want to take part.
- You can say 'No' or you can say 'Yes'.
- No one will be upset if you say 'No'.
- If you say 'Yes', you can always say 'No' later.
- You can say 'No' at anytime

Why am I doing this research?
I am doing this research to find out more about climate change education and climate change actions at your school.

What would happen if I join this research?
If you decide to be in this research, I would:

- Observe between 1-3 of the school meetings that you attend at school about climate change.
- Take notes on climate action practices observed, practiced, and/or discussed, as well as your reactions, comments, and engagement with the discussion.

Are there any risks if I join this research?

- During the observation, I may hear some things that are not related to my research. If this happens, I will not write down this information.

Are there any benefits if I join this research?

- Research about climate change education can help make it better for you and for other students like you. This is an opportunity to help students in your school and in other schools have better climate change education.
- If you are interested, you can also see a summary of the results when the study is finished.

Do you have to be in this study?

- If you don't want to be in the study, you don't have to be.
- It is also OK to say yes and change your mind later. You can stop being in the research at any time. If you want to stop, please let the student researcher know and your data will be destroyed.
- If you choose not to participate, you may still see me in your meeting, but I will not take notes about your comments or reactions during the meeting.
- Your data can be deleted until I share the results. I expect to share these results by August 31, 2020.

What else should you know about this study?

- The researcher will not share anything you say or do during the observation with anyone else.
- When the final report is written, your name will not be included.
- The data collected will be kept in a safe place and will be deleted when no longer needed.
- Your choice to be in this study will not affect how you are treated or your position as a student in any way.
- To make sure your data is kept confidential, this form will be stored separately from the data collected.

Do you have any questions?

- You can ask questions any time. Take the time you need to make your choice.
- This research project has been approved on ethical grounds by the University of Saskatchewan Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office ethics.office@usask.ca, (306) 966-2975. Out of town participants may call toll free (888) 966-2975.

****

If you don't want to be in this study, don't sign this form.

If you want to be in this study, please sign your name below.
If you sign here, it means you agree to participate in this study.

Student's Name _____

Student's Signature _____

Printed Name of Researcher _____

Signature of Researcher _____

_____
Date

A copy of this consent will be left with you, and a copy will be taken by the researcher.

Informed Consent Form for Interviews

UNIVERSITY OF SASKATCHEWAN

Project Title: Practicing Change: A Study of Practice and Climate Action in a K-12 School

Researcher: Kristen Hargis, Graduate Student, School of Environment and Sustainability, University of Saskatchewan, (306) 241-7933, kbh719@mail.usask.ca

Supervisor: Dr. Marcia McKenzie, Department of Educational Foundations; Director, Sustainability Education Research Institute, University of Saskatchewan, 306-966-2319, marcia.mckenzie@usask.ca

Purpose(s) and Objective(s) of the Research:
This study seeks to:

- Describe climate action practices occurring at a K-12 school in Canada
- Understand how climate action practices develop and change within the four domains of a whole institution approach: Overall Governance, Teaching and Learning, Community Partnerships, and Facilities and Operations

Procedures:

- Interview participants will first complete a demographic survey, which will also include questions related to climate change and climate action practices at their school.
- Participants will be asked to pretend the researcher is going to switch places with them to plan and carry out a month focused on climate action at their school. They will be asked to tell the researcher everything she needs to know so that she is not un-masked.
- Participants can bring any pictures or objects they would like to the interview to help tell their story. Participants can stand up or walk around the room/school if they feel as though parts of their story are better told through movement.
- This interview will be recorded to ensure accuracy of interpretation. The student researcher will transcribe the interviews. Participants will have the opportunity to review and revise the transcript of their interview. As soon as the interview is transcribed, the student researcher will send participants their interview transcript via email for feedback.
- Participants can ask for the recording device to be turned off at any time without giving a reason.
- The interview will last up to an hour.

Funded by: Social Sciences and Humanities Research Council

Potential Risks:

- Participants may feel sad or angry when talking about actions to address climate change.
- The recording may pick up people talking who are not part of the interview

- Risk(s) will be addressed by:
    - Informing participants that they can choose to not answer any questions and that the interview can be stopped at any time.
    - Only data provided by the participant will be transcribed and analyzed.

Potential Benefits:

- Contribution to an emerging field of research as few studies have examined whole institution approaches to climate action practices at K-12 schools.
- Talking about climate actions may lead to sense of empowerment to address climate change.
- Interested participants will be provided with a summary of the final results

Confidentiality:

- Your interviews are confidential
- In the final report, no identifying information will be included
- Storage of data:
    - The data will be stored on a password-protected computer. Any printed documents will be stored in a locked file cabinet
    - The data will be kept for up to five years and will be destroyed when no longer required
- Your choice to participate will have no effect on your position (e.g., employment, standing as a teacher and employee, access to services) or how you will be treated
- In order to ensure confidentiality, consent forms will be stored separately from data.

Right to Withdraw:

- Your participation is voluntary. You can choose to answer only those questions with which you are comfortable or knowledgeable.
- You may withdraw from the research project for any reason at any time without explanation or penalty of any sort.
- Should you wish to withdraw, your data will be destroyed
- Your right to withdraw will apply up until the results have been disseminated. After this date, it may not be possible to withdraw your data. Results are expected to be disseminated by August 31, 2020.

Follow Up:

- To obtain results from this study, please indicate your interest in the interview or by email and these results will be emailed to you.

Questions or Concerns:

- If you have any questions, please contact the researcher, using the information at the top of page 1
- This research project has been approved on ethical grounds by the University of Saskatchewan Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office

ethics.office@usask.ca, (306) 966-2975. Out of town participants may call toll free (888) 966-2975.

- [Name of the District] Administrative Council has granted permission for this research proposal to be conducted at your school
- The information collected through this research is done so under the authority of Board Policy BP 2401-D and the Municipal Freedom of Information and Protection of Privacy Act. Users of this information will be the Administrative Council
- Inquires pertaining to the collection of this information may be made to the Superintendent of Education responsible for research requests
- Participants will receive a copy of this consent form for their records.

Signed Consent:

Your signature below indicates that you have read and understand the description provided; I have had an opportunity to ask questions and my/our questions have been answered. I consent to participate in the research project. A copy of this Consent Form has been given to me for my records.

_____	_____	_____
Name of Participant	*Participant's Signature*	*Date*

_____	_____
Researcher's Signature	*Date*

A copy of this consent will be left with you, and a copy will be taken by the researcher.

Informed Consent Form for Focus Groups (Teachers)

UNIVERSITY OF SASKATCHEWAN

Project Title: Practicing Change: A Study of Practice and Climate Action in a K-12 School

Researcher: Kristen Hargis, Graduate Student, School of Environment and Sustainability, University of Saskatchewan, (306) 241-7933, kbh719@mail.usask.ca

Supervisor: Dr. Marcia McKenzie, Department of Educational Foundations; Director, Sustainability Education Research Institute, University of Saskatchewan, 306-966-2319, marcia.mckenzie@usask.ca

Purpose(s) and Objective(s) of the Research:
This study seeks to:

- Describe climate action practices occurring at a K-12 school in Canada
- Understand how climate action practices develop and change within the four domains of a whole institution approach: Overall Governance, Teaching and Learning, Community Partnerships, and Facilities and Operations

Procedures:

- Participants will first complete a demographic survey, which will also include questions related to climate change and climate action practices at their school.
- Participants will establish a working definition of climate action practices with the other group members and create a map of where climate action practices are occurring at the school, including relevant dates and emotions associated with those actions.
- The discussion will try better understand the climate action practices mapped as well as how the mapped climate action practices are associated with what occurs within their classes.
- This focus groups will be recorded to ensure accuracy of interpretation
- The focus groups will last up to an hour and will take place at the school after school hours.

Funded by: Social Sciences and Humanities Research Council

Potential Risks:

- Participants may feel sad or angry when talking about actions to address climate change.
- Risk(s) will be addressed by:
    - Informing participants that they can choose to not answer any questions and that the interview can be stopped at any time.

Potential Benefits:

- Contribution to an emerging field of research as few studies have examined whole institution approaches to climate action practices at K-12 schools.
- The chance to talk with colleagues about climate action practices may lead to sense of empowerment to address climate change.
- Interested participants will be provided with a summary of the final results

Confidentiality:

- The researcher will undertake to safeguard the confidentiality of the discussion but cannot guarantee that other members of the group will do so. Please respect the confidentiality of the other members of the group by not disclosing the contents of this discussion outside the group and be aware that others may not respect your confidentiality.
- In the final report, no identifying information will be included
- Storage of data:
    - The data will be stored on a password-protected computer. Any printed documents will be stored in a locked file cabinet
    - The data will be kept for up to five years and will be destroyed when no longer required
- Your choice to participate will have no effect on your position (e.g., employment, standing as a teacher and employee, access to services) or how you will be treated
- In order to ensure confidentiality, consent forms will be stored separately from data.

Right to Withdraw:

- Your participation is voluntary, and you can participate in only those discussions that you are comfortable with or knowledgeable about. You may withdraw from the research project for any reason, without explanation or penalty of any sort. Should you wish to withdraw, you may leave the focus group meeting at any time; however, data that have already been collected cannot be withdrawn as it forms part of the context for information provided by other participants.

Follow Up:

- To obtain results from this study, please indicate your interest in the interview or by email and these results will be emailed to you.

Questions or Concerns:

- If you have any questions, please contact the researcher, using the information at the top of page 1
- This research project has been approved on ethical grounds by the University of Saskatchewan Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office ethics.office@usask.ca, (306) 966-2975. Out of town participants may call toll free (888) 966-2975.
- [Name of the District] Administrative Council has granted permission for this research proposal to be conducted at your school
- The information collected through this research is done so under the authority of Board Policy BP 2401-D and the Municipal Freedom of Information and Protection of Privacy Act. Users of this information will be the Administrative Council
- Inquires pertaining to the collection of this information may be made to the Superintendent of Education responsible for research requests
- Participants will receive a copy of this consent form for their records.

Signed Consent:

Your signature below indicates that you have read and understand the description provided; I have had an opportunity to ask questions and my/our questions have been answered. I consent

to participate in the research project. A copy of this Consent Form has been given to me for my records.

_____	_____	_____
Name of Participant	*Participant's Signature*	*Date*

_____	_____
Researcher's Signature	*Date*

A copy of this consent will be left with you, and a copy will be taken by the researcher.

Informed Consent Form for Focus Groups (Parents)

UNIVERSITY OF SASKATCHEWAN

Project Title: Practicing Change: A Study of Practice and Climate Action in a K-12 School

Researcher: Kristen Hargis, Graduate Student, School of Environment and Sustainability, University of Saskatchewan, (306) 241-7933, kbh719@mail.usask.ca

Supervisor: Dr. Marcia McKenzie, Department of Educational Foundations; Director, Sustainability Education Research Institute, University of Saskatchewan, 306-966-2319, marcia.mckenzie@usask.ca

Purpose(s) and Objective(s) of the Research:
This study seeks to:

- Describe climate action practices occurring at a K-12 school in Canada
- Understand how climate action practices develop and change within the four domains of a whole institution approach: Overall Governance, Teaching and Learning, Community Partnerships, and Facilities and Operations

Procedures:

- Participants will first complete a demographic survey, which will also include questions related to what climate change means to them and climate action practices occurring at their school.
- Participants will be divided into two groups. One group will draw a picture or write a description about current climate action practices occurring at their school. The other group will draw a picture or write a description of climate action practices their school could be doing.
- The researcher will then ask both groups to explain their pictures and/or descriptions.
- The focus group will be recorded to ensure accuracy of interpretation
- The focus groups will last for about an hour and will take place at the school during their regularly scheduled class time.

Funded by: Social Sciences and Humanities Research Council

Potential Risks:

- Participants may feel sad or angry when talking about actions to address climate change.
- Risk(s) will be addressed by:
    - Informing participants that they can choose to not answer any questions and that the interview can be stopped at any time.

Potential Benefits:

- Contribution to an emerging field of research as few studies have examined whole institution approaches to climate action practices at K-12 schools.

- The chance to talk with friends about climate actions may lead to sense of empowerment to address climate change.
- Interested participants will be provided with a summary of the final results

Confidentiality:

- The researcher will undertake to safeguard the confidentiality of the discussion but cannot guarantee that other members of the group will do so. Participants will be asked to respect the confidentiality of the other members of the group by not disclosing the contents of this discussion outside the group and to be aware that others may not respect their confidentiality.
- All information collected will be kept in strict confidence and the students will not be identified individually
- In the final report, no identifying information will be included
- Storage of data:
    - The data will be stored on a password-protected computer. Any printed documents will be stored in a locked file cabinet
    - The data will be kept for up to five years and will be destroyed when no longer required
- Your choice for your child to participate will have no effect on your position (e.g., employment, access to services) or how you will be treated
- In order to ensure confidentiality, consent forms will be stored separately from data.

Right to Withdraw:

- Your child's participation is completely voluntary, and they can participate in only those discussions that they are comfortable with or knowledgeable about. They may withdraw from the research project for any reason, without explanation or penalty of any sort. Should they wish to withdraw, they may leave the focus group meeting at any time; however, data that have already been collected cannot be withdrawn as it forms part of the context for information provided by other participants.

Follow Up:

- To obtain results from this study, please have your child indicate their interest at the focus group or inform the student researcher by email and these results will be emailed to you.

Questions or Concerns:

- If you have any questions, please contact the researcher, using the information at the top of page 1
- This research project has been approved on ethical grounds by the University of Saskatchewan Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office ethics.office@usask.ca, (306) 966-2975. Out of town participants may call toll free (888) 966-2975.
- [Name of the District] Boards Administrative Council has granted permission for this research proposal to be conducted at your child's school

- The information collected through this research is done so under the authority of Board Policy BP 2401-D and the Municipal Freedom of Information and Protection of Privacy Act. Users of this information will be the Administrative Council
- Inquires pertaining to the collection of this information may be made to the Superintendent of Education responsible for research requests
- Participants will receive a copy of this consent form for their records.

Signed Consent:

Your signature below indicates that you have read and understand the description provided; I have had an opportunity to ask questions and my/our questions have been answered. I consent to participate in the research project. A copy of this Consent Form has been given to me for my records.

_____	_____	_____
Name of Participant	*Participant's Signature*	*Date*

_____	_____
Researcher's Signature	*Date*

A copy of this consent will be left with you, and a copy will be taken by the researcher.

Research Assent Form for Focus Groups

UNIVERSITY OF SASKATCHEWAN

Your class is participating in a research project on climate change education in Canada. I am going to spend a few minutes telling you about our project, and then I am going to ask you if you are interested in taking part in the project. Your parents have been informed about your participation and they are also welcome to ask me any questions about this research.

What is a research study?
Research studies help us learn new things. We can test new ideas. First, we ask a question. Then we try to find the answer. This paper talks about my research and the choice that you have to take part in it. I want you to ask me any questions that you have. You can ask questions any time.

Important things to know…

- You get to decide if you want to take part.
- You can say 'No' or you can say 'Yes'.
- No one will be upset if you say 'No'.
- If you say 'Yes', you can always say 'No' later.
- You can say 'No' at anytime

Why am I doing this research?
I am doing this research to find out more about climate change education and climate change actions at your school.

What would happen if I join this research?
If you decide to take part in this study there are some different things I will ask you to do.

- First, I will ask what climate change means to you.
- Second, I will ask you about climate actions at your school.
- Third, I will ask you about what your school could do to take climate actions. Some of the activities today will involve drawing.
- This discussion would be audio recorded so that I can remember what we talk about.
- While doing these things all you have to do is try your best. If you have tried your best and do not know what to say or do next, you can guess or say 'I do not know'.
- It will take about 60 minutes to do these things as a group.

Are there any risks if I join this research?

- When talking about climate change, you may feel sad or angry. You can choose not to answer any of the questions asked.

Are there any benefits if I join this research?

- Research about climate change education can help make it better for you and for other students like you. This is an opportunity to help students in your school and in other schools have better climate change education.

- Talking about climate change actions with your friends may make you more hopeful about addressing climate change.
- If you are interested, you can also see a summary of the results when the study is finished.

Do you have to be in this study?

- If you don't want to be in the study, you don't have to be.
- It is also OK to say yes and change your mind later.
- You can participate in only those discussions that you are comfortable with. You can leave the discussion for any reason, without explanation or penalty of any sort. Should you wish to leave, you may do so at any time; however, data that have already been collected cannot be withdrawn as it forms part of the context for information provided by other students.

What else should you know about this study?

- The researcher will not share the information that you discuss in the group with others but cannot guarantee that other members of the group will do so. Participants will be asked to respect the confidentiality of the other members of the group by not sharing what was discussed outside the group and to be aware that others may not respect their confidentiality.
- When the final report is written, your name will not be included.
- The data collected will be kept in a safe place and will be deleted when no longer needed.
- Your choice to be in this study will not affect how you are treated or your position as a student in any way.
- To make sure your data is kept confidential, this form will be stored separately from the data collected.

Do you have any questions?

- You can ask questions any time. Take the time you need to make your choice.
- This research project has been approved on ethical grounds by the University of Saskatchewan Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office ethics.office@usask.ca, (306) 966-2975. Out of town participants may call toll free (888) 966-2975.

****

If you don't want to be in this study, don't sign this form.

If you want to be in this study, please sign your name below.
If you sign here, it means you agree to participate in this study.

Student's Name _____

Student's Signature _____

Printed Name of Researcher _____

Signature of Researcher _____

_____*Date*

A copy of this consent will be left with you, and a copy will be taken by the researcher.

Appendix C

Data Collection Protocols

Classroom Observation Protocol

Teacher: M F	Direct Instr: L - - H	Date:	Time: to:
# Students:	Grade:	Subject:	Time of write up:
Synopsis of lesson, activities: Students' reactions, comments, and engagement with the material Researcher's sensory perceptions:		Climate action practices observed, practiced, and/or discussed: Materials used to engage in/talk about climate action practices (e.g., technology, books, other objects): Competences used to engage in/talk about climate action practices (e.g., type of knowledge or skill): Meanings used to engage in/talk about climate action practices (e.g., ideas, aspirations, emotions):	

Notes. This table is adapted from an observation protocol in Stake (1995). The abbreviation 'Instr' is for instruction. The scale L - - H indicates low to high.

Climate Action Team Meeting Observation Protocol

Date:	Time: to:	Participant type:
Time of write up:	# Participants:	
Synopsis of meeting: Students' reactions, comments, and engagement with the material Researcher's sensory perceptions:		Climate action practices observed, practiced, and/or discussed: Materials used to engage in/talk about climate action practices (e.g., technology, books, other objects): Competences used to engage in/talk about climate action practices (e.g., type of knowledge or skill): Meanings used to engage in/talk about climate action practices (e.g., ideas, aspirations, emotions):

Notes. This table is adapted from an observation protocol in Stake (1995).

Field Trip Observation Protocol

<table>
<tr><td>Teacher: M F</td><td>Direct Instr: L - - H</td><td>Date:</td><td>Time: to:</td></tr>
<tr><td># Students</td><td>Grade:</td><td rowspan="2">Organization:</td><td rowspan="2">Time of write up:</td></tr>
<tr><td colspan="2">Subject:</td></tr>
<tr><td colspan="2">Synopsis of lesson, activities:

Students' reactions, comments, and engagement with the material

Researcher's sensory perceptions:</td><td colspan="2">Climate action practices observed, practiced, and/or discussed:

Materials used to engage in/talk about climate action practices (e.g., technology, books, other objects):

Competences used to engage in/talk about climate action practices (e.g., type of knowledge or skill):

Meanings used to engage in/talk about climate action practices (e.g., ideas, aspirations, emotions):</td></tr>
</table>

Notes. This table is adapted from an observation protocol in Stake (1995). The abbreviation 'Instr' is for instruction. The scale L - - H indicates low to high.

Demographic Survey for Interviews and Focus Groups

Identifier: _____

1. What do the words 'climate change' and 'climate action' mean to you?

2. What types of materials, objects, tools, or technologies are used at your school to support climate action practices?

3. What types of understandings, skills, or background knowledge is used at your school to support climate action practices?

4. How important is it to take climate action at your school?

❑ Not Important at all ❑ Somewhat Important ❑ Moderately Important ❑ Very Important ❑ I don't Know

5. How important is it to you to take climate action?

❑ Not Important at all ❑ Somewhat Important ❑ Moderately Important ❑ Very Important ❑ I don't Know

6. What is your age?

❑ 7-14 ❑ 15-19 ❑ 20-24 ❑ 25-29 ❑ 30-34 ❑ 35-39 ❑ 40-44 ❑ 45-49
❑ 50-54 ❑ 55-59 ❑ 60-64 ❑ 65-69 ❑ 70-74 ❑ 75-79 ❑ 80-84 ❑ 85+

7. What is your gender identity?

❑ Female ❑ Male ❑ Another gender identity

8. Do you identify as (*Check all that apply):*

❑ Indigenous
❑ Canadian
❑ Decline to answer
❑ Newcomer to Canada (in the last 10 years)
❑ Other (*Please specify):* _____

Interview to the Double Protocol

Researcher Note:

- Give consent form to participants as they come in. Review the consent form with them and ask if they have any questions.
- Collect the consent form.
- Ask participants to complete the demographic survey.
- Let participants know when you turn on the recorder.

Before beginning, I would like to acknowledge the traditional First Nations and Metis territories on which we are meeting.

I am a Ph.D. student researcher from the University of Saskatchewan, studying climate change education at K-12 schools in Canada. The purpose of my research is to understand how climate action practices develop and change at your school within the four areas of: Overall Governance, Teaching and Learning, Community Partnerships, and Facilities and Operations. Today I want to learn more about your experiences planning and carrying out a climate change education month.

In this interview, I would like you to pretend that tomorrow I will come to [Name of the school] as your double to plan and carry out a climate change month. I need you to tell me everything I need to know so that I am not unmasked. For example, what materials will I need, what will I need to know, do, see, feel, and hear?

If you have brought pictures or other objects to help tell your story, then please feel free to use them. Also we do not have to remain seated in this room while you tell your story. If you would like to walk somewhere else in the school, then we can do that.

Please provide your instructions in the second person. For example, "Tomorrow, you'll go to school for a meeting to beginning planning a climate action month. You are excited about the meeting because students will be able to learn a lot but you are also nervous because it will mean extra work for you and the other teachers. At the meeting, you first need to decide what month it will be…"

Do you have any questions before we begin?

Researcher Note: Try to give as few prompts as possible and allow the interviewee to tell their story.

<u>Clarification prompts to use, if needed:</u>

- How would I do that?
- What do you mean?

- When?
- Who would I need to talk to?
- What materials will I need to do that?
- What will I need to know to do that?
- What will it feel like?
- What will I hear?
- What will I see?
- What are the main roles or tasks that I will need to carry out?

Next, I will ask some additional follow-up questions to get some more information about how to plan for and carry out a climate action month. The first questions are related to materials needed to plan for and carry out a climate action month.

For all participants:

Materials:

- **What types of materials (e.g., objects, tools, technologies) will I need to plan for and carry out a climate action month?**
    - How will I use those materials?
    - Are any of the needed materials linked to particular skills, understandings, or background knowledge about climate action at the school? (e.g., how to compost)
    - Are any of the needed materials linked to particular meanings around what climate action is at the school (e.g., recycling bins)?
    - Are any of the needed materials new?
        - If so, how will I obtain the needed materials?
    - Are there materials that would have been helpful during the climate action month that are no longer available at the school?
        - What materials would have been helpful?
        - Do you know why are they no longer available?

Next I will ask some questions about the type of skills, understanding, or background knowledge needed to plan for and carry out a climate action month.

Skills, understanding, or background knowledge:

- **What types of skills, understanding, or background knowledge do I need to have to plan for and carry out a climate action month?**
    - How will I use those skills, understandings, or background knowledge?
    - Are those skills, understandings, or background knowledge linked to particular meanings about climate action at the school? (e.g., scientific knowledge)
    - Are those skills, understandings, or background knowledge linked to particular materials used for climate action at the school? (e.g., textbooks)
    - Are any of the needed skills, understandings, or background knowledge new?
        - If so, how will I obtain the needed skills, understandings, or background knowledge?

    - Are there skills, understandings, or background knowledge that would have been helpful during the climate action month that is no longer available at the school (e.g., Indigenous knowledge)?
        - What skills, understanding, or background knowledge would have been helpful?
        - Why are they no longer available?

Next I will ask some questions about what climate action means at the school and how those meanings will affect how I plan for and carry out a climate action month.

Meanings:

- **What does it mean to take climate action at the school?**
    - Are those meanings linked to a particular type of knowledge?
    - Are those meanings linked to particular materials at the school?
    - How will those meanings affect my planning and implementation of the climate action month?
- **Are there any meanings around what climate action is that would have been helpful during the climate action month that are no longer present at the school? (e.g., climate action means writing letters to government officials, Indigenous perspectives)**
    - What meanings would have been helpful?
    - Why are they no longer present?
- **What types of emotions should I display so that I'm not un-masked while planning and carrying out the climate action month?**
    - How will I display those emotions?
- **What types of emotions should I expect to see from others while planning and carrying out a climate action month?**
    - ***For teachers*** How should I respond if a student looks angry or scared about climate change?

Next I will ask some questions about the types of conversations I should expect to have when I plan and carry out a climate action month.

Conversations

- **What types of conversations or coordination should I plan for with individuals at the school working in different areas? (e.g., School Governance, Facilities and Operations, Teaching and Learning, and Community Partnerships)?**
- **What types of negotiations or conflicts might I encounter?**
    - How will I overcome them?

The next questions are related to how the idea for the climate action month emerged and possible relationships to previous practices over time.

Time:

- **How did the idea for the climate action month emerge?**

- **What practices during the climate action month are new? Why are we taking this new approach?**
- **Are there any past practices at the school that I should know about that will affect my planning and implementation of the climate action month?**
    - If so, how will they influence the climate action month?
- How was climate action addressed at the school in the past? Why are we taking this new approach?

Next, I'll move into some concluding questions.

Conclusion:

- **What barriers should I expect when planning and implementing a climate action month (e.g., competing practices)?**
    - How should I overcome them?
- **What supports for the climate action month are in place that I can draw on (e.g., related practices)?**
    - How will I use these supports?
- **What do I think an effective climate action month would look like (e.g., student or community learning, reduce GHG emissions, etc.)?**
    - How will I know if the climate action month is successful?
    - ***For teachers***: How will I know students understand what I've taught?
    - ***For all participants:*** What am I hoping the school community will learn from the climate action month?
- **Do I want the climate action month to happen again in the future?**
    - If so, what changes would I want to make?
    - If not, why not?
- **Is there anything else I should know?**
- ***For teachers:*** Do you have any course materials about climate action or climate change that you would be willing to share?

That concludes the interview. As part of my research, I will be creating a transcript of our conversation. If you are interested, I can send you a copy to make sure that I accurately represented our conversation. If you are interested in either checking this transcript or receiving the results of this study, please write your name and email address on this piece of paper before leaving and put a check next to what you would like me to contact you about (i.e., summary and/or results).

Thank you for participating in this project!

Focus Group Protocol for Teachers

Researcher Note:
- Give consent form to participants as they come in. Review the consent form with them and ask if they have any questions.
- Collect the consent form.
- Ask participants to write their name on a tent name card.
- Ask participants to complete the demographic survey.
- Let them know when you turn on the recorder.

Before beginning, I would like to acknowledge the traditional First Nations and Metis territories on which we are meeting.

I am a Ph.D. student researcher from the University of Saskatchewan, studying climate change education at K-12 schools in Canada. The purpose of my research is to understand how climate action practices develop and change at your school within the four areas of: Overall Governance, Teaching and Learning, Community Partnerships, and Facilities and Operations. Today I want to learn more about climate action practices at your school, including how they may affect what occurs within your classes.

Will start by coming up with a working definition of what we mean by climate action practices before creating a map of where climate action practices are occurring at your school. We will create the map over three rounds. At the end, I will also ask some follow-up questions.

Before we get started, does anyone have any questions?

Opening question:
- Please tell us your name and what subject you teach.

Introductory questions:

Before beginning the mapping activity, we'll create a working definition of what taking climate action means at [Name of the school] across the different areas of Overall Governance, Teaching and Learning, Community Partnerships, and Facilities and Operations. I've prepared an initial definition to start the conversation.

Researcher Note:
- Go over whole institution definition of climate action practices written on chart paper:

***Overall Governance*:** Leadership and overall focus on climate action (e.g., policies)
Teaching and Learning: Climate action in courses (e.g., assignments, activities)
***Community Partnerships*:** Broader community engagement on climate action (e.g., field trips)
Facilities and Operations: Climate actions related to physical buildings (e.g., water bottle fountains)

Is there anything that you would change or add to make this definition a better fit for climate action practices occurring at your school?

Researcher Note:
- Write changes and additions on the chart paper.

Map-making session: Round 1

We will now begin mapping where climate action practices are occurring at [Name of the school].

Researcher Note:
- Provide participants with a rough map of the school.

Working together, please label where climate action practices are occurring at the school. You can include actions occurring outside of the school as well, adding community buildings or features as needed (e.g., if a class goes outside to learn about climate change).

Make sure to include climate action practices occurring within all four areas of Overall Governance, Teaching and Learning, Community Partnerships, and Facilities and Operations.

Researcher Note:
- You may need to facilitate participants refining their definition of climate actions as they map.
- If participants think of many actions, prompt them to label major actions within each area.

Map-making session: Round 2

Next, can you add approximate dates for when the climate action practices labeled began?

Map-making session: Round 3

Next, can you add emotion stickers next to the climate action practices labeled to indicate the different types of emotions that were associated with planning or carrying out that practice. This can be emotions felt by yourself or displayed by anyone at your school (e.g., students, other teachers, staff, administrators, parents, community members, etc.). Multiple emotion stickers can be placed next to the same climate action practice.

Researcher Note:
- Handout emotion stickers to participants.

- You have few actions mapped in the [**insert whole institution area**], what do you think are the reasons are for that?
- You have many actions mapped in the [**insert whole institution area**], what do you think are the reasons are for that?
- Over time, have some climate action practices been easier/harder to implement than others? What do you think are the reasons for that?
- How have the emotions associated with the climate action practices labeled affected their implementation?
- Have any of these climate action practices been part of negotiations and/or conflicts that had to be overcome?
- What skills, understanding, or background knowledge was needed to implement these climate action practices?
- What types of objects, tools, or technologies were needed for these actions?

The last few questions relate to how these climate action practices affect what occurs within your classes.

Concluding questions

- How are these climate action practices connected (or not) to what occurs within your classes?
    - Did any of them start because of classroom conversations? If so, how was this negotiated?
- Do you feel that climate action practices at your school within the areas of Overall Governance, Community Partnerships, and Facilities and Operations affect how or what you teach about climate change? How so?
- What meanings, ideas, or emotions do you think are important for students to associate with climate action practices?
    - How do you try to encourage this within your classes?
- What do you think influences how you teach about climate action practices the most? (e.g., curriculum, discussions with other teachers, available materials, interactions in the classroom, other classes)
- How do you know that students have understood what you have taught about climate action practices?
- How did you decide to teach about climate action within your classes?

Researcher Note: Give a 2-3 minute summary of the major ideas discussed.

Ending questions:

- Is this an adequate summary?
- Of all the things we talked about today, what do you think is the most important?

As part of my research, I will be creating a summary of our conversation. If you are interested, I can send you a copy to make sure that I accurately represented our conversation.

If you are interested in either checking this summary or receiving the results of this study, please write your name and email address on this piece of paper before leaving and put a check next to what you would like me to contact you about (i.e., summary and/or results).

Thank you for participating in this project!

Focus Group Protocol for Students

Researcher Note:

1. Students in Grades 1-12 encompass a broad range of developmental capabilities. The language in this guide can be modified according to the age of participants. In the drawing portion below, the researcher may want to explain to upper grades (6-12) that drawing is a way of understanding the world around us, that provides different information than words alone (explanation helps articulate that drawing is not necessarily a "childish" activity).
2. Before the session starts, organize the room as needed – e.g., space for two circles.
3. Give out Child Assent and Demographic forms and blank paper to students as they arrive or before starting. All should have file naming code on right corner and group number on left corner
4. Before starting, ask instructor not to participate in discussion if that is okay with them. If they prefer to, ask them to identify themselves as the instructor each time they speak
5. Students that didn't return a signed parental consent form will be given an alternative activity.

Before beginning, I would like to acknowledge the traditional First Nations and Metis territories on which we are meeting.

I am a Ph.D. student researcher from the University of Saskatchewan, studying climate change education at K-12 schools in Canada. The purpose of my research is to understand how climate action practices develop and change at your school. Today I want to learn more about climate action practices at your school.

I have handed out a Child Assent form to sign if you are okay with talking with me today as part of this study. Can you please read this now and print your name at the bottom when you are finished. If you don't want to sign, that is fine – please let me know or your teacher know.

Before we get started, does anyone have any questions?

In the left corner of your child assent form, I've put a number. I'd now like the people with '1's' to move to this side of the room, and those with '2's' to move to this side of the room. Please move now and take your pencil or pen with you.

Researcher Note:

- Place recorders in the middle of each group and turn on.

Demographics Form

The second page of your handout is a demographics form with questions about what climate change is and about who you are. I will go through these questions with you now as a group.

For question 1a, I am asking you about how you understand the words "climate change" and "climate action" What kinds of words come to your mind when you hear "climate change" and "climate action"? You can also write "don't know" or "not sure."

Does anyone have any questions?

[**After students have the chance to write down answers, ask for volunteers to share their answers**.]

Next, for question 2, I am asking you about the types of objects, tools, or technologies used at your school to support climate action practices. Examples could include: recycling bins, computers, gardens, water fountains.

[**After students have the chance to write down answers, ask for volunteers to share their answers**.]

For question 3, I am asking you about the types of understandings, skills, or background knowledge used at your school to support climate action practices? Examples could include: how to write a letter to a government official, how to plant trees, how to recycle.

[**After students have the chance to write down answers, ask for volunteers to share their answers**.]

Researcher Note:

- Depending on time available, ask for student volunteers to share back answers, then continue on to Demographic questions.
- The Demographic questions may have to be explained. As such, regularly check for student understanding as you progress through the following questions.

Drawing and Discussion Activity

Researcher Note:

- Collect Assent and Demographic forms.
- Students should have labeled sheets of blank paper, with a data code label on right corner and a number in left hand corner (latter for appropriate group).

As we discussed earlier, there are many understandings of climate change. For our activity now, I would like you to draw a picture of a topic relating to climate actions at your school:

Addressing Topic 1 students: What is your school currently doing to take climate action? Now, if this group could please draw pictures, or write information to show how your school is taking climate action, that would be great.

Addressing Topic 2 students: What do you wish your school was doing to take climate action? If this group could please draw pictures, or write information to show what you wish your school was doing to take climate action, that would be great.

For all students:

- Please only draw/write on 1 side of the paper. If you would like more paper, please let us know
- You have 10 minutes for your drawings. I will let you know when 5 minutes has passed
- The two groups are going to be working at the same time, so please do your very best not to be too noisy
- At the end of the 10 minutes, I will go around to each group, and ask you to briefly discuss your drawings. While I talk to your group, the other group can keep drawing.

Okay, we will now stop drawing and discuss drawings within our group. We will use recorders as "talking sticks" to be passed around the circle for when each student is speaking. When you have the "talking stick," it will be your turn to speak. If you do not have the "talking stick," please try and be as quiet as you can. This is because we want the recorders to get all of your information and it could get very noisy in the room if too many people are talking at once.

Are there one or two students who would like to present our discussions back to the whole group?

Researcher Note:

- Help students choose 1-2 students to present main findings back to the whole group.
- Bring groups back together.

Large Group Discussion

Now that we are all back together, each group will share some of the discussions from their drawings. Each group had a different topic to draw and discuss.

Topic 1 Students:
Can you please tell the whole class some of the things that your school is currently doing to take climate action, as discussed by individuals in your group?

Topic 2 Students:

Can you please tell the whole class some of the things that you wish your school was doing to take climate action, as discussed by individuals in your group?

Final question for the whole group together:
Is there anything important about climate change or taking climate action that I have not asked you about today that you would like to share?

Thank you for participating in this project!

Appendix D

Codebook

Category	Code	Operational Definition and Examples
1. Climate change practices, policies, and practitioners	Practice	Climate change/climate action practice is mentioned.
	Policy	Climate change/climate action policy is mentioned
	Practitioner	Mentions the person(s) 'carrying' the practice. Also includes when the participant refers to their own practices.
2. Elements of practice	Materials	Includes mentions of materials (e.g., objects, tools, technologies, the body) used for CCE or climate action. Includes electronic resources.
	Competences	Includes mentions of competences (e.g., background knowledge, understanding, skills, and techniques) used for CCE or climate action. Includes work to "get everyone on the same page" re: the climate change month or planning related to the month.
	Meanings	Includes mentions of meanings (e.g., ideas, emotions, feelings, aspirations, symbolic meaning, sensory information) used for CCE or climate action. Includes ideas, such as thinking that the school is the same or different from other schools or places. Also includes considering feelings about climate change before teaching it and how to present it to students (i.e., balancing hope and worry).
3. Whole Institution Domains	Teaching and learning	Includes mentions of CCE practices or policies related to teaching and learning for students, teachers, staff, or local community (e.g., course assignments, course activities, how climate change is taught in the class – class does not have to meet inside the physical building – or shifts of opinion/views among those in the school).
	School Governance	Includes mentions of CCE practices or policies related to leadership and overall focus on climate change or climate action (e.g., policies, eco-certifications, designations, programs, meetings, guiding frameworks, etc.). Includes mentions of ASPnet school, eco-school, Simply Living Simply, and Specialist High Schools Major.
	Facilities and operations	Includes mentions of CCE practices or policies related to physical buildings (e.g., water bottle fountains, recycling, etc.)
	Community Partnerships	Includes mentions of CCE practices or policies related to partnering with the community or working with the

Category	Code	Operational Definition and Examples
		community on climate change or climate action (e.g., field trips, guest speakers, planting trees, etc.).
4. Practice and policy level	School	Includes mentions of school practices or policies related to CCE.
	School board	Includes mentions of school board practices or policies related to CCE.
	Community	Includes mentions of community practices or policies related to CCE.
	Province	Includes mentions of provincial practices or policies related to CCE.
5. Practice connections	Co-location	Practice is connected to another practice based on co-location (i.e., happening at the same physical location and loosely connected to each other)
	Co-dependence	Practice is connected to another practice due to co-dependence (i.e., the practices depend on each other to exist such as through sequence, synchronization, proximity).
	No longer Connected	Practice used to be connected to other practices through co-location or co-dependence, but connections are no longer present.
6. Practice/ element life	Appearance	Describes how/when a practice began or how/when a practice element appeared.
	Perseverance	Describes how a practice or practice element endures or is maintained (e.g., what happens when an individual in charge of an activity is away/leaves).
	Disappearance	Describes how or when a practice or practice element disappeared.
7. Practice, policy, practitioner, and practice element influences	Competition	Includes mention of practices, policies, or practitioners that compete with each other (e.g., competing priorities) or using competition to influence practices, policies, or practitioners related to CCE. Also includes mention of how practices, policies, or practitioners emerge, persevere, or disappear as a result of competition.
	Collaboration	Includes mention of practices, policies, or practitioners that collaborate with each other or using collaboration to influence practices, policies, or practitioners related to CCE (e.g., aligning with global citizenship goals, cross-curricular goals, working with teachers to find time for projects, etc.). Also includes mention of how practices, policies, or practitioners emerge, persevere, or disappear as a result of collaboration.

Category	Code	Operational Definition and Examples
	Conflict	Includes mention of practices, policies, or practitioners that are in conflict with each other or using conflict to influence practices, policies, or practitioners related to CCE. Also includes mention of how practices, policies, or practitioners emerge, persevere, or disappear as a result of conflict.
	Conversations and communication	Includes mention of how conversations and communication influence practices, policies, or practitioners or using conversations (e.g., about how to incorporate climate change across the curriculum) and communication to influence practices, policies, or practitioners related to CCE. Also includes mention of how practices, policies, or practitioners emerge, persevere, or disappear as a result of communication.
	Leadership	Includes mention of how leadership influences practices, policies, or practitioners or using leadership to influence practices, policies, or practitioners related to CCE (e.g., knowing how/when to strategically push for initiatives, when to not get in the way, etc.). Also includes mention of how practices, policies, or practitioners emerge, persevere, or disappear as a result of leadership.
	Mobility	Includes mention of how mobile practices, policies, or practitioners influence other practices, policies, or practitioners related to CCE. Also includes mention of how practices, policies, or practitioners emerge, persevere, or disappear as a result of mobile practices, policies, or practitioners (e.g., practice at the school travelling to another school).
	Economics	Includes mention of how economics influences practices, policies, or practitioners or using economics to influence practices, policies, or practitioners related to CCE. Also includes mention of how practices, policies, or practitioners emerge, persevere, or disappear as a result of economics (e.g., concerns about future economic situations in the community, loss of a practice or practitioner due to loss of a job).
	Affect and emotion	Includes mention of how affect and emotion influence practices, policies, or practitioners or using affect and emotion to influence practices, policies, or practitioners related to CCE. Also includes mention of how practices, policies, or practitioners emerge, persevere, or disappear as a result of affect or emotion (e.g., mention of how the affect and/or emotion

Category	Code	Operational Definition and Examples
		experienced by students, teachers, or staff at the school contributes to the environment in which CCE is delivered, references to an 'energy' at the school)
	Values, culture, and worldview	Includes mention of how values, culture, and worldviews influence practices, policies, or practitioners or using values, culture, and worldviews to influence practices, policies, or practitioners related to CCE. Also includes mention of how practices, policies, or practitioners emerge, persevere, or disappear as a result of values, culture, and worldviews.
	History	Includes mention of how history influences practices, policies, or practitioners or using history to influence practices, policies, or practitioners related to CCE. Also includes mention of how practices, policies, or practitioners emerge, persevere, or disappear as a result of history.
	Place	Includes mention of how place influences practices, policies, or practitioners or using place to influence practices to influence practices, policies, or practitioners related to CCE. Also includes mention of how practices, policies, or practitioners emerge, persevere, or disappear as a result of place.
	Teaching approaches	Includes mention of how teaching approaches influence practices, policies, or practitioners or using teaching approaches to influence practices, policies, or practitioners related to CCE. Also, may include mention of how practices, policies, or practitioners emerge, persevere, or disappear as a result of teaching approaches. Examples may include: mentioning local effects of climate change, aligning with local or school values, culture, or worldview, including a focus on solutions/action, modelling CCE practices, framing CCE to make it easier to relate to/overcome barriers, using visual representations, using mentoring, using a whole institution approach, using place-based methods, using inquiry-based methods.
8. Motivations to 'carry' a	Curriculum	Practitioner includes a focus on CCE or climate action because they align with curriculum guidelines.
	Urgency	Practitioner includes a focus on CCE or climate action because feels it is urgent to address climate change.

Category	Code	Operational Definition and Examples
practice (or not)	Community culture	Practitioner includes a focus on CCE or climate action because it aligns with the local school or community culture and priorities (e.g., school goals). Could also include mentions of filtering outside requests for potential practices in relation to the school's goals.
	Personal connection to school	Practitioner includes mention of carrying a practice because of previous personal connections to the school.
	Affect	Practitioner includes a focus on CCE or climate action because of affective orientations e.g., passion, hope, fear, etc.
	Other priorities	Practitioner mentions the importance of taking care of students' and staffs' physical needs (e.g., food, health, employment, safety, etc.) before engaging in CCE, as well as decisions related to these needs. Mentions the importance of taking care of students' and staffs' emotional needs (e.g., establishing rapport, creating a welcoming environment, etc.) before/while engaging in CCE, as well as decisions related to these needs.
9. Measuring CCE effectiveness/ CCE aims	Cognitive	The effectiveness of CCE is measured by the knowledge and thinking skills developed to better understand climate change for students, teachers, or staff. Also includes CCE aimed at developing knowledge and thinking skills necessary to better understand climate change and the challenges in achieving it for students, teachers, or staff. Includes conversations about what climate change is aimed at trying to understand it.
	Behavioral	The effectiveness of CCE is measured by the action competencies developed, which could include changes in individual behaviors or behaviors directed at larger systemic structures (e.g., recycling, writing letters to government representatives, etc.) for students, teachers, or staff. Also includes CCE aimed at developing action competencies for students, teachers, or staff.
	Socio-emotional	The effectiveness of CCE is measured by the development of social skills that enable learners to collaborate, negotiate and communicate about climate change as well as self-reflection skills, values,

Category	Code	Operational Definition and Examples
		attitudes and motivations that enable learners to develop themselves for students, teachers, or staff. Also includes CCE aimed at developing social skills that enable learners to collaborate, negotiate and communicate about climate change as well as self-reflection skills, values, attitudes and motivations that enable learners to develop themselves for students, teachers, or staff. Also includes mention of considering the types of emotions students might (or do) feel when learning about climate change and how that might affect how it is portrayed. Includes mentions of de-briefing conversations. Includes mentions of what to do if a student expresses anger or denial about climate change.
	Justice-oriented	The effectiveness of CCE is measured by the development of social or ecological justice orientation.
10. Feedback & monitoring	Formal monitoring	Includes mentions of formal feedback or monitoring processes used to evaluate practices.
	Informal monitoring	Includes mentions of informal feedback or monitoring processes used to evaluate practices.
11. Other	Advice	Includes advice to other schools about how to get CCE started in their context.
	What's missing	Includes mention of what the participant feels is missing at the school in relation to CCE.
	Interesting quotes	This category is for capturing interesting quotes from participants that may be used in the final thesis.