

**TEACHERS' PERSPECTIVES OF OCEAN LITERACY THROUGH AN ETHIC OF
CARE**

by

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ABSTRACT

The world's oceans face an uncertain future through human actions leading to environmental crises such as warming waters, ocean acidification, biodiversity loss, mass extinction, and ecosystem collapse. Ocean education through ocean literacy is one approach to mitigate the consequences of our industrialized society by promoting awareness, connection, and caring for the ocean. This study sought to understand the perspectives of five teachers who experienced a module on ocean literacy through an ethic of care during an environmental education course. Nel Noddings's ethics of care along with Peter Martin's interpretations of her work within the context of environmental education provided a theoretical framework to guide the study. Qualitative research methods including structured interviews (surveys), semi-structured interviews, participant reflections, and research fieldnotes were used as data sources. By employing Miles and Huberman's approach to thematic analysis, the findings were organized into three key themes which denoted how the teachers: (1) expanded their awareness of their relationship with the ocean; (2) increased their Ocean Literacy; and (3) increased their understanding of Ocean Literacy and the role of place in ocean education. Study findings indicated the teachers incorporated a growing awareness of their relationship with the ocean through reflection of past experiences. Recognizing the important role of companions and place was also an important contributor to their perspectives.

This study's findings have implications on how ocean education through ocean literacy, with an emphasis on an ethic of care can be framed in educational settings.

LAY SUMMARY

The oceans today are under threat through human activities. Ocean education focusing on ocean literacy is one approach to understanding our views on the ocean. Five teachers participated in a study that examined their perspectives before and after a module on ocean literacy. Findings revealed an ethic of care exemplified by an increased awareness and understanding of ocean literacy and the ocean.

PREFACE

This thesis is original, unpublished work by the author, N. Jackson-Drouin. The research was developed, designed and analyzed by the author. This research study obtained the approval of the U B.C. Research Ethics Board (Behavioural Research Ethics Board; U B.C. BREB Number: H20-00509).

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DEDICATION



Sarah E. Verstegen

1957 - 2021

You left a legacy of passion, leadership, and hard work.

You embodied a true dedication to the Salish Sea.

You are dearly missed.

Sarah was the facilities operator for SeaChange Marine Conservation Society in Brentwood Bay for over 20 years. Sarah was a diver, educator, and passionate steward of the Salish Sea and SNIDŪĒĒ (*sngēet kwith* or - *The Place of the Blue Grouse*, known as Tod Inlet). Sarah replanted countless eelgrass meadows, supported in many protection, conservation, and restoration efforts, and taught on the lands she loved. Her understated confidence and ability to fix anything inspired many, including me.

CHAPTER 1: Introduction to the Study

I'm sitting on the beach on a quite summer afternoon. I'm watching the heron hunt out on the low tide. She is still, focused, watching. Before she can make a catch, one of the eagles, from the pair that nests above my cabin, swoops down, right up close to the herons' selected spot. The heron is not impressed by the eagle's presence and audibly takes off, landing on a neighbouring rock. This was not an unusual scenario playing out in front of me on the shore that day - I had witnessed the shores' creatures interact in ways like this before, but this time I felt something a little different. It wasn't just about what I had seen or what I had heard or even the story I imagined playing out, it was about what I felt. I felt an immense amount of honour and gratitude in that moment - that I was able to be there to witness that moment and many others like it, and attribute my own meaning. Reflecting on this experience, I adjusted the position I considered myself to have in terms of the greater scene of the shore and the ocean, from a self-centered perspective to a relational one. I acknowledged how fortunate I am, and I felt an even deeper draw to the ocean as a result.

1.1 Study Background and Problem Statement

The ocean has an unparalleled importance for life on earth. Earth's ocean is made up of five basins (Atlantic, Pacific, Indian, Arctic and Southern) and is the only one in our solar system (Ocean Literacy Network, 2020). The ocean regulates the climate, provides the majority of the oxygen in the atmosphere and absorbs carbon dioxide (Ocean Literacy Network, 2020). The ocean is inherently part of each being (living and non-living) on this planet. Life on earth began in the ocean and the oceans continue to support it by providing much of the planet's population with protein, replenishing fresh water through evaporation of ocean water and subsequent precipitation, and being a carbon sink, sequestering carbon from the atmosphere to its depths

(IPBES, 2019). Sadly, our ocean today is in a dire state which is largely human caused (IPBES, 2019). The ocean is facing an unpredictable future which includes threats such as industrial over-fishing, habitat destruction, increase in marine debris and plastic pollution, resulting in biodiversity decline, ecosystem collapse, habitat destruction and more. Additionally, the ocean is facing impacts directly related to rising carbon emissions including ocean acidification, rising temperatures, and rising sea-levels. The climate crisis, caused by our increase in carbon emissions, is compounding many impacts on the ocean and is contributing to changes in ocean chemistry and physics resulting in ocean acidification, thermal stratifications and changes in ocean circulation (IPBES, 2019). Both the planetary decline of biodiversity (IUNC, 2021) and warming surface water (IPCC, 2014) are tangible changes to the ocean that we are currently witnessing.

These above-mentioned changes contribute to an uncertain and precarious future for our ocean and humanity. The role the ocean plays in all of our lives is often indirect but as demonstrated above, is significant. The maintenance of the ocean, including the protection of its systems and species, contributes to the preservation of its roles and impacts on earth including its influences on the climate, food production, carbon sequestration, etc. This preservation of the roles the ocean plays on earth is vital to the maintenance of the quality of life for all those on earth. For humankind, the vital importance of the ocean informs its value. In addition to the importance of the ocean for its role in the quality of life for humankind, is its' intrinsic value or value for its own sake. It is both of these (the value to quality of life and its' intrinsic value) reasons that are the motivation for a deeper and more nuanced consideration for the ocean. One way to develop this and contribute to conserving, protecting, and improving the ocean is through education, specifically ocean education. Ocean education, which is often informed by Ocean

Literacy and its accompanying framework (Ocean Literacy Network, 2020), involves teaching about the importance and the complexities of the ocean. With that, it is known that simply knowing of the complexities and importance of the ocean to life on earth is not enough to inspire ocean conservation. In addition to learning facts related to marine science and ocean systems, ocean education must also incorporate the demonstration and building of a renewed attitude and perspective towards the natural world and the ocean (Cummins & Snively, 2000; Magrini, 2019). Fostering an ethic of care for the ocean through education is one way to address ocean related issues, by inspiring and informing learners to promote and make meaningful change. Furthermore, the incorporation of ethics of care into how humanity thinks, believes, and understands the ocean when considering it in their lives is one way to work to improve how humanity views, treats, and considers the ocean. A particularly useful context with potential for fostering an ethic of care through ocean education is teacher education. The culmination of all this leads to a specific path for ocean education and a unique way to look at ethics of care and the ocean - through Ocean Literacy education within the context of teachers' experiences. There is a lack of research demonstrating the utilization of an ethic of care in environmental educations (Nazir & Pedretti, 2016) and no examples of its utilization in ocean education or Ocean Literacy education. It is this gap that this research aims to address. The goal of this thesis is to understand teachers' perspectives on the ocean, ocean education and Ocean Literacy after experiencing a lesson on Ocean Literacy.

1.2 Ocean Literacy

Ocean Literacy has been gaining momentum within educational settings in Canada (CaNOE, 2019; Glithero & Stalker, 2018) and worldwide to address the need for ocean education, appreciation and understanding. The concept of Ocean Literacy is part of a larger

framework and it defined as “an understanding of the ocean's influence on you — and your influence on the ocean” (Ocean Literacy Network, 2020) and is a useful tool for teaching about the ocean. In an attempt to explore teachers’ Ocean Literacy, I sought to understand the perspectives of teachers who participated in a lesson taught about Ocean Literacy.

1.3 Research Question and Objectives

The following question guided this research: What are teacher perspectives of the ocean and Ocean Literacy after experiencing a lesson on the topic?

1.4 Significance of the Study

The ocean needs additional care and compassion. Current perspectives and attitudes surrounding the ocean has led to mistreatment of the ocean resulting in a sad and dire situation. This study is significant as its findings can contribute to the ongoing Ocean Literacy efforts in Canada, with specific significance for teacher’s Ocean Literacy development. Teachers in British Columbia (B.C.) are in a unique position to promote Ocean Literacy in their classrooms across the kindergarten to grade 12 system, with implications of contribution to Ocean Literacy efforts in B.C. and beyond.

1.5 Researcher Background and Inspiration

My father returned to teaching when I was 10 years old after a nearly 20-year hiatus. This happened when I was quite impressionable and as a result, I was convinced I would also be a teacher. As time went on, I pivoted away from becoming a teacher and focused on science. Finding the focus for my degree did not happen quickly. I initially studied science at Douglas College, with no concrete plans to pursue a full degree. It was not until I spent some summers

working at a Girl Guide Camp on the ancestral lands of the shíshálh Nation (Sechelt, B.C.).

This is where my shallow interest in the sea became a deep passion and ultimately, part of who I am. Here I gained my first experiences of teaching children about the ocean. At that time, I had a limited knowledge of the intertidal myself, but I enjoyed encouraging the girls to explore and ask questions. I often learned as much as the girls did from exploring. I now recognize the power of the intertidal as not only a place of study, reflection and learning but also as a teacher. The land and the sea work together here to sustain life and in doing so, can provide us with meaningful learning experiences. This is where my interest in Ocean Literacy started, without me realizing it. This thesis is the culmination of all of my prior experiences with the ocean and my hopes to share them with others. I know that I would not have made it down this path without the guidance and teachings of the ocean.

I have developed a deep reverence and respect for the ocean. The ocean is a facilitator, it is the common thread between me and the more-than-human, the non-living and the shore. It is a reliable and ever-present friend. The ocean comforts me, it guides me, and it teaches me. I have much to thank the ocean for, and I am grateful.

1.6 Thesis Organization

This thesis is organized into five chapters. The first chapter includes the necessary background of the study (including an introduction to Ocean Literacy), the problem statement, research question, the significance of the study, and the researcher's background. The second chapter presents the literature review beginning with the study's theoretical frame, which is informed by ethics of care, primarily by Nel Noddings interpretations as this aligns most closely with my understanding of care ethics. Chapter 2 also has a more thorough examination of Ocean Literacy, followed by oceans and Ocean Literacy in the B.C. curriculum. Chapter 3 presents the

methodology and methods used in this study. I included elements of qualitative research and case study design. This is followed by details of: the research setting, strategies used for data collection and data analysis. This chapter concludes with the ethical considerations for this work. Chapter 4 discusses the study's findings and analysis, presenting the three major themes of the findings, which are: 1) expanded awareness of their relationship with the ocean; 2) increased Ocean Literacy; and 3) increased their understanding of Ocean Literacy and the role of place in ocean education. The fifth and final chapter addresses the research questions, explores emergent themes, and concludes with a discussion of implications for further research.

CHAPTER 2: Literature Review

In this chapter I discuss the study's theoretical framework. I define and illustrate ethics of care through Noddings' (2002, 2013) understanding of relationship, reciprocity, ethical ideal, caring and education. I will then discuss the current state of the ocean and review select literature on Ocean Literacy. I conclude with a discussion of Ocean Literacy in the B.C. curriculum and the role of teachers in Ocean Literacy and ocean education.

2.1 Theoretical Frame

2.1.1 Ethics of Care

There are many authors who have discussed ethics of care including Carol Gilligan (1977), Nel Noddings (2002, 2013) and Virginia Held (2006). For the purposes of this study, I will focus primarily on the work of Nel Noddings as her ethics of care closely align with my understanding of ethical caring and is in turn a focus of this study. I will then review additional literature on how others have interpreted Noddings's body of work on ethics of care, particularly in the context of environmental education.

2.1.2 Nel Noddings

In terms of education, Nodding introduces ethics of care as a perspective on moral education (Noddings, 2002), acknowledging that it has similarities with character education, but with a greater focus on the relations and conditions of a moral life rather than the development of virtues of the individual (Noddings, 2002). Noddings (2002) theorizes that care ethics in education is relational, saying that "the ethic of care (as I have developed it) is fundamentally relational; it is not individual-agent-based in the way of virtue ethics" (p. xiii). In addition,

Noddings's care ethics involves the *one caring* and the *cared for*. Nodding's work on care-based education "emphasiz[es] themes of attachment, interdependence, the connected self and responsiveness to others" (Nazir & Pedretti, 2016, p. 290).

Noddings (2002, 2013) suggests that morality is rooted in feeling and intuition and delineates caring into a range between natural and ethical. Natural caring exists when no internal dissonance occurs when we are faced with a response to "I must" (Noddings, 2002), as it is motivated by love, intuition or inclination. In natural caring "we, as carers, attend and respond because we want to; we love the ones who address us or have sufficient positive regard for response" (Noddings, 2002, p. 13). Ethical caring occurs when we encounter some kind of internal resistance to the "I must" and "we draw upon an ethical ideal - a set of memories of caring and being cared for that we regard as manifestations of our best selves and relations" (Noddings, 2002, p. 13). Noddings asserts that it is not reason that motivates us, it is feeling, and this is most obvious in natural caring (Noddings, 2002, 2013). In an ethic of care, feeling as motivation is superior to reason and therefore natural caring is preferred, with ethical caring filling in only to restore a natural caring state (Noddings, 2002).

As noted above, in ethical caring, the way one behaves as a carer is guided by an ethical ideal (Noddings, 2002). This is what one relies on in ethical caring, basing the actions taken on these previous experiences and memories of caring (Noddings, 2002). Everything depends on this ethical ideal we hold for ourselves, as there is no explicit principles to guide us (Noddings, 2013).

In Noddings interpretations of caring relationships, she speaks to the need for reciprocity. Without it, the feelings of the one-caring may turn to anguish, resentment, or concern for oneself. In terms of the form this reciprocity may take, Nodding emphasizes that it is not contractual, and

that it can evolve, but at its core it completes the relations and “[w]hat the cared-for gives to the relation either in direct response to the one-caring or in personal delight or in happy growth before [their] eyes is genuine reciprocity” (Noddings, 2013, p. 91). Noddings contrasts genuine reciprocity with contractual reciprocity, where genuine reciprocity manifests as signs that the cared-for has received the caring of the carer, not through repayment or equal services. This genuine form of reciprocity is unique to human interactions, with some interactions with non-humans being able to incite this feeling of reception for us. In terms of “things and ideas”, Noddings considered this as moving away from the ethical, toward the sensitive and aesthetic, saying here that there is reciprocity, but no manifestation of feelings (Noddings, 2013).

Noddings’ body of work has been interpreted by others, and some extensions and elaborations to her work will be discussed here. Notably, John Fien and Peter Martin. Fien (1997, 2003) used Noddings’ work within the context of environmental education and curriculum, highlighting that Noddings argues for a curriculum that is organized around “centres of care” which include the care for oneself, intimate others, associates/acquaintances, distant others, non-human animals, plants, the geophysical world, the human-made world and ideas (Fien, 2003). Fien highlights that Noddings acknowledges the distinction between notions of caring and the lived process of empathy and active solidarity (Fien, 2003, p. 4). He outlines the three components of Noddings caring process: conceptual and emotive understanding, deep regard for the intrinsic value of others and the motivation, willingness and skills to protect and enhance this (Fien, 2003, p. 4). Fien goes on to encapsulate these components of care described by Noddings as “compassion”. With that, Fien suggests widening these circles and concept of compassion and care to include non-human nature. He emphasizes that the relationship that humans have with the natural world today is often transactional and without care. He makes a

clear point to say that we, as humans, are not separate from nature, but rather, we are part of nature and should consider this in environmental education.

In response to Fien (2003), Martin (2007) provides his own interpretations of Noddings' body of work on ethic of care in environmental education, noting its usefulness in creating a conceptual framework for developing education for the environment. He presents caring in the context of environmental education as being rooted in a structure of caring. Martin (2007) suggests considering the realities of other entities (human and non-human) in addition to the self's reality as fundamental and that caring translates into actions to improve things for others (Martin, 2007, p. 59). He continues with this and challenges Fien's notion of considering ourselves as inherently part of nature, stating that this is not an intuitive perspective and suggesting that "[a] conception of nature as part of self and an ethic of care based on a relational self are logically incongruous" (Martin, 2007, p. 61). He continues by saying that the conception of nature is often that of something external or separate from the self (Martin, 2007) and that relying on the conception that human beings are inherently part of nature limits our ability to teach for the environment. He suggests that the appropriate use of an ethic of care in environmental education is treating humans as relational beings to nature, even suggesting these relationships be structurally similar to those with friends or family (Martin, 2007). Martin (2007) describes this through a structure of caring informed by Noddings' notions of relatedness, reciprocity, and a conceptual and emotive understanding (thinking with the heart and the head). Relatedness is a predictor of care and is driven by proximity and awareness. We are more likely to care for those we are close to, both physically (neighbour) and relationally (partner, parent, child). With that, we have a limited capacity of relatedness and care and it is unreasonable to care equally for every entity that is proximate and related. Although, through the relatedness

lens, care for entities can be rationalized and deliberately fostered. Martin does highlight that within a care ethics lens, it is not possible to expect people to care about something that they have had no contact or experience with, saying, “[c]an I expect my students to truly care for environments with which they have no personal experience or contact?” (Martin, 2007, p. 60). Going on to say that the most that we can hope for is for them to care about the environment, which is different from caring for it. Relatedness is what dictates where care is invested, with Martin (2007) finalizing this point by saying “I make choices about how I enact caring because it is impossible for me to effectively care for all people and entities” (Martin, 2007, p. 60). In terms of Martin’s interpretation of ethic of care and environmental education, reciprocity comes in the form of a perceived responsiveness to our care and actions (Noddings, 1984, as cited in Martin, 2007). When we are able to sense that our commitment and care are acknowledged and impactful, the sense of care is reinforced (Martin, 2007). Reciprocity and impact are not always obvious and often require a nuanced and extrinsic understanding where empathy is regularly practiced and realized. Finally, a conceptual and emotive understanding - which considers that, although care ethics is developed through emotional and intuitional decision making, the influence of reason cannot be completely disregarded. Reason and logic are often employed for making sensible decisions and choices. It is here where reason and emotion work together. Emotion and feelings motivate choices, and reason helps us to make the best choice (Noddings, 2002).

Martin (2007) speaks at length of the implications and advantages of an environmental education underpinned by an ethic of care that imagines relationships with non-human nature to be structurally similar to relationships with friends and family, adding that this conceptual framework considers the importance of emotion in knowing and learning, as well as the relative

ease of identifying the features of these types of relationships. This study's theoretical frame aligns with the perspectives of Martin (2007) - that humans should be positioned as relational to the natural world and that relationships structured like those of human relationships are possible and encouraged.

To finalize this review of ethic of care, I refer to Nazir and Pedretti's (2016) review of ethic of care in environmental educations for their own work:

It is important to note that ethics of care as understood by these authors go beyond building rationally justifiable 'affection' or 'fondness' for the environment (the usual formulation found in many environmental education programmes). They offer the field a different axiological base upon which people can build different relationships (p. 291).

With that, Nazir and Pedretti (2016) identify that there is not many works actually applying ethics of care in environmental education, highlighting a gap in the literature.

2.2 The Ocean Today

Our oceans are facing changes that are unprecedented in modern history. Ocean scientist and marine educator Dr. Sylvia Earle, in her TEDx Talk shared how 60 years ago, even those most passionate and involved with the ocean would not have anticipated the impact we as humans could have on the ocean. She adds "it seemed, at that time, to be a sea of Eden, but now we know, and now we are facing paradise lost" (Earle, 2009, 0:03).

Human activity is the culprit for almost all the major impacts effecting the oceans today. Human activity has caused an increase of carbon dioxide (CO₂) in the atmosphere, the concentration of CO₂ has been rising exponentially since the industrial revolution (Haigh, 2017), which has lead to the widespread impacts of the climate crisis. With rising carbon emissions, the ocean has taken on much of it, with the ocean absorbing a minimum of 25% of the anthropogenic

CO₂ emissions per year (Watson et al., 2020). A notable impact of this is ocean acidification. As CO₂ is soluble in water, and when higher levels of CO₂ are present in the atmosphere, more CO₂ dissolves into the sea to reach a chemical equilibrium, resulting in an increase of hydrogen ions which lowers the pH of the sea water (Pope & Selna, 2013). This increase in acidity has impacts on shell forming animals including corals and molluscs (Pope & Selna, 2013), threatening many of their survival, overall ecosystems and biodiversity at large. In addition, the increase in CO₂ emissions have been linked to the increase in the mean global temperature and the warming of the oceans (IPCC, 2019). The global average surface temperature warmed by 0.44 °C between 1970 and 2010 (IPCC, 2014). Along with general warming of the planet, this increase in ocean temperatures has many detrimental impacts including: changes to species migration, resulting in changes in range, habitat and ecosystems; reduction or loss of dissolved oxygen, resulting in mass die-offs and ecosystem collapse; coastal squeeze, caused by the rapid onset of sea-level rise and habitats in coastal areas unable to adapt; and disruption of coastal nutrient systems, resulting in further decline in coastal ecosystems and biodiversity (IPCC, 2019).

In addition to this, other human activities have detrimental impacts on the ocean. The extraction of resources from the ocean has a deleterious impact on the marine environment. Overfishing is a key example (Rousseau et al., 2019) evidenced in B.C. by the collapse of all five species of Pacific Salmon which has impacted the entire ecosystem. There are less obvious and often unforeseen consequences to overfishing, an example being the overfishing of groundfish. It has been documented (in Saanich Inlet, B.C.) that the activity of groundfish on the seafloor resuspends important nutrients like silicon (Katz et al., 2009, 2016). When groundfish populations are reduced, there is a consequential reduction in dissolved nutrients and these dissolved nutrients are vital for phytoplankton. Therefore, the reduction of these fishes resulted

in the reduction of primary productivity, thereby weakening the entire system at its foundations (Katz et al., 2009).

Other biological impacts to the oceans include the planetary decline of biodiversity which includes the threat of extinction to 37% of sharks, rays, and chimeras, 33% of reef building corals, 6% of bony fishes and 1.5% of cephalopods (IUNC, 2021). This decline is facilitated by habitat destruction, industrial over-fishing, and the proliferation of invasive species. Biodiversity is key to the overall health and longevity of the ocean's ecosystems and the impacts of these declines can affect livelihoods and food sources.

The aforementioned are just some of the understood threats that the ocean face's today. There are many others, including many unforeseen changes that will only become evident with time.

2.3 Ocean Literacy

The term *literacy* goes beyond an ability to read and write to also include knowledge that relates to a specified subject (Literacy, 2021). This definition, pertaining to *having knowledge* rather than simply skills in reading and writing, has been transposed into many contexts. For example the term has been used for *science literacy*, *environmental literacy*, *health literacy*, among other uses. There is appeal in using the term *literacy* in these types of contexts as it streamlines efforts towards a common goal and provides a simple and encompassing term that guides efforts to improve knowledge and understanding of a particular subject.

The term Ocean Literacy and the formalized efforts associated with it began in the U.S. in the early 2000's after an observed lack of ocean concepts in the formal science curriculum by the ocean community (Schoedinger et al., 2010). This resulted in a collaborative effort to produce a concrete definition, with an accompanying framework and supportive resources. The

results of this monumental undertaking was The Ocean Literacy Framework (OLF) which was first published in 2005, with the most recent version having been released in 2020. The documents that make up the OLF consists of: the overarching guide titled *Ocean Literacy: The Essential Principles and Fundamental Concepts of Ocean Sciences for Learners of All Ages*, the detailed *Ocean Literacy Scope and Sequence for Grades K-12* ; a document outlining the connections between the OLF and the *Next Generation Science Standards* entitled *Alignment of Ocean Literacy to the Next Generation*; and finally the International Ocean Literacy Survey (Ocean Literacy Network, 2020). The guide is a collection of the most important concepts that everyone should know and understand about the ocean synthesized within seven principles, which are listed in Table 1. These principles are foundational to the OLF and ocean education through Ocean Literacy. They are a useful and concise way to convey important information about the ocean. Each principle has between three and nine fundamental concepts associated with it (Table 1).

Table 1		
<i>The Seven Essential Principles of Ocean Literacy</i>		
Principle Number	Title	Number of Concepts
1	Earth has one big ocean with many features	8
2	The ocean and life in the ocean shape the features of Earth	5
3	The ocean is a major influence on weather and climate	6
4	The ocean makes Earth habitable	3
5	The ocean supports a great diversity of life and ecosystems	9
6	The ocean and humans are inextricably linked	7
7	The ocean is largely unexplored	6

Within the OLF, Ocean Literacy is defined as “an understanding of the ocean’s influence on you and your influence on the ocean”, with further definitions of an ocean literate person as someone who: “understands the Essential Principles and Fundamental Concepts”, “can

communicate about the ocean in a meaningful way” and “is able to make informed and responsible decisions regarding the ocean and its resources” (Ocean Literacy Network, 2020, p. 2). The creation of the OLF sparked international efforts to improve and develop Ocean Literacy on a global scale (Glithero et al., 2020; Glithero & Stalker, 2018; Marrero et al., 2019). Ocean Literacy has become a foundational and guiding framework for ocean education, particularly in the U.S., the UK, and Canada (Costa & Caldeira, 2017) and is largely seen as a way to combat the climate crisis and work towards a more sustainable future (Chen & Tsai, 2016).

Kelly et al. (2021) describe four drivers for developing Ocean Literacy and building public connection to the ocean. These are education, cultural connections, technological development and knowledge exchange, and science-policy interconnection. In terms of education, Kelly et al. (2021) emphasizes the important role that experiential learning and community (or citizen) science has in informal Ocean Literacy education. This driver has the potential to connect people to oceanic environments and increase their concern and provide opportunities to contribute to issues (Kelly et al., 2021). Cultural connections refers to the incontestable contribution of traditional and Indigenous knowledge and understandings to Ocean Literacy efforts (Kelly et al., 2021). Technological development highlights the increased access and use of technology and the Internet in teaching about the ocean. Engaging people in knowledge exchange and policy-interconnection speaks to the important role of providing access to accurate, scientific, up-to-date information about our changing oceans for policy decisions and the role this plays in informing people about the ocean (Kelly et al., 2021). The following impediments to global Ocean Literacy education were identified: youth-centric ocean learning; western-centric programmes; single-issue focus; and the ‘digital divide’ and the disconnection between society and marine science policy (Kelly et al., 2021).

Efforts to understand Ocean Literacy have led to attempts to quantify and measure it. These efforts have led to the development and use of instruments, such as the Survey of Ocean Literacy and Experience (Greely, 2008) and the International Ocean Literacy Survey (Fauville et al., 2018; Ocean Literacy Network, 2020). Attempts to quantify Ocean Literacy in a particular context is difficult but is an important starting point and justification for Ocean Literacy efforts. Survey instruments, such as those mentioned above, have been used in Canadian contexts before, such as in the province of Nova Scotia to assess students' (grade 7-12) Ocean Literacy (H. Guest et al., 2015). Additional examples of efforts to understand Ocean Literacy have blended art and science such as the *I am the Ocean* activity co-created by an artist and a scientist to help students understand, connect, and take action on behalf of the marine environment as they “move from knowledge to passion” (Dupont, 2017, p. 1211).

In Canada, the Canadian Ocean Literacy Coalition (COLC) has worked to understand the current Ocean Literacy landscape (or *seascape*) (Glithero et al., 2020; Glithero & Stalker, 2018; Scully, 2018) and have developed an Ocean Literacy strategy for the country (COLC, 2021). The COLC recognizes the importance of the development and fostering of an ethic of care towards the ocean, with one of the intended outcomes of the Ocean Literacy strategy being to “foster an ethic of care for the ocean continuum [(land, water, ocean, sea ice)] in Canadians” (Glithero, 2020, p. 11). It is recognized that Ocean Literacy education attempts to move beyond the knowledge-based paradigm towards the emotive and ethical (Winks et al., 2020). Winks et al. (2020) does note that “[a]lthough not free from anthropocentrism, Ocean Literacy enables a greater sense of entanglement with the environment” (p. 973). All of this acknowledges the importance of and the beginning of the incorporation of the development of ethics of care in

Ocean Literacy education communities, though in its current form, ethics of care is not considered a tenet of Ocean Literacy.

2.4 Oceans and Ocean Literacy in the B.C. Curriculum

The curriculum in B.C. has three key features that contribute to student learning, they are: core competencies, essential learning, and literacy and numeracy foundations. These features contribute to a curriculum model with three elements: Content (Know), Curricular Competencies (Do) and Big ideas (Understand). The core competencies are what underpins the curriculum and are reflected in all three features of the curriculum model. The core competencies are valued for all students. The Big Ideas represent the generalizations and principles of a concept that students will come to understand. With that, the ocean and ocean education is not explicitly included in any of the core competencies or Big Ideas in the B.C. Curriculum. Though not explicitly included, ocean themes can be incorporated by the teacher to align with curriculum topics such as the water cycle, biomes, climate change, sustainability, and biodiversity. Likewise, Ocean Literacy is absent from the explicit K-12 mandated curriculum but could be implied when discussing the ocean within the curriculum. In order for teachers to be able to meaningfully incorporate the ocean into their classroom, they require an awareness, understanding and interest in the ocean. Therefore teachers are the link between the curriculum and Ocean Literacy. Additional opportunities for incorporating the ocean and Ocean Literacy into the classroom exist through the lens of First Peoples Principles of Learning (FPP) and the fostering of a sense of place.

2.6 Summary

The ocean is vital to life on earth and the marine environment is facing unprecedented, rapid, and widespread changes. Greater understanding and appreciation for the ocean is imperative to address current ocean destruction and devaluing. Efforts to promote and improve our understanding as well as appreciating and taking action to conserve the ocean resulted in the development of the Ocean Literacy Framework, which can be a useful tool for ocean education as this review revealed. In this chapter, I identified the OLF as a starting point and linked the current literature on OLF with Noddings's ethic of care rooted in the relatedness and emotiveness of the human condition. I concluded with a discussion of the B.C. Ministry of Education K-12 curriculum and how teachers can play a fundamental role in the processes and outcomes outlined in the OLF as they enact the curriculum, hence the explicit focus of this study on teachers' Ocean Literacy as key to further promotion of Ocean Literacy in B.C. and beyond. My review of the literature revealed a lack of studies focusing on using an ethic of care to inform environmental education, exploring teachers' perspectives on Ocean Literacy, or with the explicit incorporation of care ethics in Ocean Literacy. The research presented in this thesis attempts to address some of these gaps by providing insight into teachers' experiences with the ocean and Ocean Literacy as seen through an ethic of care.

CHAPTER 3: Methodology and Methods

To investigate and understand the experiences of teachers during an Ocean Literacy lesson which was part of an environmental education course, I employed a qualitative research approach. Drawing upon case study, I conducted qualitative interviews (structured and semi-structured) as the primary method of data collection and used thematic analysis to analyse the data. This chapter discusses my research design, including discussion of triangulation and researcher bias; data collection, including ethical considerations; and data analysis, including discussion of reliability and validity in addition to the limitations of this research.

3.1 Qualitative Research Study

Qualitative data can emphasize peoples' lived experiences while remaining steeped in the data's context of the phenomenon under study (Miles et al., 2014). In qualitative research, knowledge is 'constructed' continuously and in an ongoing process (Merriam & Tisdell, 2016c). Qualitative research is suited for representing educational phenomenon (Nazir, 2016), as "[q]ualitative researchers are interested in understanding how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences." (Merriam & Tisdell, 2016d, p. 6). Hence, I chose a qualitative research design for this study as dictated by the research question, the phenomenon under study, and the research context.

3.1.1 Case Study

Case study is specific and unique in the greater context of qualitative research. The key feature of case study is the case - the demarcation of a specific object of study (Merriam & Tisdell, 2016c). Case study understands a specific object or case as either intrinsic or collective, often satisfying both (Stake, 1995). In a case study, the focus is on the particular, rather than the

general. The individual case involves long term engagement, meaning making, and in-depth understanding (Stake, 1995). Case studies share commonalities with other qualitative research approaches which include the “search for meaning and understanding, the researcher as the primary instrument of data collection and analysis, an inductive investigative strategy, and the end product being richly descriptive” (Merriam & Tisdell, 2016c, p. 37).

A case study is appropriate when it is impossible to separate the phenomenon from the context (Yin, 2014). The case is the “what” of the study and is “a single entity, a unit around which there are boundaries” (Merriam & Tisdell, 2016c, p. 38). This is encapsulated in “a bounded system”, where the participants in the experience are bounded by time and context (Stake, 1995). A case can be a program, a specific community or group, or simply a single person. Merriam and Tisdell (2016b) describe a sort of test for whether a subject of research should be considered a case study, and that is to understand the “boundedness” of the topic and consider “how finite the data collection would be” (p. 39). Understanding the bounded systems helps in conceptualizing what constitutes as case study. If a subject of study can have an indefinite number of sources for data collection, such as a general group of people or programs, it cannot be considered a case study. Merriam and Tisdell (2016b) also describe that the unit of analysis is what further characterizes a case study, in that it is a particular case (program, community, group, person) that is the focus of study and the topic of interest, rather than the overarching topic or subject.

In order to investigate an object of study, case studies employ multiple data sources, utilizing at least two sources of data, with some important sources being: documents, interviews, direct observations and physical artifacts (Yin, 2002). This allows for an in-depth exploration of the bounded system, in which the case study is interested, in great detail (Creswell, 2013).

This study constitutes a case study as it is particular in nature with a finite possibility for data. It was impossible to separate the phenomenon from the context. This study is considered a bounded system as the context only existed within the study's setting.

3.2 Research Design

In this section, I outline the setting and context of this research along with the recruitment of participants. Also, I discuss how I ensured trustworthiness through triangulation and how I addressed research bias.

3.2.1 Study Setting

This study was conducted during a four-week long Science (Environment) Education course that ran during the summer of 2020 at the University of British Columbia (U B.C.). The course is an elective for teacher candidates in the Bachelor of Education program and for practicing teachers enrolled in an outdoor education diploma program. Due to the global COVID-19 pandemic, all U B.C. courses switched to remote learning. The course was taught asynchronously, with teachers coming together once a week for an optional online discussion about the week's module. The module in Week 2 (Module 2) was the Ocean Literacy lesson for this study.

3.2.2 Recruitment of Participants

The course instructor recruited participants for the study via the course online platform (CANVAS) prior to and during the first week of the course (Appendix A). Contact information for the research team was included in all recruitment efforts, and teachers in the course were

encouraged to ask questions for further clarification if needed. Teachers who agreed to participate responded via email with electronic copies of signed consent forms (Appendix B).

3.2.3 Triangulation

Denzin (2017) advocates that “the sociologist should examine [their] problem from as many different methodological perspectives as possible” (p. 297). In case study, at least two data sources should be used (Yin, 2002). Triangulation goes further and advocates for multiple data sources for the same phenomenon. Multiple data sources contribute to a more informed picture and richer story. Triangulation is imperative to ensure reliability and validity – along with mitigating bias, and should not be underestimated (Fusch et al., 2018). A study is considered valid if it is able to describe and capture accurately what actually occurred (Brink, 1993; Polit & Beck, 2012, as cited in Morse, 2015), while it is considered reliable if the methods used are able to consistently produce the same results (Brink, 1993; Morse, 2015) or, in terms of a case study, the process of study is consistent and stable over time (Miles et al., 2014). Triangulating the data with multiple sources makes it possible to comment more meaningfully on the phenomenon and provides more information about the experience of the participants. This study employed triangulation, the “use [of] multiple methods, data sources, and researchers to enhance the validity of research findings” (Mathison, 1988, p. 13) and included interviews, field notes and participant reflections.

3.2.4 Research Bias

The Hawthorne effect refers to instances when participants know their behaviour and responses are being observed by the researcher, resulting in possible effects on the data being collected (Landsberger, 1958) and a potential source of bias. The effect was minimized through

the use of multiple data sources (Yin, 2002), and limited interactions (pre-recorded lectures and post-intervention interview) between the participants and the researcher. Finally, no course assessment or evaluation was attached to the data collected.

3.3 Intervention: Module 2 - Caring for the Ocean

Module 2 was entitled *Caring for the Ocean* and was one of four modules of the Environmental Education course. The course instructor decided on the content and the outcomes of Module 2 and all other modules.

Module 2 comprised of two parts. The first part involved teachers becoming familiar with the concept of Ocean Literacy and Ocean Literacy education. The second part involved teachers having an experience with the ocean. In part one, in order to become familiar with Ocean Literacy, teachers were assigned to review the Ocean Literacy Framework and the paper *The Heart of our Biosphere: Exploring our Civic Relationship with the Ocean in Canada* (2020) co-authored by Ocean Literacy experts Diz Glithero, Hilistis Pauline Waterfall, Mary Simon and Wendy Watson-Wright. This paper considers critical and epistemological challenges to advancing Ocean Literacy in Canada while highlighting the different perspectives of Ocean Literacy of three women from across Canada. These perspectives included the experience of Ocean Literacy of two Indigenous (Inuit and Coast Salish) women and a scientist, with each of the three coastlines being represented. Other suggested (not required) course readings were included in the module (Appendix C). In addition, I delivered a pre-recorded lecture on Ocean Literacy to complement the reading. For part two, there was a total of three options. Option A was an in-person experience with the ocean. Due to the COVID-19 pandemic, it was recommended to avoid locations with large gatherings of people. With that, two other options were provided for participants that chose not to partake in an in-person activity. They could

choose to either watch one film or multiple videos (Option B) or explore an ocean related resource (Option C). Details for these options are provided in Appendix D. Participants were not limited to only one option. Teachers were encouraged to explore multiple options if time permitted. Generally, participating teachers choose one option for part two with the majority choosing an in-person experience. One teacher choose to watch a film and no teachers chose Option C for their ocean experience.

3.4 Data Collection

3.4.1 Interviews

Interviews are a common form of data collection in qualitative research such as case study (Merriam & Tisdell, 2016c). The purpose of an interview is for the interviewer to obtain information from another (Gay et al., 2012). Interviews can take many forms and are characterized by the number of participants, the format, and the types of questions asked, guided by the theoretical framework of the study (Merriam & Tisdell, 2016c). Three common research interview formats include unstructured, structured, and semi-structured. Unstructured interviews involve casual, unplanned and conversational interactions with no predetermined questions; whereas structured interviews are formal and planned with predetermined questions to prompt similar information from all participants (Gay et al., 2012). Semi-structured interviews incorporate elements of both structured and unstructured formats. In this study, I employed paper based structured interviews along with online semi-structured interviews.

The pre and post interviews used for data collection were structured interviews, as they followed a pre-determined series of questions. The interviews conducted after the module (one for each teacher) can be characterized as semi-structured as the format was planned with some guiding questions; unstructured and unplanned discussion about the participant's experience was

encouraged. To reduce the possibility of influencing participants' thoughts and experiences, I developed questions for both interviews based on the qualitative interview as recommended by Seidman (2006). In addition, two science education experts were consulted before the interviews were conducted.

3.4.1.1 Structured Interviews (Pre- and Post- Interviews)

The study used pre and post interviews for data collection as a way to examine participants' perspectives (Appendix E). In order to capture the starting point or baseline of all the teachers' perspectives before experiencing Module 2, a structured pre-interview was conducted. A structured interview was chosen for consistency for all participants as well as it provided an understanding of the teachers' perspectives of the ocean and Ocean Literacy, focusing on their understandings, familiarity, knowledge and assigned value of the ocean and the Ocean Literacy Framework. The same interview, both in format and questions, was conducted after completion of the module with the intention of the results to be used for comparative purposes.

3.4.1.2 Semi-Structured Interviews

As recommended by Patton (2015), an interview protocol was prepared for the semi-structured interviews after teachers experienced the module. The intent of the interviews was to prompt for the teachers' understandings of ocean literacy after the intervention, their overall experience of the module, and impacts the module had on their personal life as well as their teaching practice. The interviews also allowed teachers the opportunity to expand upon their written work through in-depth discussions on their perspectives during conversations with the researcher.

3.4.1.3 Interviewing with Zoom

During the summer of 2020, U B.C. restricted all in person interviews due to the COVID-19 pandemic. In adherence with U B.C. policy, an online method for the semi-structured interviews (Zoom) was used to work with the teachers. Zoom is considered a Voice over Internet Protocol (VoIP), which is described as “a system which provides users with a way to send voice and video across the internet via a synchronous (real-time) connection” (Iacono et al., 2016). The use of VoIP tools is considered to be a source of new opportunities in research (Iacono et al., 2016) with Zoom, in particular, being rated as highly satisfactory by participants due to unique features and a high appeal for qualitative researchers (Archibald et al., 2019). Finally, U B.C. affiliated Zoom complies with U B.C.’s Information Security Standards (U B.C. Information Technology, n.d.), making it a safe and secure platform for conducting research interviews. VoIP tools and methods should be considered a viable and useful alternative to in-person interviews (Archibald et al., 2019; Iacono et al., 2016). Though useful, some challenges include: navigating technical difficulties, Internet connection issues, inequitable access to required technology and the increased security risk with the use of cloud-based storage (Iacono et al., 2016).

3.4.2 Reflections

Much like personal documents, reflections are good data for providing insight and to make meaning of a “person’s attitudes, beliefs, and view of the world” (Merriam & Tisdell, 2016a, p. 166). Personal documents, such as reflections, are often an important part of data collection in qualitative research. These data are also good at providing specific insight into the study (Merriam & Tisdell, 2016a). All teachers in the course submitted a reflection as part of their course work after experiencing the module. With the consent of the participating teachers, copies of reflections were forwarded to me. The reflections were used as an additional data

source to triangulate utterances the participants' made during the structured and/or semi-structured interviews about their perspectives and specific episodic experiences with the module. Thus, the reflections further contribute to understanding the participants' overall experiences.

3.4.4 Researcher Field Notes

The researcher field notes were in the form of a personal journal that was kept throughout the data collection and analysis. This personal journal was a reflexive journal (Lincoln & Guba, 1989 as cited in Morse, 2015), where I was able to reflect on previous thoughts and perspectives and examine oneself for any potential bias that might arise during data collection and analysis. Researcher notes in the form of a reflexive journal created a resource for me to reference and "audit", in order to increase the study's trustworthiness (Lincoln & Guba, 1985), referring to the rigor and credibility of the study. This also created a creditable way (Nowell et al., 2017) for me to speak to my evolving views by referencing written field notes.

3.4.5 Participants

Five teachers consented to participate in the study, with one being familiar with Ocean Literacy. All participants are labeled teachers for the purposes of this study. The teacher candidates who participated in this study completed their long practicum and were certified to teach in a classroom as a teacher-on-call (TOC). Four teachers chose the in-person experience for part 2 of Module 2, which involved a direct experience with the ocean. One teacher chose to watch a film. To ensure anonymity, study participants are referred to by the following pseudonyms in this thesis: Drew Frankie; Quinn; Skye; and Teri. A paragraph describing each of these participants are provided below.

Drew was completing the Bachelor of Education program with a focus on social studies education. Drew studied geography in his undergraduate studies. Drew shared that he had a unique experience while travelling, where he was able to put one foot in both the Indian and Atlantic oceans at the same time. Drew considered himself to have a fair amount of science knowledge about the ocean. He is interested in sustainability and reducing pollution.

Frankie is a practicing teacher with experience teaching special education. He was pursuing an outdoor education diploma. Frankie spoke to his lack of ocean education as a child and remarked that he wanted to find ways to incorporate the ocean into his classroom. He shared that he considered himself to have very limited information about the ocean. Based on the interviews, Frankie seemed to have a great care and love for being on the beach and in the ocean. He spoke of his many experiences surfing, swimming, and playing at the beach and described the ocean as a close companion.

Skye was completing the Bachelor of Education program and studied science and ecology in her undergraduate work. In interviews, Skye revealed a passion for aquatic species of B.C., particularly Pacific Salmon. Skye spent time by the shore as a child exploring the beaches of the Lower Mainland, and also visited the beach as a university student during a field course experience. Skye expressed having a beginner-moderate knowledge of the ocean and shared she felt more removed from the ocean as an adult compared to when she was a young child.

Teri was completing a Bachelor of Education program and studied forestry and conservation in her undergraduate work. Teri likes the ocean and is considerate and aware of the importance of its systems and ecosystems. She occasionally visits the ocean, enjoying the opportunity to observe nature, sharing her enjoyment in walking on the beach. Teri also acknowledged the importance of the ocean and the risks it currently faces.

Quinn works as a teacher at the district level supporting other teachers in environmental education and outdoor learning. Quinn is familiar with the Ocean Literacy Framework, having used it in the development and delivery of an Ocean Literacy program for students. The ocean holds an immense amount of value to Quinn and her family, as she enjoys recreating and spending time with the ocean. Quinn considers herself to have an above average understanding of the ocean, ocean life and ocean issues.

3.5 Ethical Considerations

Teachers' confidentiality and anonymity were maintained by assigning pseudonyms on all interview excerpts and field notes. No names or any other identifying information were used in this thesis or in any presentations or publications that might result from the study. All participants provided consent and understood they could withdraw from the study at any time without penalty. No assessment or mark was associated with participation in the study. There was no academic incentive to participating in the study. I had no role in the assessment or evaluation of the teachers in the course. All data collected during the study were strictly confidential, with only study investigators (i.e., myself and my supervising research committee) having access to the data; identifiers were removed, and the use of pseudonyms ensured that committee members are unable to pinpoint teachers who participated in the study. All personal information and data was stored on an encrypted and password protected portable storage device and computer.

3.5 Data Analysis

Here, how the data was analyzed in the study is explained. The reliability and validity of this work, along with research limitations are also discussed.

3.5.1 Data Analysis in Qualitative Research

It is through the process of data analysis that a researcher makes sense of data (Merriam & Tisdell, 2016b). This is where meaning and understanding is attributed to what has been collected (Merriam & Tisdell, 2016b) and is summarized in a “dependable and accurate manner and ... has an air of undeniability” (Gay et al., 2012, p. 465). This is ultimately guided by the established theoretical framework and research question(s) of a study. It is often challenging and time consuming to parse through the data collected, and in qualitative research, analysis may be carried out simultaneously with data collection (Merriam & Tisdell, 2016b).

I drew largely from Miles and Huberman’s (1994) approach to thematic analysis to analyze the data. The approach is suitable for the study for the following main reason: it is widely used in qualitative research to examine patterns that cut across an entire data set (Braun & Clarke, 2006; Miles & Huberman, 1994). In the context of this case study, these patterns allow for the identification of teachers’ key perspectives of the ocean and Ocean Literacy following the module. It should be noted that thematic analysis can be deductive, inductive or a combination of the two, and the process entails the development of codes that are subsequently used to develop themes (Braun & Clarke, 2006). The codes may be linked to raw data as “summary markers” for later analysis (G. Guest et al., 2014, p. 9).

In this study, a largely inductive approach was implemented to construct the themes (Miles & Huberman, 1994), where the analysis focused on identifying and describing both implicit and explicit ideas within the data (G. Guest et al., 2014). I mainly modified from Miles and Huberman’s (1994), and included the following steps in order to develop a highly reflexive, systematic, and iterative analysis to tease out the experiences of the participants:

- (1) Overall examination of the data. In order to become familiar with the data set, I carefully read and reviewed all of the collected data. This was the beginning of the process of becoming aware of what was present.
- (2) Selection, reduction, and organization of data. The data was organized according to the participants. This was followed by iterative readings and marking of relevant parts of the interview transcripts (both structured and semi-structured interviews; transcribed verbatim) and participant reflection pieces. This step allowed for the creation of a collective document (i.e., individual participant profiles [Tan & Nashon, 2015]) with details such as marked quotes and descriptions of their experiences to form narratives for each individual participant. The profiles allowed me to become familiar with each participating teacher and to gain deeper understandings of their utterances.
- (3) Construction of themes. This process entailed looking for common words, phrases, meanings, relationships, and patterns in the marked parts of the data. This in turn allowed for the development of codes which comprised of summative or essence-capturing descriptions of passages into a single word or short phrase (Miles et al., 2014). The codes were re-examined and consolidated to construct themes.
- (4) Verification of the themes. The themes were checked against the rest of the data set (serving also as a form of triangulation), such as the teachers' reflection pieces and the researcher fieldnotes for consistency in meanings. The themes were adjusted if necessary.

Once the themes were verified, I began an iterative writing process to create the descriptions as well as a summary of each theme. It can be noted that the thematic analysis employed here

resembles the analytical approach coming from Nazir and Pedretti's (2016) research with environmental educators at an outdoor education centre.

3.5.2 Validity and Reliability

The concern for validity and reliability when using thematic analysis (G. Guest et al., 2014) is discussed here.

Validity and reliability are increased through the countering of errors which are inherently part of the research process (Brink, 1993). Both validity and reliability are interlinked and are promoted by using diverse and robust experimental design, data collection processes and data analysis methods. Errors are reduced through thoughtful planning, the use of multiple data sources and prioritizing triangulation, all of which were employed in this study. An awareness and acknowledgment of sources of error and bias that can threaten validity and reliability is a vital first step to reducing them (Brink, 1993).

Validity (internal) is analogous with credibility and reliability is analogous with dependability (Lincoln & Guba, 2007). For these purposes, a study is considered valid/credible if it is able to describe and capture accurately what actually occurred (Brink, 1993; Polit & Beck, 2012, as cited in Morse, 2015), while it is considered reliable/dependable if the methods used are able to consistently produce the same results (Brink, 1993; Morse, 2015).

Additional strategies and techniques are suggested in the literature and utilized here. These include peer-debriefing, and thick descriptions (Lincoln & Guba, 2007; Morse, 2015).

3.5.3 Research Limitations

The findings of this work are limited to the context in which they were collected, including the select Environmental Education course and the teachers who elected to participate

in this research. However, as with other case studies, the findings may be applicable to similar contexts.

3.5 Summary

This research utilized a qualitative research approach and drew upon case study design to investigate teachers' perspectives. The study took place during a Science (Environmental) Education course during the summer of 2020 at U B.C., with the lesson of interest being one module of the course. I used both structured and semi-structured interviews, along with reflections, as sources of data. Structured interviews took the form of pre and post module surveys and semi-structured interviews were conducted after the module via Zoom. Researcher field notes were also used throughout as a self check. Data was analysed using thematic analysis. Reliability and validity were increased through the implementation of triangulation, thoughtful planning, multiple data sources and thick descriptions.

CHAPTER 4: Study Findings and Analysis

In this chapter, I report the findings and provide analysis of the study data to address my research question: How are the teachers' perspectives of the ocean and Ocean Literacy affected after experiencing a lesson on the topic?

All the data collected through structured and semi-structured interviews, and participant reflections were analyzed using thematic analysis (Miles & Huberman, 1994). Excerpts from the interview transcripts and the reflections were presented under each defining theme. The results are divided into major themes and supporting sub-themes. The data in this study were analyzed within the following three themes: 1) expanded awareness of their relationship with the ocean; 2) increased Ocean Literacy; and 3) increased understanding of Ocean Literacy and the role of place in ocean education.

Patton (2015) notes that in qualitative research, themes will frequently 'emerge' from the data. Throughout this study, themes became apparent at multiple junctures in the data analysis and were discerned into three themes. These constructed themes were related to the research question that drove the study and were identified in teachers' responses.

4.1 Expanded Awareness of Their Relationship with The Ocean

The first theme characterizes the teachers' views on their relationship with the ocean. This theme describes the ways the module experiences expanded their awareness of their relationship with the ocean. Within this theme, the following sub-themes emerged from the data: 1) connection to past experiences and the ocean; 2) the influence of others and their experiences with the ocean; and 3) self-awareness of their relationship with the ocean.

4.1.1 Connecting to Past Experiences with the Ocean

Drew shared memories with the ocean from his personal experiences where he connected with the ocean during his travels worldwide. He highlighted what made those memories significant, “[o]ne of the fondest memories [...] was [...] in South Africa and sticking my foot in the Indian and Atlantic oceans” (Drew, Pre-survey). He also spoke of past experiences where he associated the ocean as a mode of travel such as “[t]aking boats o[r] ferries across channels and gulfs” (Drew, Pre-survey). Drew also spoke of his connectedness with the ocean saying that “the idea that the ocean is what connects us all. How water can be along the coast of Australia one day then in another place [the] next” (Drew, Pre-survey). Drew found that the module experience reminded him of past experiences with the ocean. These past experiences provided a foundation for his understanding of Ocean Literacy: “[i]t was things that I've learned in the past and it's nice to be reminded of it, so it was [...] a nice refresher” (Drew, Interview).

Quinn’s past experiences with the ocean focussed on her years of employment as a recreational guide. She spoke about the connectedness that had been developed through those experiences which she described as “having an intimate relationship with the ocean as a sea-kayak guide” (Quinn, Reflection). This module experience was a profound reminder of this close relationship with the ocean, forged during her guide work. Quinn noted: “[t]he surveys (structured interviews) did remind me of the deep connection I do have for the ocean” (Quinn, Reflection). Quinn expressed her connection with the ocean in terms of a source of work, play, and food and went on to establish the importance of the ocean to all life on earth: “[w]e [...] work on the ocean, play on the ocean, eat from the ocean, and understand that everything can be connected back to the ocean” (Quinn, Pre-survey). Quinn summed up the module experience as supporting the important need for Ocean Literacy in education. She found the experience

“reaffirming to continue with ocean education and the importance of Ocean Literacy” (Quinn, Interview), and was grateful for the opportunity to reconnect to the ocean through this experience.

Even with her prior knowledge and experiences with the ocean, Quinn found the ocean to be an ongoing source of awe and wonder as well as knowledge and inspiration. She shared that “the ocean always amazes me no matter how much time I spend there because I am blown away and learn something new every single time I'm there” (Quinn, Interview). Quinn also discussed how the ocean is always changing, with much yet to be revealed. She believed that spending time with and on the ocean provides insight into the many mysteries of the ocean realm, such as when a crab moults its shell, which Quinn excitedly shared as a part of her experience with the ocean for this module. Quinn found these experiences to be exciting and part of a process, which is often hidden from view due to human’s primarily terrestrial existence:

I think that the ocean is constantly changing. Right, and there's so much we don't know about it and it reveals kind of secrets of itself to us all the time. So, like I mentioned about [...] the rock crab moulting right, I was learning [during] that experience when I was there, so more time spent at the ocean and more time just in general spent outside exposes us to these various experiences that we might read about in a book, but when you're actually seeing it, there's a true excitement about it. [...] [I]'s just so phenomenal, that this stuff just happens every day and often we don't see it and it's kind of under this blanket of water and there's so much we don't really know about it [...] I think learning with the ocean, its a process [...] It's a process that reveals itself through time spent there (Quinn, Interview).

Skye drew on past experiences growing up in the Lower Mainland where the ocean was a constant companion throughout her life. She fondly remembers beachcombing experiences from her childhood where she would spend the entire day exploring the intertidal zone. Skye shared that “[g]rowing up in the [L]ower [M]ainland, the ocean has always been part of my life. I remember spending entire days at the beach in my mom's old neighbourhood [...] exploring the intertidal life on the beach (Skye, Pre-survey). Skye went on to specify how past experience made the ocean significant and meaningful: “I still think of the childhood memories I have of spending time in and along the ocean” (Skye, Post-survey).

Teachers drew upon and reflected on past experiences with the ocean to expand their relationship with the ocean after their module experience. These ecological memories (Jardine et al., 2018) included positive recollections of travel, which highlighted a connectedness with the ocean, childhood excursions with the ocean becoming as lifelong companion, and work-related experiences where the ocean was a source of employment as well as pleasure. All these past experiences contributed to teachers’ developing a meaningful and relevant relationship with the ocean. The module experience resulted in teachers reflecting on their past experiences and the ways these significant life experiences with the ocean expanded their ocean awareness.

4.1.2 The Influence of Others and their Experiences with the Ocean

Teachers identified the important role of others – family and friends – as contributing to and expanding awareness of their relationship with the ocean. Most teachers selected module activities they could experience with others and found that their relationship with the ocean was enhanced and expanded by the shared experience. Frankie spoke to the awe and wonder he felt when he reconnected with the ocean in the company of his daughter. Experiencing the module with his daughter resulted in Frankie seeing the ocean through the eyes of a child. He shared, “I

am humbled by the fact that it takes my [daughter], fairly new to the world, to re-awaken my heart, my emotions, and my worldview to the wonder and awe that I used to maintain full-time for the ocean” (Frankie, Reflection). Frankie went on to describe the shared experience with his daughter:

I like[d] taking my two year old out to the ocean, she’s been in the ocean before but less than 5 times and, I think [...] there’s a newness for her each time which makes it more meaningful and maybe re-awakens something that isn’t dead but maybe sleeping [...] because I think the “awe-ness” or the “awesome-ness” of the ocean is maybe not something that inspires my daily life but I think when you see it through a kids eyes I think it might be more spectacular. Because there’s so many little things that you forget about (Frankie, Interview).

Fundamental to Frankie’s experience was having the opportunity to share the ocean with his daughter:

The thing that’s maybe been helpful [...] it’s been doing things with my family, people you are always in discussion with so my wife jokes that she is basically taking the course with me [...] and then I like[d] taking my [child] out to the ocean (Frankie, Interview).

Frankie “liked the emphasis of going with my family, otherwise its really awkward for me to leave [them]” (Frankie, Interview) continuing to say that “as my [children] and I go to the beach more, I want their questions to inspire more inquiry in my own life” (Frankie, Reflection).

Frankie described his “re-awakening [...] to the awe and wonder of the ocean. The vastness and the great unknowns” as a significant and memorable experience (Frankie, Post-survey). He noted in addition to him being his daughter’s companion, he also viewed the ocean as a companion: “I think about the ocean the most when I am playing in it (surfing, swimming,

playing at the beach). It is like a close companion I suppose” (Frankie, Pre-survey). Experiencing the ocean with his daughter expanded upon and enhanced his relationship with the ocean due to the companionship and the shared experience, which renewed his awe and wonder and enabled him to see the ocean through his daughter’s eyes.

Other teachers spoke to the power of experiencing the ocean with a companion. Teri asked her sibling to join her for the module experience and relayed how she came to view her sibling as a co-learner with whom she could share knowledge of the ocean. Teri explained: “I brought my [sibling] with me to this journey” (Teri, Reflection). She noted that involving her sibling in the module experience increased her “level of knowledge of ocean” (Teri, Post-survey). Drew included his partner in his module experience and shared “she might have had more fun than me” (Drew, Reflection).

For these teachers, sharing the module experience with a companion influenced and expanded their own relationship with the ocean. In Frankie’s experience, he became the adult companion essential to rediscovering our inborn sense of wonder Rachel Carson writes about in her seminal book *Sense of Wonder* (Carson, 1965). Frankie found that his daughter rekindled his own sense of wonder, as he was able to view the ocean through a child’s eyes. He also identified the ocean as a companion to wonder. Teri became a co-learner as she and her sibling experienced the ocean together, and for Drew, he found joy in his partner’s sense of wonder for the ocean. In all these cases, experiencing the ocean with a companion influenced the participant’s own relationship with the ocean, expanding their awareness of their relationship with the ocean realm.

4.1.3 Self-Awareness of their Relationship with the Ocean

The teachers recognized increased self-awareness of what the ocean meant to them and recognizing the significant role the relationship played in their lives as they reflected upon their

module experience. Frankie described the ocean as an “old friend”. He found the module experience provided the opportunity for him to recommit “to an old friend” (Frankie, Interview).

Skye became aware of how forging her relationship with the ocean was an ongoing process that required work and commitment to deepen the connection. She acknowledged she needed to continue to develop her relationship with the ocean as the module experience opened up the possibilities:

My current relationship with the ocean is 'in progress'. Now that I possess a clearer understanding of what a 'relationship with the ocean' involves, I recognize that I have some work to do to deepen my connection with and understanding of the ocean (Skye, post-survey).

Skye went on to describe what she meant by connection with the ocean and how to further that connection by becoming aware of multiple perspectives:

...now I kind of see it as not only knowing about the ocean but also having a connection to it as well, yea I was thinking of it more along the lines of being able to identify species and knowing about currents and stuff like that but now I see it more as not only taking that kind of western based scientific knowledge but also incorporating other perspectives [...] and also your own connection to the ocean and your experiences, memories, that kind of thing (Skye, Interview).

Quinn linked her developing awareness with her multiple relationships with the ocean. She characterized these relationships as cognitive, affective, and corporeal, involving advocacy and stewardship:

I have many relationships with the ocean. I have a personal relationship, it is a place of solitude, reflection, and relaxation. I have a physical relationship through it as a place of

recreation and fun. I have a relationship of wonder, the ocean is a place to explore and discover. I also have a relationship of responsibility; I advocate and am a steward of the ocean (Quinn, Reflection).

Quinn went on to share the extrinsic and intrinsic value the ocean held for her and her family:

The ocean holds an immense amount of value to me. I understand how vital it is to the earth's existence of how we know it now. We also work on the ocean, play on the ocean, eat from the ocean and understand that everything can be connected back to the ocean (Quinn, Pre-survey).

Quinn also noted how her awareness included not only her own health and well being but also for her family and future generations: “[the ocean] has a value for the health of my family's future generations; it holds a value of [being sacral]. The ocean will take care of all the generations after me” (Quinn, Post-survey).

Skye found that the module experience enabled her to become more aware of why she values the ocean. She now found she valued the ocean more deeply not only in what the ocean could do for her but also, for what she could do for the ocean:

... the reasons I value [the ocean] might now be more informed. For instance, I recognize the role of the ocean in supporting life on Earth (provision of water, nutrients and oxygen, climate regulation, etc.). I also still recognize my own personal connections to organisms (like salmon) that depend on the ocean and therefore have an invested incentive to care for the ocean, and develop my relationship with the ocean (Skye, Post-survey).

Skye's described how for her, developing awareness involved moving from caring to taking action on behalf of the ocean. She spoke to her growing understanding of her relationship to the ocean and its implications for care:

[t]his realization pushed me to consider how I viewed my own relationship to the ocean and to salmon, and I ultimately realized that I need to move from simply caring about Pacific salmon to actively taking part in caring for and protecting these keystone species. I am in the process of considering what this new definition of care will look like (Skye, Reflection).

Skye also noted the importance of self-awareness leading to reciprocity, speaking specifically to the reciprocal potential of this relationship and care:

[this] re-positioned my view of what a relationship with the ocean meant, by highlighting the fact that it is a reciprocal relationship, meaning that I have to consider ways I can demonstrate care for the ocean rather than simply caring about it and only considering my connection to it as being one-sided (Skye, Reflection).

Quinn's self-awareness led to developing a relationship which benefitted the health and well being of herself and her family: "Fo[r] me and my family we find a deep solitude when we are near the ocean. We [...] gain such a sense of adventure, wonder and discover[y] whenever we are near the ocean" (Quinn, Pre-survey). She added: "if something happens to the ocean [...] I won't be able to recreate on the ocean or share those experiences with my family" (Quinn, Interview), which reveals a primarily extrinsic and human focused perspective on her relationship with the ocean.

The teachers found the module experience furthered their self-awareness of the ocean as they connected with the ocean. In some cases, teachers developed a more intrinsic relationship

where they came to value the ocean for its own sake. Others found value in what the ocean could provide in terms of physical and emotional health benefits, well being, and recreation for them as well as for their family. All teachers recognized that their relationship with the ocean was ongoing, and through the module experience, they became more aware of the importance and significance of the ocean and what the relationship involved in terms of connection, care, and advocacy.

Teachers expanded their awareness of their relationships to the ocean through a combination of connecting to past experiences, influence from others and their own self-awareness of their relationship. By reflecting and recalling on notable memories with the ocean, teachers were reminded of their interest and love for the ocean. With other people's involvement in teachers experiences, teachers were able to rekindle a sense of wonder, be co-learners and find joy in others enjoyment. Self-awareness of their relationship with the ocean led to deep and meaningful reflection on the implications of this for teachers current and future relationship with the ocean. Ultimately, all of this contributed to teachers developed perspectives of their relationship to the ocean.

4.2 Increased Ocean Literacy

The second theme is the teachers' views on Ocean Literacy and their connections to the ocean. In this section, I present each teacher's views of Ocean Literacy and then summarize their views into a collective.

Drew

Drew described his views on Ocean Literacy before he experienced the module describing it as the “[d]ifferent ways we can learn about the ocean. Literacy can be text, images,

interactions etc.” and added “I also know the importance that [the ocean] plays on our earth. 2/3 of the earth is ma[d]e up of the ocean, so we have to make sure it is respected. The problem is not a lot of people do” (Drew, Pre-survey). Drew expanded on his views post experience when he characterized Ocean Literacy as being “...about how humans learn and interact with the ocean. There is an interconnection between western knowledge and Indigenous knowledge that allows us to get in touch with our ocean and its environment” (Drew, Post-survey).

Drew’s views on Ocean Literacy come together when he describes his current relationship with the ocean in his post survey interview: “I would say it is one sided and I need to care for the ocean more” (Drew, Post-survey). He then acknowledges how Ocean Literacy is a continuous endeavour and that caring for the ocean is a way to advocate and take action on behalf of the ocean. Drew then shares what he found significant and meaningful about his experiences with the module: “principle #7, the ocean is largely unexplored, [...] I think the last [principle] allows us to keep exploring and investigating our ocean” (Drew, Post-survey). Here Drew articulates his views on the continuous and never-ending nature of understanding the oceans and Ocean Literacy.

Drew also acknowledged that Ocean Literacy involves the need for him to care more for the ocean. He noted the importance of keeping Ocean Literacy in mind when teaching and sharing awareness of the ocean and ocean relatedness issues:

I would say it is one-sided and I need to care for the ocean more. In the lower mainland we have a relational connection to the ocean [...] I find that in school it can be out of sight out of mind, so we need to make students aware of how we can care for the ocean (And remind them!) (Drew, Post-survey).

Drawing upon his course experiences, Drew was able to make connections to his own students and the importance of developing Ocean Literacy by incorporating Ocean Literacy into his classroom. He views his role as a teacher as ensuring students develop Ocean Literacy through awareness of the ocean, which will then foster care for the ocean.

In his interview discussion of Ocean Literacy, Drew identifies issues of Globalization as shaping his views of Ocean Literacy in terms of how human actions are affecting the earth worldwide. He advocates for a holistic approach to Ocean Literacy that encompasses all terrestrial, freshwater, and marine environments. Drew states that literacy is “not so much how we're affecting oceans or bodies of water [...] a different way to look at [globalization] and seeing it in that whole. We think of it more like landforms and stuff but then also thinking [...] we're working with all this transportation we're still moving to the ocean or we're still needing the oceans resources [...] too so that would be another area to look at. Beyond things like fishing, like fishery. I know is a big one that we always bring up but then there are other things that we can talk about too (Drew, Interview).

Drew also shared in his interview how his views on Ocean Literacy evolved. He started with the ways humans use the ocean and then moved to including a science-based view of Ocean Literacy that involved understanding systems such as the water cycle and ultimately viewed Ocean Literacy as providing the foundation for understanding the ocean through Indigenous perspectives of community and inter-relatedness:

I was thinking [Ocean Literacy] being very defined [...] going out [...] on a ferry type thing, and now thinking of it in terms of the water cycle, and [...] transportation, of how in indigenous times (histories) that was the main source or the fastest way of transporting and moving about, but I think that's kind of another way that I've looked at Ocean

Literacy, is in more of that globalized sense of it and how it connects everyone together instead of just the physical H₂O of it (Drew, Interview).

In his pre-experience survey (structured interview), Drew focused on Ocean Literacy as knowledge acquisition, and how that knowledge could be shared and disseminated in multi modal ways. He viewed Ocean Literacy as prescriptive, fact based, and benefitting humans with a focus a human centred relationship with the ocean. Post experience, Drew discusses Ocean Literacy as highlighting the importance of how we feel about the ocean and how caring should be an important feature. His view includes a more intrinsic understanding of Ocean Literacy as he moves from - what can the ocean do for me; how do I feel about the ocean; and ultimately to what can I do for the ocean? Drew discusses an Ocean Literacy which values Indigenous perspectives and Traditional Ecological Knowledge (Barnhardt & Kawagley, 2005); an Ocean Literacy which finds common ground between western and Indigenous science.

Frankie

Frankie's views on Ocean Literacy before experiencing the module are evidenced by his discussion around ecology and care. He shares, “[u]nderstanding the way that the ocean systems and ecology interact with the rest of the environment on land. Also, the understanding of how care (or lack-thereof) for our oceans affect the earth” (Frankie, Pre-survey).

After experiencing the module, Frankie's views of Ocean Literacy expanded to involve developing a physical and emotional connectedness with the ocean. Frankie shares that for him Ocean Literacy “changed to being more connected and emotionally compelled by the ocean, that was what it meant for me” (Frankie, Interview). He then added that this change revealed to him

that emotion and connection were not specifically part of his views on Ocean Literacy prior to the module experiences.

I probably would have assumed it was like a holistic understanding, but I think the compulsion by emotion or connection maybe wasn't part of my definition or wouldn't of been, I mean maybe a bit but not in the same capacity, I would say that that was the biggest change (Frankie, Interview).

During his interview, Frankie elaborated on his views of Ocean Literacy and highlighted his lifelong love for the ocean based on direct experience with the ocean that involved activities such as surfing. He then shares how his views developed from a human centred approach, using the ocean for pleasure, to incorporate a more earth centred understanding of Ocean Literacy that prompted him to think about how to give back to the ocean:

...if I loved the ocean before, it was more at an experiential level, but I always loved the ocean, I hate sitting at the beach, I always hated sitting period and so I hate just sitting anywhere, which is hard for me when I'm supposed to sit and reflect, so I would surf on that water, previously when I was in my 20s [...] so those kind of activity-based things on the ocean, what can the ocean give me? [The module experience] was sort of a renewing reminder – [...] the ocean is not just about what it offers [...] it is what it teaches us but also about our immediate, how much more our decisions in places that are not in the ocean will impact the ocean as well, [...] like plastics, [...] how we preserve the ocean from our homes, how we do laundry, those things actually matter, so rather can I get a cool sport out of the ocean, what I am going to give back to the ocean in return? (Frankie, Interview).

Frankie also experienced change in his views on Ocean Literacy as evidenced in his post-survey and interview discussion. “Ocean Literacy [...] means to me: the connectivity and wonder we have towards the ocean” (Frankie, Post-survey) and “as best as possible there needs to be a bigger experiential piece at a personal level” (Frankie, Interview).

Frankie also discussed Ocean Literacy as involving a large body of specialized knowledge. He notes that humans could not possibly know or understand everything about the ocean but through developing care for the ocean, Ocean Literacy can be developed. Frankie shares his views on Ocean Literacy in his discussion on the knowledge involved for in-depth understanding of the ocean realm:

...I feel like I know less than 1% about most topics, but I know far less than that 1% about the ocean when I/we explore[d] [...] some of the resources and just like everyone’s niche about belugas or like the language of whales, there’s like a gazillion different little nuances that have endless amounts of information. You can research with like 17 PhD’s and still not uncover it all so I feel maybe just simply - the ocean seems like this endless abyss of knowledge that I’ll never unpack so learning with the ocean I almost feel like it’s almost unobtainable, [...] maybe there’s even just a couple nuggets that I could take away in my lifetime then that would be sufficient (Frankie, Interview).

Frankie goes on to explain how care can be an achievable goal of Ocean Literacy: “...the only thing that I could do is care about it and be connected to it and then in that way is how I could be [ocean] literate” (Frankie, Interview). Finally, Frankie also shared how: “I understand with my head knowledge the importance and connectivity of the ocean to our planet. I would say that my heart is coming along to catch up with my head knowledge” (Frankie, Post-survey).

Frankie's views of Ocean Literacy prior to the module experience included the importance of care, acknowledging that a lack of care has implications for the conditions of the ocean. The involvement of emotion and connection to the ocean was recognised as a novel feature in Frankie's understanding of Ocean Literacy, sharing that the compulsion by emotion and connection was the biggest change in his perspectives of Ocean Literacy. From Frankie's responses, the importance of direct experience with the ocean for developing care for it was clear and that through this experience Frankie was able to shift towards a more earth centered perspective of Ocean Literacy. Frankie also suggested that it is through developing care for the ocean that Ocean Literacy can be most achievable.

Quinn

Quinn had a clear familiarity with the OLF, and that was evident in her initial views on Ocean Literacy where she explained how, what we do to the ocean, we ultimately do to ourselves: "[u]nderstanding how the ocean effects us and how we effect the ocean" (Quinn, Pre-survey). Quinn confirmed this view of Ocean Literacy in her post-survey response, "[h]ow the ocean influences us and how we influence the ocean. An all-encompassing understanding of the ocean and ocean life" (Quinn, Post-survey). By adding the view that Ocean Literacy involves "an all-encompassing understanding", Quinn acknowledges the breadth of knowledge and holistic view which goes beyond knowing about the ocean and comprises of a relational and in-depth understanding of Ocean Literacy.

Quinn referred to the module experience as reaffirming and refreshing her existing views on Ocean Literacy. She expressed excitement that Ocean Literacy was at the forefront of the

course and was being discussed and taught to educators who could then incorporate it into their own classrooms:

Well I think the most enlightening thing is that this is a topic in the course. [...] Ocean Literacy, I feel is a bit of a new concept. It's [...] something I've been working on for the last couple years so I'm familiar with it, but I know none of my students are and it's something that I'm bringing it to [the] attention for a lot of people so when I saw Ocean Literacy as a module in the course, that alone was refreshing (Quinn, Interview).

Even though Quinn was familiar with Ocean Literacy and a firm believer of Ocean Literacy playing an important role in education, she found the module experience further inspired her belief in the efficacy of teaching and learning about Ocean Literacy. She found the module experience on Ocean Literacy to be “refreshing” and a source of resources that she could use and share with her own students.

For Quinn this experience was an exciting topic for her as she was familiar with the OLF and had used it in her practice. As Quinn was familiar with Ocean Literacy, she knew the formalized definition as well as acknowledged the importance of having an all-encompassing understanding of the ocean. Quinn considered the experience a refresher in terms of their commitment to Ocean Literacy and ocean education as well as a source of further inspiration to continue her efforts in ocean education.

Skye

Skye’s initial views of Ocean Literacy focused on connecting with the ocean in local settings and were primarily science based. She shared that through this connection, people would develop understanding and awareness of the ocean. She also highlighted the important role of

direct experience during ocean related activities such as identifying ocean related flora and fauna.

Having an understanding of and an appreciation for ocean environments. For people in the lower mainland, I might relate Ocean Literacy to developing a connection to local ocean environments. Activities that promote Ocean Literacy could involve getting out and experiencing these environment[s] and observing and identifying the plant and animal life in these environments (Skye, Pre-survey).

Skye notes that her initial view of Ocean Literacy was scientific with a focus on species identification and knowledge of marine ecosystems. She explains how she did not believe herself to be ocean literate due to a lack of this kind of knowledge about the ocean:

...and I would just [remove] that idea that its really rooted in being able to [...] [identify] things because that's what the [marine ecology] course focused on, and I always kind of felt like I wasn't "ocean literate" because I didn't have a lot of experience with that so I would take that out of my definition [of Ocean Literacy] (Skye, Interview).

In addition to this, Skye discusses how her views on Ocean Literacy changed after the module experiences. Her views shifted from a solely western perspective of the ocean to include Indigenous knowledge systems:

...a key difference was the fact that my understanding of what 'knowledge of the ocean' and a 'relationship with the ocean' signified. In my post-survey, I highlighted the fact that my previous definition of 'knowledge of the ocean' really only considered a Western-based, scientific knowledge. After working through the materials for this module, I have come to realize that ocean

knowledge encompasses a great deal of other knowledge systems and perspectives: Indigenous knowledge, and social, cultural, and economic perspectives (Skye, Reflection).

After the module, although Skye's views on Ocean Literacy continued to be primarily human centred, she did reveal a more inclusive understanding of the ocean when she spoke to the importance of Indigenous knowledge and perspectives:

Ocean Literacy is defined as an understanding of the ocean's influence on you, and your influence on the ocean. To this definition, I would also add that Ocean Literacy must involve both Indigenous Knowledge and perspectives on the ocean as well as Western knowledge of the ocean (Skye, Post-survey).

Prior experiences with the ocean informed Skye's science-based understanding of Ocean Literacy. In her pre experience surveys, Skye highlighted the important role of understanding the ecology of local environments and being familiar with the species that are found there. Direct experiences and expertise of local environments played a large role in this understanding. After the experience with the module, Skye was able to identify the presence of this scientific understanding of Ocean Literacy and acknowledge the role it played in her initial interpretation. Skye incorporated the inclusion of multiple diverse perspectives to ocean education with a focus on the inclusion of Indigenous knowledge systems. Skye developed a more inclusive understanding of Ocean Literacy that extended past a solely human centered view.

Teri

Teri's initial views on Ocean Literacy focused on the science of ocean ecosystems. After the module experience and learning about Ocean Literacy, she expanded her views to include

human interaction and connection with the ocean environment as being important to Ocean Literacy. Teri explains that she initially included “[u]nderstanding ocean as a complex ecosystem and as a part of the world” (Teri, Pre-survey). She notes “I basically think about ocean as a topic for study for science courses, however after spending time near the ocean and learning about [...] the framework in the module I understand it is also very important to incorporate the human dynamic into Ocean Literacy (Teri, Interview).

After the module experience, Teri discusses how connection became a part of her understanding of Ocean Literacy: “I’ve learned more about Ocean Literacy in the sense that we are connected with the ocean and how our world views change our perspectives toward the ocean” (Teri, Interview).

Teri spoke about the different ways she understood Ocean Literacy as a learner which included the water, colours, currents, and the non-human inhabitants. She also remarked on what is unknown and yet to be discovered about the marine environment and recognizes these are all part of and affect our relationship with the ocean:

As a learn[er] I think the ocean is way more dynamic than we can think of, we usually think of the water and the different aspects of water, lets say the colour or movement and stuff like that, but there’s so much more, they’re animals that are large like seagulls or very small, we may not even see with our bare eyes living in the ocean and there so much that we don’t know about the ocean and there are many factors like biotic or abiotic factors are influencing the ocean or even our relationship with the ocean (Teri, Interview).

Teri shared how our relationship with the ocean mirrors how we develop relationships and make connection with human communities. Knowing more about the ocean helps us know

more about ourselves: “when we are learning about the ocean we are also learning about ourselves too, let’s say there are things we don’t know about the ocean and there are things we don’t know about ourselves and our community” (Teri, Interview).

Teri also discussed the view of Ocean Literacy she developed through the module experiences. She came to appreciate more fully the recreational value of the ocean which led to enjoyment, particularly for young children: “[i]t is important to acknowledge that ocean has recreational values to young children and environmental education can be taught when they are enjoying their activities” (Teri, Post-survey). Teri also acknowledged the vital roles the ocean plays in our lives and the interconnectedness of humans and the ocean. She found Principles #6 of the OLF (the ocean and humans are inextricable interconnected) (Ocean Literacy Network, 2020) to be particularly relevant and meaningful for her. Teri noted that sometimes we take the natural world, including the ocean, for granted and become complacent about the importance of the ocean to our daily lives:

Living in Vancouver, I sometimes take the beautiful beaches and forests for granted.

Acknowledge the services ocean is providing us and how our daily actions affect the health of the ocean and its organisms, I later answered the survey valuing the interconnectedness of human and ocean (Teri, Reflection).

In addition, Teri acknowledged the devastating effects humans have on the ocean as the result of our relationship with the ocean. She reflected on how the module experience prompted her to look at how personal actions could affect the ocean in detrimental ways: “[b]y completing this activity, I understand how our daily actions, such as purchasing goods that are deported from far away, can have a negative hidden influence on the ocean and the organisms that live in or nearby” (Teri, Reflection).

At the beginning of the module experience, Teri did not consider the human dynamic and importance of our relationship to the ocean in her understanding of Ocean Literacy. Teri's initial interpretation involved the scientific (ecosystems, currents, water) and the aesthetic (colour), also considering the non-human. Teri's initial views were prescriptive, viewing the ocean as a subject of study. The module experience led Teri to consider the role of connection in Ocean Literacy and to understand it through the recreational value and potential of the ocean, highlighting the role of enjoyment for young children. Teri considered that learning about this discovery with the ocean helps us learn about ourselves, likening the unknown of the ocean to the unknown of our own self and community. Teri also considered that we often don't think about the ocean or consider our impacts on it and become complacent.

Increased Ocean Literacy in this study was personalized for each teacher. For Drew, his experience with the module resulted in the consideration of feeling and care for the ocean. Frankie's experience with his children ignited a renewed admiration for the ocean, this becoming a driver of his understanding of and own Ocean Literacy. Quinn's familiarity with the OLF made her experience with the module an opportunity to be reminded of the importance of Ocean Literacy. Skye acknowledged their previously held scientific interpretation of Ocean Literacy and welcomed the consideration of additional perspectives, adding inclusivity to their understanding of Ocean Literacy. Teri incorporated the importance of connection and an understanding of the recreational value of the ocean. Commonalities in the teacher's Ocean Literacy development included a drift away from a human centered understanding of Ocean Literacy to a more nuance, earth centered view. Many teachers initially held scientific and prescriptive understanding of Ocean Literacy, which many kept throughout the experience, but

the opportunities of this module led them towards a more inclusive and diverse understanding and perspective. Connection and relationship with the ocean was prevalent in teacher's increasing Ocean Literacy and understanding of it.

4.3 Increased Understanding of Ocean Literacy and the Role of Place in Ocean Education.

This theme addresses the relationship between the teachers' understanding of Ocean Literacy and ocean education. Connection with place (Wattchow & Brown, 2011), which I define as a local bioregional setting, emerged as an important outcome of the teachers' module experience as they came to view the ocean as a context, an educational setting, for teaching and learning about and alongside the ocean.

Teri identified the ocean as an outdoor setting for marine education experiences. She articulated her valuing of the ocean as a place for education and acknowledged "that ocean also can be a classroom and a platform for learning" (Teri, Post-survey). Teri voiced her ideas on how she would help students connect with the ocean in multi modal ways by providing experiences where learners could explore their relationship with the ocean. She shared that she "will start by asking them to examine their relationship with the ocean and allowing them to connect with the ocean either spiritually and/or recreationally" (Teri, Reflection). Teri shared what she found meaningful and enlightening about the module experience and her perspective on incorporating other ways of knowing about the ocean. She noted the importance of drawing upon different cultural perspectives and knowledge into her practice:

I really liked the reading, how they talked about other ways of knowing the ocean and that is really meaningful and invites me to think about incorporating other cultures and their knowledge of the ocean into my [practice], and also [...] you know the activity that I visited the beach makes me think about how do I encourage younger students who are not

really interested in spending time in nature to learn about the environment? (Teri, Interview).

Teri linked her module and classroom experiences to Ocean Literacy. She noted in her post-survey that students' level of Ocean Literacy was not associated with their age or grade level. Rather students' Ocean Literacy was related to their attitudes about and engagement with the ocean. Teri also described the ocean as providing students with a source of fun and place for connection. Through engagement with the ocean, Teri believed students connected with the ocean and were then inspired to know more about the world around them. She stated, "...having fun near the ocean or even a lake [...] [students] start to form a connection with it and become more curious about know[ing] the environment we live in and start learning [...] on their own even (Teri, Interview).

Skye made connections between ocean education and place when she highlighted the importance of teaching and learning through direct experiences with the ocean. She explained that ocean education "could involve getting out and experiencing these environments and observing and identifying the plant and animal life in these environments (Skye, Pre-survey); it has been noted how the activities Skye cited could help students form relationships with specific shorelines or oceans, which is consonant with ideas around developing a sense of place (Wattchow & Brown, 2011). Reflecting on her pedagogy after the module experience, Skye shared her thoughts on other ways she could incorporate ocean education with a focus on Ocean Literacy into her practice:

...now I've kind of started thinking about other ways that I can introduce the ocean or [...] engage students with learning about the ocean, like videos [...] so I'm kind of

expanding my ideas of what ocean education can mean and yea it's a lot more broad now and doesn't necessary involve visiting the ocean everyday (Skye, Interview).

Quinn focused on a pedagogical approach to Ocean Literacy, which involved sharing positive aspects of how humans can help the ocean. She focused on how the ocean provided the place for students to experience nature. As she did, Quinn spoke of how she would share the ocean with her students: [the module experience] did remind me [...] that I want to continue to expose the thrill of ocean to the students" (Quinn, Reflection). Drawing upon her module experience, watching a TEDx talk on ocean conservation by Dr. Sylvia Earle, Quinn focused on the importance of teaching about the positive changes and impacts humans can have on the ocean:

I think my biggest take away was Sylvia Earle's Ted-Talk and the call to action to protect the ocean through restoration and marine protected areas. These human efforts do make a difference in returning biodiversity to an area and the overall health of the ocean. I am even more motivated to include more content and example[s] of current efforts and action we are doing to help improve the health of the ocean, I want to continue to emphasize [...] that we are not starting from ground zero but joining a movement (Quinn, Reflection).

Quinn concluded that ocean education must involve responsible action, an important outcome of ocean education and Ocean Literacy. She noted that positive change is already happening, and this is important for students to know. Advocacy and action on behalf of the ocean is instrumental to students' Ocean Literacy.

Drew noted that he would incorporate aspects from the module experience into his own practice. For him, ocean education would include a focus on the human-ocean relationship specifically within the context of physical and human geography:

From a geography lens, this would be great to teach about physical geography and how the ocean forms our shorelines. Look at the rocks, how are the waves moving, what pollutants do you notice etc. These are all elements we can add to this experience.

Depending on where you are, you can include how humans are interacting with the environment and what are some pros or cons around this relationship (Drew, Reflection).

Drew also highlighted the importance of being able to interact with the ocean which involved developing knowledge, direct experiential interaction, and reflection, all tenets of Ocean Literacy:

“I think it has to do with how we can learn about the ocean. (Different approach we can take). What steps we can take to interact with the ocean. First we learn about, then interact, and finally reflect on what we learned” (Drew, Pre-survey).

Drew later emphasized the important role of direct experience in learning about the ocean and how students should be prepared for that experience: “I would say actually going to the ocean or body of water, more hands-on activity [...] you need to know what we're dealing with first before [so] we can actually understand how we're going to see it from that point (Drew, Interview).

For his module experience, Drew visited the ocean. He found the corporeal (physical) connection, where he employed all his senses as he witnessed the rising tide, the lapping waves, the rolling rocks, and the calling birds, essential to the experience:

...actually seeing the water meet the land, it puts into a different perspective for you and it's seeing that interaction that way and then also when I was there seeing the tide was coming in so when it started, I was probably a meter from the shore, but then after I was done [...] I think the water was probably a meter past me at that point, so I had to keep backing up (Drew, Interview).

Drew reflected on the intimate and powerful sensory nature of the experience:

I was kind of in my little inlet and there was two rocks there and just the only thing I could hear really was the birds and the trees and the waves going in and out and just hearing the rocks rolling (Drew, Interview).

Teachers acknowledged the importance of connection to the ocean and that connection could be realized through direct in-person experiences such as beach walks or through virtual platforms such as videos. Teri, Quinn, and Drew engaged with in-person experiences with the ocean and for them, they found it important to incorporate spending time near the ocean and being in close proximity to the marine environment. Teri expressed her connection with the ocean as learning with the ocean – ocean as co-learner – when she noted “for me personally, learning with the ocean includes spending time near the ocean rather than learning from the textbook” (Teri, Interview). Quinn emphasized the role of direct experience when connecting with nature when she spoke to her belief and understanding of the power of proximity and spending time at the beach, saying that “experiencing it firsthand is what makes it true and rich” (Quinn, Interview).

Skye’s experience was unique as she took part in a remote and at home experience, which involved watching a video/documentary. Her experiences indicate that she was able to connect with the place and deepen her understanding of Ocean Literacy without having a direct in-person

experience with the ocean. Skye discussed her thoughts on proximity and the relationship to Ocean Literacy:

A key thing that stood out to me in this experience was the realization that developing a sense of proximity to the ocean to deepen our connection to it does not require one to have physical proximity to the ocean (Skye, Reflection).

Skye found that “Ocean Literacy can happen anywhere; you don’t need to be right next to the ocean” (Skye, Interview) and that “the same kind of connection or even more powerful connection could be had without that physical proximity piece” (Skye, Interview). This feeling of connection was fostered through the remote experience. Skye shared: “[a]fter watching the [video] I felt a renewed sense of closeness to the ocean” (Skye, Post-survey), adding that “afterwards I felt so connected to the cause and salmon and just seeing all those images [...] and getting kind of really close to that issue, it brought me a sense of closeness to the ocean and to the issue itself” (Skye, Interview). Skye expanded on the unique remote nature of this experience:

This [remote experience] made me consider problems impacting oceanic life, and for the rest of the day I was thinking about salmon, the ocean, and ways to protect and preserve marine ecosystems in B.C.. This experience thus brought a consideration of the ocean and caring for the ocean to the forefront of my mind without physically going to the water's edge! It really reinforced the many possibilities of creating a connection to the ocean without physically going to visit it (Skye, Post-survey).

Skye offered why the experience was a powerful way for her to connect with place, and she found she was able to fully immerse herself in the environmental problems affecting the ocean:

I feel that the reason this [remote experience] had such an impact on me was that it gave me a sense of proximity to the issue [...] I realized the gravity and urgency of this situation. I could not disassociate from the problem because it was happening where I live and impacting animals that are integral components of B.C. ecosystems (Skye, Reflection).

Whether the module experience was remote or in person (involving direct in-person experience with the ocean), the teachers connected with place. The teachers found the experience informed their interpretation of Ocean Literacy and inspired them to share their knowledge, understandings, and advocacy.

4.4 Summary

Through participating in the module, teachers expanded their awareness of their relationship with the ocean. Highlighted in their experiences were the critical roles past experiences and companions play in shaping the awareness, where the teachers also increased their self-awareness of their relationship with the ocean. The participating teachers were able to speak about this relationship and expand on the impacts in terms of the earth, education, and their personal perspectives of the ocean. The teachers also increased their Ocean Literacy and understanding of it. They gained a familiarity with the concept and came to understand the potential of expanding Ocean Literacy to include feelings, connection, emotions, and care, all while starting to consider a less human-centered and more earth/ocean-centered approach to it. The experience ultimately contributed to their understandings of what Ocean Literacy entails and expressed the importance of the role of place in ocean education. All the teachers valued

opportunities for their students to experience and witness the ocean, advocating that there should be efforts to include this in ocean education.

CHAPTER 5: Summary of Findings and Implications

In this chapter, I present a summary of my study and answer my research question. Next, I present the implications of the study with discussion on the pedagogical approach to ocean education within the context of Ocean Literacy, which I follow with recommendations for professional development and conclude with the argument for the need for ocean education. Finally, I discuss my research conclusions and the study's implications.

5.1 Summary

In this study, I investigated five teachers' views on Ocean Literacy. I followed a qualitative case study research design to explore an in-depth understanding, and to make meaning, of each teacher's thoughts, ideas, and experiences. I collected individual reflections and conducted pre and post structured interviews, in the form of surveys, and semi-structured interviews through Zoom with each of the participating teachers during the summer of 2020. The data corpus included transcripts from 15 interviews, participant reflections and my researcher notes. The collected data were analyzed using a thematic analysis, where I drew mainly from Miles and Huberman's (1994) approach.

I will begin by answering my research question: What are teacher perspectives of the ocean and Ocean Literacy after experiencing a lesson on the topic?

I presented the teachers' views within the following three themes: 1) expanded awareness of their relationship with the ocean; 2) increased Ocean Literacy; and 3) increased understanding of Ocean Literacy and the role of place in ocean education. These themes were related to the research question under study and were identified in my analysis of the participating teachers' interview responses.

In the first theme, *expanded awareness of their relationship with the ocean* each participant characterized their views on their relationship with the ocean as ongoing and life long. They became more aware of the importance and significance of the ocean and what the relationship involves in terms of connection, care, and advocacy. They also came to understand a more ocean centred approach to their relationship. All teachers adopted a deep ecology (Naess, 1973), intrinsic view of their relationship and moved beyond an awareness of *what the ocean can do for me* to *what can I do for the ocean?* Teachers developed awareness and connection through direct experience with the ocean, and for one teacher, connection and care were fostered through watching a video (the documentary *Salmon Confidential* (2013)), without having an in-person component to the experience.

The awareness of how to help the ocean, their advocacy, further evolved throughout the module experience. Teachers drew upon their past experiences with the ocean and noted environmental crises related to the health and well being of the ocean, such as overfishing and climate disruption. In their present relationship with the ocean, they acknowledged the importance of ocean advocacy through conservation and action as important outcomes of ocean education.

The second theme, *increased Ocean Literacy*, incorporated the views of the teachers that indicated their understanding of Ocean Literacy was increasing as they viewed the ocean through their own experiences, the experiences of others, and through the experiences of the ocean itself. Drawing upon the described definition of Ocean Literacy, as described by the Ocean Literacy Network, and for the purpose of this thesis, “an understanding of the ocean’s influence on you and your influence on the ocean”, all teachers identified the module experience as being a launching point for an increase in their Ocean Literacy. The teachers drew upon ecological

memories (Jardine et al., 2018) to make connection to their increasing Ocean Literacy. They reflected on past experiences with the ocean and identified these as significant life experiences (Chawla, 1998). As marine ecologist and conservationist Jacques Yves Cousteau writes, “*The Sea, once it casts its spell, holds us in its net of wonder forever*” (n.d.). The teachers were inspired by the wonder they experienced and came to see the ocean as the companion Rachel Carson writes about, who is there to help us keep alive our inborn sense of wonder (Carson, 1965).

The third theme, *increased understanding of Ocean Literacy and the role of place in ocean education*, addresses the relationship between the teachers’ understanding of Ocean Literacy, ocean education and the connection with place. In the context of this thesis, I define place as a bioregional setting, a familiar backyard space which in this study, was the shore of the ocean. Through the experience of place, it informed the teachers Ocean Literacy and inspired them to share their knowledge, understandings, and advocacy. Science education researcher Derek Hodson (2009) reminds us that a goal of science education must be socio-political action. He proposed we connect with the earth not only in cognitive and experiential ways, but also through the affective. Participating teachers noted the power of the affective when they spoke of the awe and wonder their relationship with the ocean and their developing Ocean Literacy evoked.

The teachers’ connection to the ocean through place and their desire to share their Ocean Literacy with others through education brings to mind Payne and Wattchow’s (2009) slow pedagogy of place. The authors propose an eco-pedagogy, which embraces the cognitive and affective through the making of experiential, corporeal, spiritual, and cosmological connections. Marine education realized through eco-pedagogy is one way we can address the current

environmental devaluing and destruction of the ocean realm. Through ocean education with a focus on Ocean Literacy, learners can develop awareness, connection, care, advocacy, and action on behalf of the ocean.

5.2 Implications

The implications for Ocean Literacy and ocean education were manifest in the participating teachers' views about their relationship with the ocean within the context of increasing Ocean Literacy, and how that relationship can be nurtured, sustained, and furthered to foster ethics of care. The teachers' reflections on their relationship with the ocean also developed a connection with place, which led to suggestions and recommendations on the role of place in ocean education.

5.2.1 Ethics of Care

Ethics of care was a recurring and critical idea which I identified through the data collection and analysis. This finding is an important outcome as based on my review of the literature; care ethics is not included as a tenet of Ocean Literacy. The teachers' spoke about their past, present, and familial experiences with the ocean which they developed through connection and expressed through the understanding of Ocean Literacy as "an understanding of the ocean's influence on you and your influence on the ocean". The teachers also connected with the ocean through an ethic of care, which Nel Noddings (1992) refers to as being fundamentally relational and involves the *one caring* and the *cared for*. Martin (2007) draws upon Noddings's care ethics and identifies the key features of caring as relatedness, reciprocity, and conceptual and emotive understanding (thinking with the heart and the head). The teachers' voices in this study reveal clear connections developed and sustained through relatedness, reciprocity, and

conceptual and emotive understanding. Taken together, the teachers' experiences align with Noddings (1997), as described by Moen et al.'s (2020) care elements: 1) *the one caring, cares for another*; 2) *one caring is aware of their caring which leads to caring for* and 3) *the cared for recognizes that the one caring cares for them*.

An example which illuminates Noddings's care ethics through relatedness, reciprocity, and emotive understanding comes from Skye when she shared her intention to "have an invested incentive to care for the ocean and develop [their] relationship with the ocean (Skye, Post-survey). The module experience led to Skye developing connection which fostered an ethic of care which, "pushed me to consider how I viewed my relationship to the ocean", and she "ultimately realiz[e] the need to move from simply caring about Pacific salmon to actively taking part in caring for and protecting these keystone species" (Skye, Reflection).

Drew also acknowledged how the module experience resulted in him experiencing a more reciprocal relationship with the ocean. He was aware that he needed to develop more care for the ocean and up to this point in his life, his relationship with the ocean was embedded within a shallow ecology view; it was human centred, and hence "one sided" (Drew, Post-Survey). In contrast to Drew developing a more intrinsic understanding of his relationship with the ocean, Teri maintained her human centred view. After the module experience, she continued to describe her relationship with the ocean as "what can the ocean do for me?" when she expressed she valued the ocean for benefit(s) received and "... from services the ocean has provided" (Teri, Post-survey).

An example of Noddings's reciprocity can be discerned in Frankie's experiences. During the interview, he voiced his care for the ocean and his understanding that the relationship was reciprocal. Frankie's responses revealed an ocean centred view when he described the ocean as

teacher and pondered how he could engage with the ocean in reciprocal ways: "...the only thing that I could do is care about it and be connected to it" (Frankie, Interview) adding that "the ocean is not just about what it offers [...] it is what it teaches us [...] what I am going to give back to the ocean in return?" (Interview, Frankie).

Absent from the teachers' voices is Noddings's (1997) third element: *the cared for recognizes that the one caring cares for them* (as cited in Moen et al. 2020). The question here is whether the cared-for, in this case the ocean, can acknowledge and/or respond to the act of caring, as Noddings third element is situated exclusively within the human world (2002).

Drawing upon the literature on place and eco-pedagogy as well as Indigenous perspectives, I suggest the ocean responds to being cared for and does acknowledge the act of caring.

Indigenous scholar and educator Vine Deloria (in Jensen, 2000) posits that if we "prepare the area right", nature will heal and give back to us in "an abundance of gifts" (Kimmerer, 2017).

Robin Wall Kimmerer (2013) affirms the importance of care ethics and the necessity of the kinds of action which comes through caring: "To love a place is not enough. We must find ways to heal it" (p. 317). In reference to Noddings's *the cared for recognizes that the one caring cares for them* within the context of the ocean responding to that caring, taking action on behalf of the ocean is incumbent upon us. If we take care of the ocean, the ocean will acknowledge through an abundance of gifts.

5.2.2 Place and the Ocean

The importance of being in close proximity to the ocean was evident in the teachers' experiences. The power of direct experience with the ocean, both in-person and virtual, enhanced their awareness, furthered their relationship with the ocean, and fostered their ethics of care.

Hence, the study findings strongly support the value of in-person placed-based experiences. The experiences of the teachers highlight the importance of eco-pedagogy, learning with, from, and alongside the ocean. With ocean as companion and teacher, learners make corporeal, spiritual, and cosmological connections, drawing upon the cognitive, affective, and experiential domains (Payne & Wattchow, 2009). Eco-pedagogy of place values and enacts all the senses- seeing, feeling, smelling, hearing; fully experiencing the ocean, while embracing and prioritizing an ethic of care. Many teachers viewed these sensory experiences and their resultant ethical caring as an important part of their Ocean Literacy development.

However, as evidenced by Skye's choice of virtual ocean experience, not everyone can personally access the ocean (Yumagulova, 2020). Skye found the remote experience with the ocean powerful and thought provoking. The experience revealed the power of visual media of provoking and reawakening a connection and care for the ocean. Finally, all of the teachers where enrolled in a course that was delivered on-line and showed that learning about the ocean and Ocean Literacy can be done virtually.

In sum, the teachers' experiences regardless of being in-person or virtual, resulted in comparable outcomes in terms of connection and care and Ocean Literacy.

5.3 Conclusion

This study investigated five teachers' perspectives of the ocean and Ocean Literacy. Drawing upon the teachers' views and experiences, this study revealed the teachers were able to enhance their existing knowledge of Ocean Literacy, ocean education and the ocean through building an awareness of their relationship with the ocean. This was facilitated by connecting with past experiences, incorporating others into their experience, and developing an understanding of their relationship with the ocean. Teachers increased their Ocean Literacy and

understanding of it, all while highlighting the role of place in Ocean Literacy. A number of final conclusions from this work can be drawn and considered for future directions of Ocean Literacy efforts.

Firstly, the role of place in Ocean Literacy was illustrated through the opportunities it created for teachers to connect and make corporeal, spiritual, and cosmological connections to the place and the ocean. This was further exemplified by participant's fierce advocacy of the importance of being able to experience the ocean in-person. Secondly, the incorporation of an eco-pedagogy that fosters an ethic of care in Ocean Literacy efforts would promote a holistic, reciprocal, and wholesome approach to ocean education, conservation, and support. Finally, the power of virtual and technologically powered experiences with the ocean, which was evidenced by similar connections being fostered in both in-person and virtual experiences, demonstrates the potential for virtual experiences with the ocean. These findings might inform the direction of Ocean Literacy efforts and education.

5.4 Implications for Future Research

This study's findings reveal a range of views and rich perspectives about human relationships with the ocean, Ocean Literacy, and ocean education. Although generalization is not the intent of case study, and this study's findings cannot be generalized to all teachers, this study identified how to develop awareness and teach about current problems facing the marine environment through an ocean education which incorporated developing connection and care with a focus on Ocean Literacy. Teachers, teacher educators, educators, administrators, and policy makers may draw upon this study to further understand and take steps on ways to teach ocean education through Ocean Literacy. Curriculum designers, education policy makers, education administrators, and teacher educators can draw upon this work for ways to incorporate

ocean education into school curriculum, education policy, professional development initiatives, and teacher education programmes. Learning about the ocean through developing connection and an ethic of care for the ocean are integral to effective and inclusive ocean education. Areas for further research include place, ocean education, ocean eco-pedagogy, and Ocean Literacy in the curriculum.

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APPENDICES

APPENDIX A: Recruitment Letter



THE UNIVERSITY OF BRITISH COLUMBIA
Faculty of Education
Department of Curriculum & Pedagogy

Faculty of Education
2125 Main Mall
Vancouver, BC, Canada V6T 1Z4

Recruitment Letter

Principal Investigator:

Dr. Yuen Sze Michelle Tan
Assistant Professor
Department of Curriculum & Pedagogy
Faculty of Education
Email: michelle.tan@ubc.ca

Primary Contact:

Natasha Jackson-Drouin
Master of Art in Science Education Student
Department of Curriculum & Pedagogy
Faculty of Education
Cell: [REDACTED] | Email: n.jackson-drouin@alumni.ubc.ca

An Ethic of Care in Remote Ocean Literacy Education of Pre-service Teachers

My name is Natasha Jackson-Drouin and I am a Master of Art in Science Education student at the University of British Columbia. I have a background in marine and ocean sciences and am very interested in ocean literacy, particularly in alternative ways of interpreting and teaching about the ocean. This project in particular will investigate the experiences of Bachelor of Education students, or pre-service teachers that participate in alternative ocean literacy lessons. These lessons will incorporate remote experiences, holistic pedagogies, ethic of care and ecophenomenology to teach not only about the ocean but have the ocean act as an active participant in knowledge acquisition and production. This research project will be used as my master's thesis project, with Dr. Michelle Tan and Dr. Sandra Scott acting as co-supervisors and Dr. Douglas Adler as an advisor to the project.

You are invited to participate in this project as you are Bachelor of Education student, a pre-service teacher and are enrolled in [REDACTED] Environmental Education in the Summer 2020 Term 2. If you choose to participate, you will participate in the study/class activities and your data will be collected. The study activities include the completion of a before and after survey, the Module 2 lessons, a brief reflection piece and finally, an interview will be done (remotely) to further investigate themes that arise during the course of the study.

Potential benefits to your participation include:

- A greater understanding and broader perspectives of ocean literacy and its accompanying framework.
- Exposure to and thoughtful reflections on holistic education and pedagogies, ethic of care, ecophenomenological philosophies, and indigenous science perspectives.
- Introduction to strategies that can be used in your future practice and classrooms.

This study will take the form of lessons and activities that will occur during [REDACTED] regardless of your participation in the study. A before and after survey and a brief reflection (between 500 - 1000 words) about the experience will also be part of [REDACTED]. The only additional piece to participating will be doing an interview with myself. If you do choose to participate, you will be required to consent to the collection of your survey information and reflection piece as well as the audio recording of the interview. The information collected will be used to determine any emergent themes in the experience of participants. The collected information will only be used for this study and there are no plans for its use in future studies. Choosing to participate will not influence your evaluation in [REDACTED].

If you are interested in participating, please either find the consent form attached along with this letter or on Canvas, and email a signed copy to n.jackson-drouin@alumni.ubc.ca within two weeks. If you have any questions, please do not hesitate to email me at any time.

Your participation in this study is voluntary.

You are free to deny participation at any time, with no reason and there will be no influence on your evaluation in [REDACTED] should you choose not to participate.

There is no expected or known risk with your participation in this study.

Thank you for your time.

Sincerely,

Natasha Jackson-Drouin, BSc.
Master of Art in Science Education Student
Department of Curriculum & Pedagogy
Faculty of Education
Cel: [REDACTED] | Email: n.jackson-drouin@alumni.ubc.ca

APPENDIX B: Consent Form



THE UNIVERSITY OF BRITISH COLUMBIA
Faculty of Education
Department of Curriculum & Pedagogy

Faculty of Education
2125 Main Mall
Vancouver, BC, Canada V6T 1Z4

Main Study Consent

Principal Investigator:

Dr. Yuen Sze Michelle Tan
Assistant Professor
Department of Curriculum & Pedagogy
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Email: michelle.tan@ubc.ca

Primary Contact:

Natasha Jackson-Drouin
Master of Art in Science Education Student
Department of Curriculum & Pedagogy
Faculty of Education
Cel. [REDACTED] | Email: n.jackson-drouin@alumni.ubc.ca

An Ethic of Care in Remote Ocean Literacy Education of Pre-service Teachers

This study seeks to understand what participants (ie. Bachelor of Education students and pre-service teachers) experience during an alternative and remote ocean education lesson, within the context of ocean literacy. In particular, understanding how participants interpret and articulate the experiences and what the essential structures of those experiences are. I hope to work collaboratively with participants to have an experience that is informative, meaningful and productive. This study is being informed by holistic education, ethic of care and ecophenomenology, each bringing complexity to our perspectives and deepening our understanding of ocean literacy. Overall, this study intends to inform and engage participants, and learn about their experience in order to inform future ocean education and ocean literacy projects, studies, and efforts.

This study will be used as the master's thesis project for Natasha Jackson-Drouin, with Dr. Michelle Tan and Dr. Sandra Scott acting as co-supervisors and Dr. Douglas Adler as an advisor to the project. This research team will each have access to data and findings.

Research Question

What are the essential structures of pre-service teachers' experiences during ocean literacy lessons that are done remotely and emphasize learning with the ocean, and how do they interpret and express those experiences?

Study Procedures

This study will unfold in the following manner.

- Consent will be obtained from participants by sending their signed consent form to n.jackson-drouin@alumni.ubc.ca.
- A before/entrance survey will be done by all students. Only participants data will be used in the study.
- Students in [REDACTED] will participate in an intervention lesson as part of the course.
- All students will take part in a remote experience with the ocean.
- An after/exit survey will be done by all students. Only participants data will be used in the study.
- A brief reflection piece will be submitted by all students. Only participants data will be used in the study.

- Finally, participants will participate in an interview about some emerging themes in the previously collected data.
- Analysis of data will follow, where essential structures will be interpreted.
- Findings will be used for the purposes of completing a Master of Arts in Science Education.
- Further dissemination of study findings through presentations and publications.

The time commitment for this study will be one interview for ~45-60 minutes.

Survey, Reflections Remote Interviews

For this study, I am requesting your consent to collect your response to two surveys, a brief reflection piece and audio recording of remote interviews.

At your convenience we will interview you using Zoom and only record the audio portion of the session. As we are audio recording, the camera will be turned off during the interview. The recording will be held on an encrypted hard drive stored on the principal investigator's laptop and not on Zoom. However, Zoom servers are located outside of Canada, and Zoom will store your 'zoom name' and information regarding your use of Zoom on a site outside of Canada. We encourage best practices while using Zoom including using a substitute name.

Potential Risks & Benefits

There are no expected or known risk for participating in this study. Potential benefits would include opportunity for thoughtful reflection of ocean literacy and its accompanying framework and principles, and the opportunity to reflect deeply and broaden perspectives on the explored subjects.

Confidentiality

Your identity will be kept strictly private and confidential. Any written material collected will be collected electronically on an encrypted and password protected device. Identifiers will be removed, and pseudonyms will be used in all data and any written reports. This will ensure data cannot be associated back to participants. Publications may require findings and data to be open access, meaning findings and data will be publicly available or part of a research repository. This inherently increases the potential for a breach in confidentiality. All appropriate measures will be taken to minimize this risk. Any electronic files and the devices containing files and personal information will be encrypted. This includes computers and portable digital devices. Any audio-recordings, transcripts, researcher notes, submitted written material and personal information will be stored either on a password protected computer or portable storage device and stored in a locked cabinet at the Primary Contact's personal residence.

Contact for information about the study

Please contact the co-investigator, Natasha Jackson-Drouin at [REDACTED] or n.jackson-drouin@alumni.ubc.ca with any questions or for additional information about this study.

Contact for concerns about the rights of research subjects

If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Ethics at 604-822-8598 or if long distance e-mail RSIL@ors.ubc.ca or call toll free 1-877-822-8598.

Your participation in this study is completely voluntary and will not affect your evaluation in this course. Likewise, your choice to not participate will have no affect on your evaluation. You are free to withdraw from or stop participating at any time without giving reason(s).

Main Study Consent

An Ethic of Care in Remote Ocean Literacy Education of Pre-service Teachers

Consent

Your signature below indicates you have received and reviewed a copy of this consent form, which you will keep for your personal records. Your signature also indicates that you understand the form and consent to participate in this study.

I _____ consent to participate in this study in which I consent to:
(Print name)

provide response to surveys (pre and post) _____
(initial)

collection of reflection piece _____
(initial)

audio-recording of remote interview _____
(initial)

Subject Signature

Date

Printed name of above Subject

Additional Information:

I would like to be receive a summary (abstract) of the results of this study. Yes No

Contact Information:

Preferred Email Address: _____
(only provide if you selected "Yes" to the above information)

APPENDIX C: Module 2 Reading List

Required readings:

Glithero, L. (Diz), Waterfall, H. P., Simon, M., & Watson-Wright, W. (2020). *The Heart of our Biosphere: Exploring our Civic Relationship with the Ocean in Canada*. Ottawa ON.

Ocean Literacy Network. (2020). *Ocean Literacy - The Essential Principles and Fundamental Concepts of Ocean Science for Learners of All Ages Version 3*.

Optional readings:

Schoedinger, S., Lynn Uyen Tran, & Whitley, L. (2010). From the Principles to the Scope and Sequence: A Brief History of the Ocean Literacy Campaign. In L. M. Tooker, C. Strang, & L. U. Tran (Eds.), *Special Report #3 The Ocean Literacy Campaign featuring: Ocean Literacy Scope and Sequence for Grades K - 12* (pp. 3–7).

Glithero, L. (Diz), & Stalker, J. (2018). *A Canadian Ocean Literacy Strategy - Development Plan: Draft 2*.

APPENDIX D: Module 2 Activities

Activity 1: Experience With the Ocean

Part 1. There are outdoor and indoor options for this Activity. Please complete at least ONE of the options. You are welcome to do more than one option if you like!

Option A) Outdoor Ocean Experience -- Go to the Ocean

If you are able and comfortable, spend some time at the ocean's edge. (We realise this may not be possible for everyone.)

Some options for what to do at the beach:

- Find something that catches your attention. Investigate why you were attracted/interested in it.
- Take a minute or two to sit with your surroundings and listen to the sounds while considering the what attracts and interests you.
- Make your way to the water and dip your toes (or more!) in.
- Take some photos or video of your surroundings.

Option B) Indoor Ocean Experience -- Watch Ocean-Related Film/Videos

For this option, choose at least two videos OR one film to watch.

Videos (choose two):

- choose at least two of the Ocean Stories from Ocean Wise: <https://ocean.org/stories/> [↗] (NOTE: open each story in a new browser tab to avoid internet and technology mishaps)
- TED Talk by Sylvia Earle - My Wish: Protect our Oceans https://www.ted.com/talks/sylvia_earle_my_wish_protect_our_oceans [↗]
- Orca Vocalising in a quiet sea - Northern Resident I65 and I4 Matriline <https://www.facebook.com/mersocietybc/videos/534042357399976/> [↗]
- Highlights from a recent Low Tide exploration done by Seaquaria Education on Vancouver Island
[IG Livestream Highlights: Low Tide Beach Walk \(Sidney, B.C.\)](#) [↗]



Films (choose one):

- Sea of Shadows (Documentary on Vaquita) <https://vimeo.com/375581621> [↗]
- Salmon Confidential
[Salmon Confidential, Documentary About Salmon Farms in Canada & Diseased Salmon](#) [↗]



Option C) Indoor Ocean Experience -- Explore an Ocean Education Online Resource

For this option, explore the online and interactive experience of Ocean School. Ocean School was created by the National Film Board (NFB) and Dalhousie University:

"Ocean School is a groundbreaking educational experience that uses powerful storytelling techniques, immersive technologies and interactive media. Its inquiry-based approach advances critical thinking, innovation and environmental awareness."

- In order to explore Ocean School, you will need to create an account with the NFB
- Once you have done so, either select the "North Atlantic" or follow this link: <https://oceanschool.nfb.ca/adventures/north-atlantic> [↗] .
- Please complete two of the themes explored in North Atlantic option (*Healthy Habitats*, *Protecting Populations*, and/or *Evolving Ecosystems*).
[Some of the activities may prompt you to connect a mobile device, and some require iOS/an iPhone. If you encounter this and are unable to do it, don't worry about it, and just complete what you can.]
- Take some time afterwards to explore the resources in the "Educator Space".

APPENDIX E: Pre- and Post- Survey Questions

Starting point

1. What does Ocean Literacy mean to you?
 2. Are you familiar with the Ocean Literacy Framework?
 3. Describe your *knowledge* of the ocean.
 4. Describe your *value* of the ocean.
 5. List some of things that come to mind for you/knowledge you have about the ocean.
 6. Would you feel comfortable teaching about the ocean in your classroom? Why or Why not?
-

Wrapping up

1. What does Ocean Literacy mean to you?
2. What stood out to you about the Ocean Literacy Framework?
3. Describe your *knowledge* of the ocean.
4. Describe your *value* of the ocean.
7. Would you feel comfortable teaching about the ocean in your classroom? Why or Why not?
8. Describe something that stood out to you about this experience (good or bad).

Additional comments or thoughts:

APPENDIX F: Reflection Prompts

Ideas to help you get started:

- Describe the overall experience as it pertains to your perspectives of *Ocean Literacy* and *ocean education*.
- Describe in detail *an aspect* of this experience and what it has meant to you.
- Tell me *how you felt* during the experience.
- Did anything *stand out* to you about this experience? Please provide details.

APPENDIX G: Interview Protocol

OPENNING

- ▶ I will be recording the audio of this interview (no video) – you have already consented to this but would like to confirm that that is ok with you.
- ▶ You are welcome to stop at anytime if you need or want to without reason.
- ▶ Before I start recording, do you have any questions about being a participant or the study in general?

OCEAN LITERACY

- What does Ocean Literacy mean to you?
 - Can you describe how this has changed over the course of this experience?
 - How might you “define” it?
 - Tell me what you may have *added* or *removed* from your perspectives?

THIS EXPERIENCE

OVERALL

- Describe some specific features of this experience that were enlightening/meaningful.
 - What made them meaningful?
 - What did you learn?
- What does “*learning with the ocean*” mean to you after this experience?
 - Give me some details about your experience doing so.
- Was there anything you wanted to explore more? Less?
- Can you give me a *word* that encompasses this experience?
- Is the response you submitted for the Module 2 Activity the same as the responses you made in your group forum?
 - If they are different, what did you include in the group discussion that may not have been included in your final response?

PERSONAL

- Tell me if this might influence your daily life?
 - How might it do so?
- Did you find this experience to be helpful or support your learning?

TEACHING PRACTICE

- Tell me how this might influence your practice as a teacher?
 - What might you consider doing differently?