Landscape Lessons: Co-designing a relational approach for learning in complex socio-ecological system dynamics

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Abstract

This dissertation is a multidisciplinary inquiry into the role of environmental education in complex social-ecological system dynamics. The work is a timely application of relational world views within natural resource management and environmental education. A pragmatic approach of relational pedagogy (land and place) is engaged to understand how environmental education connects to complex SES relationships. Critical Indigenous Research Methodologies and Conservation Social Science techniques resulted in the two-part study "Landscape Lessons" in collaboration with a class of 4th graders in Lapwai. Participants engaged in a process of co-design of a curriculum that followed student interest and leveraged a learning environment focused on developing people-nature relationships. Arts-based and conversational methods created meaningful data on how participants related to land during field explorations in a nearby nature area. Participants demonstrated sensory observation and exploration during the field days. The relational pedagogy of land resulted in participants about observation and surprise, safety and danger, authority and autonomy, and social-cultural dynamics. Lessons learned from the study are positioned in the 2021 *Handbook for Research Methods in Social-Ecological Systems* framework to demonstrate how this work tackled two aspects of SES research: a) provides an understanding of system interconnectivity and linkages, and b) addresses concerns about power relations. The conclusion of this work is an approach to EE that works with a complex SES research framework and an application of land education pedagogy to address the power dynamics of knowledge creation in environmental education.

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Dedication

I dedicate this work to all who are learning and relating in a time of uncertainty and rapid change.

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Introduction

This dissertation applies relational pedagogy in Environmental Education (EE) and Complex Social-Ecological Systems (SES). The research methodology follows principles from Critical Indigenous research Methodology and the design of Community Based Research and engages with community-oriented, land relational pedagogy. Methods used for data creation were qualitative, participatory, and conversational. The practices and insights from this work apply to Environmental Education, Adaptive Natural Resource Management, and SES research.

Personal Interest & Context

The work in this dissertation began with my desire to design climate change pedagogy that would work in Idaho, being flexible enough to navigate both public schools and rural social dynamics. I'm interested in learning how people make meaning and relationships with the world around us. Knowledge systems, values, and culture are present in systems science and natural resource management. Social systems directly influence how people manage ecosystems. I find it fascinating how knowledge, values, and culture structure decision-making processes around land management, thus shaping the land itself. Understanding the social-political relationship with the environment can inform the development of equitable solutions to climate change impacts. The philosophy of complexity and complex adaptive systems stands out as a significant hurdle for natural resource social scientists to contribute to the broader discussion on system dynamics.

Positionality Statement

I was born and raised in Ada and Boise County, Idaho. I am a descendant of settlers who crossed the plains in the 19th century and settled in what we now call Utah and Idaho. My educational background is in Recreation Management (Brigham Young University) and Human Dimensions of Natural Resource (Colorado State University). Thus, I come to this work from a Western mindset, trained in European philosophy and Western scientific traditions. In this work, I had the role of researcher, collaborator, and educator. In the curriculum design, I worked as a facilitator and educator, or guest teacher, with a class of 4th grade students. My role as researcher and educator comes from an "outsider" perspective, whereas I am not an inside member of the community where the project takes place. I am a guest in the community and have a research agreement that governs this outside researcher/collaborator/educator role.

Problem

Social-ecological systems scientists generally accept the role of learning as a mechanism for adapting to change (Folke, 2006; Carpenter et al., 2002) and environmental educators (Krasny, Plummer, Löf) developed pedagogy to support learning in a social ecological systems context. But the relationship between environmental education and social-ecological systems is underdeveloped in theory and application. Moreover, few studies apply "learning as a process" to conservation management practices (see Ardoin & Heimlich, 2013). This dissertation adds much-needed discourse regarding education theory in human-nature relationships, as well as an application of relational pedagogy in complex Social-Ecological Systems science. The work in this document reflects overall questions about the role of environmental education in improving the adaptative capacity of natural resource management as a complex adaptive system.

Study Purpose & Aims

This dissertation explores relationality, a concept that appears in separate conversations in environmental education discourse, land education pedagogy, and complex social-ecological systems. First, the purpose of this work addresses the need to engage with a process (relational) ontology in Complex Adaptive System (CAS) science (see *Adopting process-relational perspectives to tackle the challenges of social-ecological systems research,* Garcia et al., 2020). Second, this work identifies methods and case studies that establish methodologies to apply relational world views in sustainability science (see *Towards a relational paradigm in sustainability research, practice, and education.* Walsh et al., 2021). It also addresses the need to examine environmental education and sustainability science research methods (Bang et al., 2014:39) and encourage relational pedagogy that engages with learning environments as reciprocal relationships (p. 43). The following points summarize the aims of this project:

- To engage with environmental education theory and demonstrate learning as an adaptive process in people-landscape relationships
- To apply relational ontologies and pedagogy in the Complex SES and Sustainability discourse
- To facilitate and learn from a community-oriented, land-centered pedagogy with participant-collaborators.
- To implement land education pedagogy and center Indigenous futures in environmental education and SES discourse through a collaborative curriculum design process/

Research Questions

This dissertation began with an explanation of relationality and complexity as critical features in adaptive social-ecological systems. Social-ecological systems are distinct from other physical systems in their interconnectedness. The relationship of actors in this system is subject to "powerful reciprocal feedbacks," which gives the system the complexity for adaptation (Folke et al., 2005: p. 443). The concepts from systems theory developed an interest in how young people learn about complexity through relating to landscapes around them. A literature review about complex system dynamics and education theory revealed "learning as a process" to improve a system's social-ecological conditions. In this dissertation, the application of relationality to environmental education began with an intention to study several cases of place-based education and how this system complexity and relationality played out within those educational approaches. However, it became clear that it was beneficial to explore this concept directly through a collaboratively designed educational intervention. The following questions guided this work:

a) How and in what ways does a community-based relational pedagogy (i.e., Land education pedagogy) facilitate learning about people-nature relationships with 4th-grade students at Lapwai Elementary School?
b) What patterns of interaction give insight into participants' experiences relating to the land?
    a. What did participants experience?
c) How do relational perspectives emerge in participant experiences?
    a. In which conditions, events, processes (social-ecological context) did these land relational narratives emerge?

These research questions focus on the learning processes of a land relational pedagogy. The first part of this work necessitated a collaborative curriculum design process to create a land-based curriculum for students to experience, the process and results (i.e. the explicit curriculum) of which are described in the "Landscape Lessons" project (see Chapter 3). The research questions named above focus on the processes of learning and exploration, and evidence for the ways that students experienced the curriculum (see Chapter 4).

Brief description of research design

A participatory, Community-Based Design Research approach (Bang et al., 2015: 3-4; Bang & Vossoughi, 2016) resulted in two collaborative processes: 1) curriculum design and lesson planning, and 2) study of participant experiences using narrative inquiry and conversational methods (Kovach 2010; Lemly & Mitchell, 2012). The collaborative lesson planning process created an outdoor, interactive learning environment for a class of 4th-graders to explore a local nature area. Audio

recordings of conversations and observations of participants gave insight into their experiences of people-land interaction through a relational pedagogy. The approach links broader inquiries about the role of environmental education in CAS. It explores how relational pedagogy and land education interact to promote collaborative knowledge creation within the context of sustainability (Norström et al., 2020).

Chapter 1: Philosophical Context

A new paradigm is opening in sustainability science and turns to relational approaches to understand complex people-nature interactions (García et al., 2020; Hertz et al., 2020; Lejano, 2019; West et al., 2020: West et al., 2021). Sustainability science looks at the interconnectivity of people and nature, and researchers work to apply this knowledge to improve social and ecological conditions (Kates, 2011). These complex relationships are the connections between diverse and dynamic systems (Westley et al., 2002). Two of these conceptual frameworks are Complex Adaptive Systems (CAS) and Social-Ecological Systems (SES). SES is a younger framework in systems theory. Thus, CAS informs the concepts that define SES theory. However, the two are differentiated by theoretical perspectives, for example, differences in how complexity functions within a given system and a lack of well-defined complexity in SES frameworks (see Preiser et al., 2018). Nevertheless, system scientists and thinkers continue to characterize the complexity of SES. Furthermore, they are engaging with the CAS framework as a foundation, identifying the need for process-oriented, relational approaches in systems research (West et al., 2021).

Relational approaches in science and knowledge generation are not new concepts, and have existed in ways of knowing like Indigenous Methodologies (García et al., 2020; Hertz et al., 2020; Pugh et al., 2019; K. Whyte, 2020). One way to address a broad need for relational approaches and relational thinking is through the process of environmental education, preparing young people in ways that might influence their future skills and dispositions in natural resource management. This chapter is a collection and review of interdisciplinary literature to lay the theoretical framework for the dissertation, which focuses on the application of a relational pedagogy and the experiences of students engaged in that pedagogy. It connects this approach back to the larger context of relational ontologies and epistemologies within social-environmental systems.

Background

The link between sustainability, systems science, and learning is made clear in environmental education (EE) (see Krasny et al., *Special issue of Environmental Education Research*). Many EE case studies demonstrate how the act of learning about the environment improves environmental quality (Krasny et al., 2010; Balvenera et al., 2012). For example, place-based education initiated pro-environmental behavior and local watershed stewardship in a class of elementary school students, as seen in the Boulder Creek Study in rural Idaho (Bingaman & Eitel, 2010). On a broader scale, the intersections of EE and SES dynamics emerge in the international development and disaster relief

discourse. For example, one program applied EE as a response to undesirable environmental conditions in post-Hurricane Sandy in NYC (Dubois & Krasny, 2016: 257).

Regardless of well-meaning intention, some epistemic foundations of pedagogy in EE focuses on learning outcomes that "control" the environment (Bowers, 2008; Engle-Di Mauro & Carroll, 2014: 75) in ways that run counter to stated goals of EE. The problem lies in the lack of relational perspectives and process-oriented pedagogy and the potential for these programs to replicate neoliberal ideology through EE (Hursh et al., 2015, Calderon, 2016; see Tuck et al., 2014). A controlling epistemology of people-nature connectivity objectifies nature to manipulate, thereby risking a pedagogy that teaches the act of isolating humans from "nature" and the world around us (Engle-Di Mauro & Carroll, 2014: 75). As we move towards perspectives that include human-inclusive parts of nature, we necessitate the development of reciprocal relationships with the bio geophysical world around us.

A solution to this epistemic issue is engaging with relational ontology and relational pedagogy in EE. West et al. (2021) describe relational or process ontologies as an "epistemic opening" in sustainability and system science. Within environmental education, relational pedagogy is present in Land education and decolonizing place-based education (Bowers, 2008; Tuck et al., 2014). In the following synthesis of the literature, I first present the adaptive cycle of complex social-ecological systems, then describe the contribution of relational ontology to complex adaptive systems and sustainability science via Land education pedagogy. Next, a critique of natural resource management and environmental education paradigms demonstrates the need to shift perspectives to a relational ontology. Finally, the conclusion of this chapter establishes gaps in the existing literature and opportunities to develop methodologies to apply relational ontology and pedagogy for adaptive management of complex adaptive natural resource systems.

Gathering of Literature

The literature review used online academic databases like the University of Idaho Library, Web of Science, and Google Scholar. Literature was identified by searching the terms and combination of "complex adaptive systems," "SES," "environmental education," "place-based education," "resilience," "adaptation," "Indigenous methodologies," and "land education" or "land-based pedagogy." An in-depth review of the literature occurred before and throughout the writing process. Given the cross-disciplinary nature of this dissertation, I evaluated my approach to ensure a comprehensive and extensive representation of work presented in this chapter using an online tool called *Research Rabbit* (www.researchrabbit.ai).

Natural Resource Management as Complex Adaptive Systems

Co-evolutionary natural resources (NR) theory views people-nature relationships as complex, adaptive, social-ecological systems. Like CAS, SES describes the relationships between humans and the natural world are interconnected and alive; these systems evolve, collapse, and change over time (Levin et al., 2012; Preiser et al., 2018). However, CAS is different from SES, as varying levels of co-evolution define the relationships between people and nature: CAS is characterized by environmental interactions as interwoven relationships. CAS continually and collectively adjust "by mutual feedback creating a dynamic process" (Rammel et al., 2007: 12).

The difference between a complex system and a CAS is the ability of the system to learn by sharing information. In Melanie Mitchell's book C*omplexity: A Guided Tour* (2009)*,* Mitchell encourages us to consider the difference between a hurricane and an ant colony: both are complex, but eventually, the hurricane disperses because it does not "learn." On the other hand, an ant colony remains intact, adapting and swarming to new conditions (p. 3-5). Adaptability is a result of the ants' ability to learn and exchange further information.

Adaptive cycle, aka Panarchy

Co-evolutionary natural resource management examines how to maintain adaptive capacity during fluxes in the dynamics of a CAS (Levin et al., 2012; Preiser et al., 2018; Rammel et al., 2007). Allen et al. (2014) refer to this as Panarchy, defined as "a conceptual model that describes how complex systems of people and nature are dynamically organized and structured across scales of space and time" (p. 580). Developed initially to understand complex ecosystem dynamics, Panarchy became useful in modeling human influences on the environment. Holling and Gunderson (2002) characterize the term in systems science: Panarchy as "an antithesis to the word hierarchy… Instead, Panarchy is a framework of nature's rules (p. 21).

The conceptual framework Panarchy describes an abstract process of how complex systems are formed, swell, collapse and transform, and identify the multiple scales at which this process occurs (see Figure 1, below). While the Panarchy model is primarily conceptual, it does allow for hypothesizing about how complex adaptive systems function over time and space (Allen et al., 2014). Another way to think about Panarchy is an adaptive cycle, with each phase containing different system properties. From a Panarchy perspective, systems are constantly transforming, and there is no equilibrium or "stasis" period (Holing, 1973; Walker et al., 2004; Allen et al., 2014).

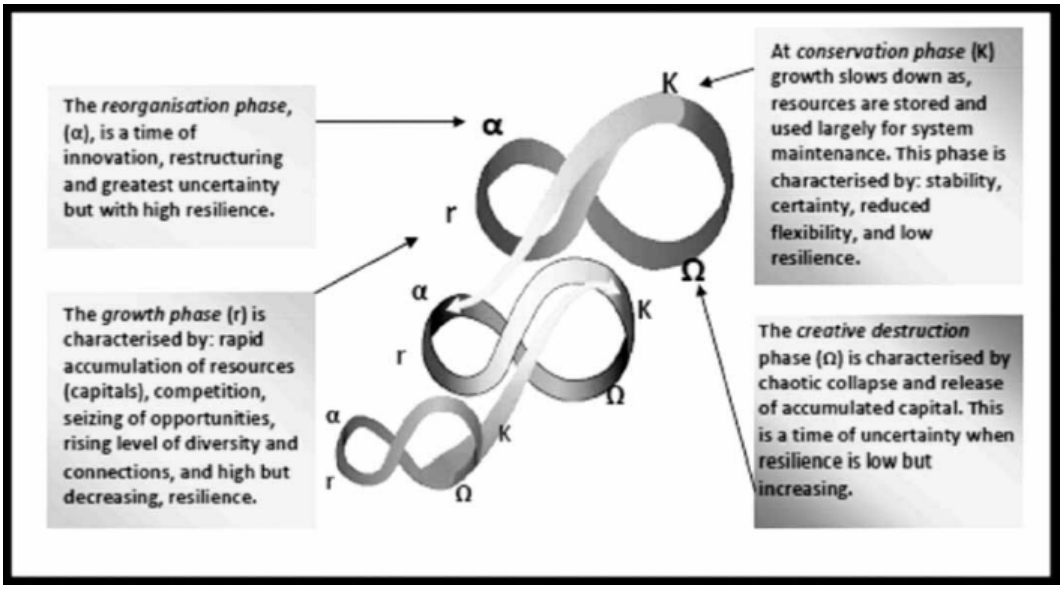

Figure 1: The Panarchy model of the adaptive cycle. Source: Davoudi et al. (forthcoming) adapted from Holling and Gunderson (2002, pp. 34–41) and Pendall et al. (2010, p. 76)."

Each phase of the cycle expresses distinct characteristics: high resilience and uncertainty during the reorganization stage. As the system changes phase, it goes through "leverage points" (Chan et al., 2020; West et al., 2020). Leverage points are opportunities to influence system behavior, where interventions can be effective during system change if there is enough adaptive capacity and innovation (Levin, 2013).

The co-evolutionary (or adaptive) potential of natural resource systems is dependent on system innovation, where novel ideas and solutions are "often driven by crisis, conflicts, learning, and redesign" (Rammel et al., 2007: 11; Löf, 2010). Innovation occurs during the "back loop" of the Panarchy framework: the time between the creative destruction and reorganization phases (Carpenter et al., 2002: 173-174). In other words, this is a time of system collapse and destabilization and a time of system transformation (Löf, 2010).

The seventh chapter of Gunderson & Holling's (Eds) 2002 book on Panarchy, titled *Collapse, Learning, and Renewal,* addresses this perspective of system collapse. The authors argue that various environmental management case studies suggest that crisis and collapse are typical or even predictable (Gunderson et al., 1995; Hilborn et al., 1995; Leven 1999; Redman 1999). If collapses are so predictable, why are they so common? And if collapses are so common, why is humanity still here? A pessimistic answer is that humanity is on a transient downward spiral. A converse view takes a hopeful perspective: sustainability is possible and contingent on the resilience of nature, flexibility of societies, and creativity of people. (p. 173)

The adaptive cycle, or Panarchy perspective, demonstrates how an emergent collapse of the system is not, in literal or figurative terms, the end of the world. The disintegration of structures and system states is quite common, as we can see through a historical lens. A period of system collapse can be reorganized into a new system if the conditions allow and innovation occurs (Löf, 2010; Carpenter et al., 2002; 174). In *Collapse, Learning, and Renewal* (2002), the authors emphasize the need for straightforward, flexible, and diverse innovations during times of system collapse and transformation (p. 174). Here, the term "deep resilience" refers to the stored capital, or value, available during reorganizations of systems. Information about system change is essential during these phases and the social creations that share information. For example, Walker et al. (2002) modeled information sharing about decreased harvest yields during times of system collapse and found that increases in decentralized information (collective learning) significantly support adaptive strategies and system reorganization (p. 176-177).

Learning to avoid "traps" during system change is adaptive innovation.

In Panarchy (adaptive change), system properties of resilience & transformation are balanced counterparts of complex adaptive system dynamics. Learning is an essential process in Panarchy, specifically in times of system collapse, as learning and innovation drives system adaptability, resilience & transformation (Berkes & Ross, 2013; Krasny, 2009; Löf, 2010). However, a normative focus on one system property or function (like learning for system resilience) can lack innovation during a system phase change (Lama et al., 2017).

The lack of innovation during times of system change can result in "traps" (Lejano, 2019); for example, rigidity traps and poverty traps (Löf, 2010; Gunderson & Holling, 2002). A rigidity trap happens when the structure of a system is so inflexible and controlled that it cannot adapt to changing conditions; a "poverty trap" is when there are not enough resources or access to resources for adaptive change to occur (Carpenter & Brock, 2008: 2). In summary, we face a potential "rigidity trap" as systems collapse and a "poverty trap" as systems reorganize. "Deep resilience" can act as a spring against these potential traps, as discussed in the next paragraph. The argument here is to identify learning strategies to improve the adaptive dynamics of social norms and institutions, avoid potential traps. If the human-nature relationship does not learn or integrate new information in the system as the system changes, the shock spreads rapidly, and the system cannot adapt to recent changes (Löf, 2010).

Thus, a rigidity trap is "maladaptive" in that it does not lead to system resilience or transformation (Holling, 1973; Lama et al., 2017). Butler & Goldstein (2010) studied the rigidity trap in a complex adaptive system of wildfire. Their paper *The US Fire Learning Network: Springing a*

rigidity trap through Multi-scalar collaborative networks is an example of how the model of Panarchy can be used to understand the role of learning in system adaptation. Managers improved the system's adaptability to fire by developing capacity for learning and information sharing about complex fire regimes.

Rigidity traps and poverty traps are essential concepts to understand the problem addressed in this dissertation. Environmental education and nature-focused pedagogy have potential rigidity traps (Rammel et al., 2017: 18). For example: if environmental education outcomes direct actions to maintain current system structures (for example, the "status quo" of neoliberalism, economic drivers of climate change, and dominant western perspectives), then the practice and pedagogy may reinforce these structures rather than changing them. See below for an example of how this might play out.

In the article *Environmental Education in a neoliberal climate,* Hursh et al. present an example of how "environmental education tends to become absorbed by general education paradigms rooted in neoliberalism" (2015: 308). For example, some EE lessons teach recycling as the solution to environmental degradation and loss of resources rather than the role of capitalism and consumerism in maintaining harmful resource extraction. If we only prioritize education outcomes that hold the "status" of a previous system in a constant flux of Panarchy, we will be trapped as the system state transforms. Innovation is the way out of these traps, and learning plays a crucial role in system innovation and adaptation (Löf, 2010: Rammel et al., 2017).

Philosophical Barriers in Natural Resource Management

Sustainability scientists, CAS researchers, and environmental educators must ask ourselves how we "understand, signify and value nature and community" and how the process of learning results from the ontology and practice of EE (Hursh et al., 2015). These two questions are about axiology and ontology about the environment. Axiology is the values carried by researchers and operationalized in studies. Ontology describes the essence of reality, encapsulating the process of knowledge generation or what it means to know something (Guba, 1990:18). Too often, CAS scientists fail to critically examine the ontologies and concepts in dominant perspectives of nature and society. Instead, scientists and practitioners must consider ontological assumptions to broaden perspectives and possibilities in complex adaptive social-environmental systems science (Mancilla Garcia et al., 2020:1). Ontological considerations also matter for professionals engaged with Diversity Equity and Inclusion (DEI) statements, to make space for other ways of knowing and cultural diversity in scientific pursuits.

For much of the western world, a controlling approach to nature is taken, which results in separating people from nature. This approach originated from a western, European ideology that

viewing a barrier between people and the environment. The resulting philosophy is one of dominion and claims the right to exercise power over the natural world. Mauro & Carroll (2014: 75) describe this worldview and how it emerged:

> Diop's analysis provides an explanation for the development of a western European (Northern Cradle) worldview by rooting it in the original environmental context in which it was forged. To understand the control of nature, one must see nature as an object, something outside of and unrelated to the self and that needs to be manipulated and exploited for personal gain (p. 75)

This description of western European worldviews of the environment differs from African and other Indigenous perspectives, resulting from the land where worldviews emerge. The process of learning to objectify nature starts with detaching oneself from the natural world, viewing the world as "other," a determining nature as a thing to be used and controlled. Thus, the western perspective of land is a human-centered philosophy of separation, or separation perspective- a legacy of western European environmental beliefs.

Separation perspectives and Substance Ontology

The separation mindset is a barrier in complex social-environmental systems research. A recent (2020) article from scholars at Stockholm Resilience Centre (Stockholm University) and the Centre for Complex Systems in Transition (Stellenbosch University) describe the separation perspective and its influence on systems research and ecology:

> Consider, for example, the standard approaches to conceptualizing the relations between the social and the ecological dominate the sustainability discourse at large. These approaches range from strong anthropocentrism, which includes the relational modes of detachment, domination, and utilization, to deep ecology, which supports the relational mode of wardship … However, despite the ideological differences between these positions, they share the ontological commitment that nature exists as a separate material realm, and that nature lacks agency. Deep ecology thus remains tethered to (and limited by) the same substance ontology informing anthropocentrism, and therefore cannot offer a radical alternative to anthropocentrism (Mancilla Garcia et al. 2020, p.2)

Separation perspectives are a legacy of western philosophical thinking that works to objectify and delineate to understand reality. This way of thinking is human-centered and permeates SES research, land management, and ecological restoration. It can be helpful in some scenarios; however (as mentioned before), many researchers and practitioners overlook or ignore the importance of critical reflection on ontology in systems research. The result is an amplified attempt to control and manipulate complex adaptive systems for human-centered or anthropocentric outcomes.

The separation perspective can also objectify non-human animals, positioning animals to manage, control, and manipulate if needed. Human-Wildlife Conflict is an excellent example of this assumption, which can be dangerous for all involved (Anand & Radhaskrishna, 2017). To illustrate this idea, we can see the "use-conflict" mindset in the assumed increases in grizzly-human conflict as bears migrate due to climate. We see a prominent narrative about bear-human conflict based on a viewpoint of eminent competition for food (See Roberts et al., 2014 *Idiosyncratic responses of grizzly bear habitat to climate change based on projected food resources changes*). The example demonstrates rhetoric of a conflict, anticipating violence with bears over access to resources rather than a discourse on working together, or cooperatively, with bears. There are many cases where wildlife management is successful (e.g., wolf reintroduction, return of bison herds), but the mindset of controlling non-human animals and beings dominates the discourse.

Separation perspectives emerge from human-centered realities based on a materialistic view of reality or substance ontology. Mancilla Garcia et al. (2020) describe the interwoven relationship between substance and separation perspectives and how that influences the abstraction of social-environmental relations:

> Substance perspectives enforce the separation between the social and ecological spheres, thereby limiting the scope of their integration. Modern science, including many of the scientific disciplines that contribute to sustainability science, largely but often implicitly accepts, and works with, standard scientific perspectives that have their roots in the thinking of philosophers such as Plato, Aristotle, or Descartes (May 2005). These philosophers endorse substance perspectives, that is, perspectives that give existential priority to objects and present change as secondary and exceptional. This seems in stark contrast to the ever-changing nature of SES. In a substance perspective, objects are defined in terms of well-defined properties (their "substance"), which are viewed as more fundamental than processes and relations. As a result, substance perspectives enforce the separation between the social and ecological spheres, thereby limiting the scope of their integration (p. 2)

Substance ontologies, or materialistic views of reality, combine with separation perspectives and dominate the discourse on people-nature connectivity. Human-centered values are prominent drivers in natural resource management and strategies that often overemphasize western European or settler visions of the future (Calderon, 2014: 14-15; Mauer, 2020: 146).

Consider the current discussion about dam removal, a timely example of changing social-environmental systems, people-nature relationality, conflict arising from clashing perspectives, and solutions dominated by western European perspectives. Dam removal is rife with competing worldviews, as there are diverse perspectives and social pressures around the usefulness of dams, despite the potential to restore river systems and watershed resilience. Substance and separation perspectives emerge around the ideas of "use v. restoration," "system manipulation for fisheries," "watershed resilience." The following section will look deeper and reflect on the ontologies present in dam removal debates, particularly the removal of two dams on the Elwha River in 2011 and 2014.

Example: Remove the dam, leave the ideology

The science about dam removal suggests quick recovery of watersheds, a viable solution to improve the "bounce back" of river systems. From a systems resilience perspective, this would be an attempt to restructure the system to transform to a healthy state and avoid the rigidity or poverty trap (Hammersley et al., 2018). However, the politics of dam removal and watershed restoration are complex and social tension emerges. In addition, complex cultural and political contexts create a challenge for Natural Resource Management encountering different values and beliefs around how the landscape should look/function (Fox et al., 2016; Magilligan et al., 2017).

The title of a 2016 article on dam removal in New England states, *"You kill the dam, you are killing part of me:…"*, demonstrating the sentiment that people in New England prefer to keep the "legacy" of the dam and its impact on the land, despite the function of the system decreasing (Fox et al., 2016). In watersheds west of the Rocky Mountains, there are concerns about the loss of economic benefits from the dam as infrastructure. For example, in the Elwha River, the argument against dam removal was about hydroelectric power (Loomis, 1996; Winter & Crain, 2008). In the Klamath River, it was about irrigation and agriculture (Gosnel & Kelly, 2010). In the Lower Snake River, competing values of transportation, trade, and hydroelectric power dominate the debate (Bargai & Shittu, 2021). While each case represents a different cultural context and geographic location, these rivers suffered significant impacts because of dams built in the past. While the river can become healthier after dam removal, the proposals create complex political challenges and divide social relationships. Finally, these projects and resulting debates demonstrate how land managers, water managers, and politicians continue to engage with ontologies of control and dominion over complex river systems.

After decades of work, planners removed the Elwah river dams. The river bounces back, and species return, like the return of lamprey and steelhead populations in Elwah River post-dam removal (Liermann et al., 2017; Hess et al., 2021). Many ecologists and environmentalists view the Elwha River dam removal case as a success (Prach et al., 2019). However, the attitudes of dominance over nature and manipulation of the environment are still present. Mauer (2020) writes about the western/settler ideologies behind the damming and un-damming the Elwha river:

> … The damming of the Elwha transformed the work of the river. Once monopolized and dammed, it produced a new form of work in service of the settler state. The Elwha River was re-imagined and physically restructured by actors recognized and legitimized by the settler state and, as such, physical-social relations were transformed through a power-laden process of exclusion and domination. The ways that the Elwha River was reshaped indicate the significance of landscapes and environments in facilitating the expansion and endurance of settler colonial structures (p. 146)

As noted by Mauer, what happened on the Elwha removed the physical infrastructure of the dams, but the relationships between nature and society remain rigid in a western, substance perspective. In short, dam removal extracts the physical materials of previous natural resource policies, but settler-colonial land ontology remains. Mauer (2020) continues, providing an example of how to address ontological divides in ecological restoration work:

> Ecologically focused interventions for ecosystem restoration may have limited the ability to upend the social hierarchies and settler-colonial structures at the root of environmental injustice in Indigenous communities. However, restoration interventions that build cooperative alliances can help bridge the gap between ecosystem restoration and environmental justice (Tomblin 2009). Kimmerer advocates for a reciprocal approach to restoration informed by Indigenous knowledge systems such that land restoration and cultural revitalization become mutually reinforcing (p. 146).

If restoration work aims to promote environmental justice, it is critical to understand the non-material legacy of settler-colonial perspectives of land. According to Mauer, the Elwah Dam Removal lacked the cultural awareness needed to build reciprocal relationships with other ways of knowing. Mauer indicated the potential for natural resource managers to increase socio-ecological resilience through collaboration, just relationships, and opening space for other forms of knowledge in ecological

restoration work. In this way, land managers can address the epistemic legacy of separation and control over nature by honoring different land relationships, sharing power and decision-making ability, and respecting diverse knowledge about complex landscape dynamics,

Solutions: Relational Ontology and Indigenous Knowledge Systems

The call to center diverse knowledge systems in sustainability science and adaptive management appears in scholarly work about CAS and Adaptive Natural Resource Management (Norström et al., 2020; Pulver et al., 2018; Tàbara & Chabay, 2013; West et al., 2021; Whyte, 2013). The solution to issues of ongoing settler-colonial ideology in ecological restoration and SES science can be found in the opening of relational ontologies in Natural Resource Management, moving away from normative outcomes to process and relationships (Hertz et al., 2020; Lejano, 2019; Walsh et al., 2021; West et al., 2020, 2021). Mancilla Garcia et al. (2020) gives insight into how relational perspectives reduce the barrier of epistemic separation in people-nature systems:

> One key difference between the process-relational approach in this paper and other current ontological perspectives for understanding SES (including critical realism), is that process-relational perspectives do not enforce a separation between epistemology and ontology. This means that processes and relations do not have an existence independent of an observer. However, this does not mean that the process-relational account is a subjectivist account (see Duvernoy's 2016 discussion of Deleuze's perspectivism), which would again suppose a difference between the observer and the observed. (p. 2)

A relational approach to understanding SES dynamics dissolves the philosophical barrier between what is "known" and the process of "knowing." In the quote above, the "observer" is an individual in a system who experiences the complexity of a system as a part of the system. Thus, the shift to relational approaches in systems research can also shift perspectives as a researcher. In short, relational ontologies remove the barrier between people and nature and illuminate the dynamic interconnectedness through observation of emergent complexity.

This thought exercise helps illustrate the previous point about the need for a relational approach in SES science. Imagine a situation where funding has come through for a study about tree species in a remote forest. A SES settler-colonial approach to forestry might identify a specific tree species to find, then go measure and document species populations. A relational approach to forestry might mean sitting in a forest quietly and observing the interactions of animals, insects, trees. Different types of knowledge are produced from these different approaches, and I suggest that the

ability to switch perspectives allows for greater insight and potential for novel phenomena to emerge. In addition, the relationships that are built with the earth through direct experience illuminates the reality of nature as an interconnected and dynamic system.

The relational approach to understanding system complexity through observation of phenomena is also an aspect of Indigenous Methodologies (Denzin, Lincoln, Smith, 2008: 26, 499). In recognizing complexity, we begin to see multiple causations and the possibility of different vantage points from which to view a phenomenon (Denzin, Lincoln, Smith, 2008: 138). Multilogical epistemologies can take multiple perspectives to learn more about a system. Engaging with various views in a just and common way empowers people with diverse knowledge and cultural systems to make informed land management decisions. In this way, relational approaches in Adaptive Natural Resource Management shift the narrative of Western ideology by engaging with various and dynamic ways of knowing (Denzin, Lincoln, Smith, 2008: 49, 135-140).

Solution: Engage with Relational Approaches to avoid "Substance Ontology."

Theoretically, learning is a crucial process to the adaptability of complex systems, where learning serves as a cooperative process that connects people with important information about the change (Ekins, 2020; Krasny et al., 2010; Löf, 2010; Carpenter et al., 2002: 193). The application of relational pedagogy in this dissertation explores the perspective of learning as a relationship between people and nature and the connection of relationality as a necessary perspective to understand complexity in adaptive natural resource systems (García et al., 2020; Hertz et al., 2020; Lejano, 2019; Spies & Alff, 2020; West et al., 2021). The emphasis on relationality in Land education pedagogy and Critical Indigenous Methodologies addresses the need to include relational ontology in sustainability science, include diverse knowledge systems in adaptive NRM, and build adaptive capacity through environmental education.

Process-relational ontology is a clear distinction from Western-dominated environmental viewpoints and moves toward collective behavior and cooperation models (Mancilla Garcia et al., 2020: 2). The shifts from separation/conflict models to collective/cooperative models are happening in CAS science, ecology, environmental governance, and biological models of evolutionary behavior (West et al., 2021; Adger, 2003; Levin, 2010; Ostrom, 2004). The ontological move aligns with literature regarding the adaptive governance of natural resource systems and the requirement for accessible forums of discourse to foster reciprocal relationships and innovation during system change (Rammel et al., 2017; Löf, 2010). Calls for diverse knowledge, participatory methods, local engagement, and place-based solutions to complex natural resource management challenges all regard

the process of knowledge generation: the necessity for equity and diversity in learning about complexity and interconnectivity (Berkes, 2004).

Scholars across disciplines in sustainability call for the inclusion of education and knowledge production into theories of adaptation, change, and CAS (Ostrom, 2009; Balvanera et al., 2017; Folke, 2006). Social institutions of education and knowledge generation are a strategic pathway to the adaptiveness of complex SES, particularly when thinking about environmental management and natural resource management (Rvammel et al., 2007; Levin et al., 2013).

Diverse knowledge is key to developing adaptive capacity in complex systems. Many perspectives of a specific "event" (e.g., wildfire, flood, drought) in complex system states gives insight into what is going on and which processes are related (Mancilla Garcia et al., 2020). The call to explicitly open paradigms in Adaptive Natural Resource Management resonates with the need to engage with relational epistemology and ontologies in sustainability science and environmental education (West et al., 2021; Tuck et al., 2014). The following section gives an overview of environmental education theory and application, focusing on how EE scholars have conceptualized education as a process within complex adaptive SES (see Krasny et al., 2013 text "Resilience in SES: The role of learning and education").

The Role of Environmental Education within CAS: System Resilience

This dissertation takes a holistic environmental educational philosophy of learning *from* the environment and learning *for* the environment (Krasny, 2009). EE encompasses educational approaches that instruct learners to understand, embrace, and respond to environmental challenges (UNESCO, 1978; Krasny, 2020). Environmental education began to be included in the discourse on CAS in the 2000s, focusing on the SES framework. This dissertation continues the inquiry to elevate the importance of learning as a function of system resilience, emphasizing the importance of EE as a process in CAS dynamics and developing pedagogy that supports co-evolutionary natural resource management outcomes.

C.S Holling originally defined the concept of system resilience in 1973 as a "measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationship between populations or state variables" (p.14). Defining resilience is an intricate process. In SES, resilience is the capacity to bounce back from a system disturbance/shock, "essentially maintaining its structure and functions. It describes the degree to which the system is capable of self-organization, learning, and adaptation" (*Resilience*, 2015). In CAS, resilience is an inherent property of a system with high adaptive capacity and heterogeneity, allowing the system to adapt (Levin, 1998; Preiser et al., 2018).

Clearly defining resilience as capacity (in SES) and a property (in CAS) may seem semantic. Still, it is crucial to the reader to understand why resilience can be a tricky word in interdisciplinary systems science. As stated in the previous paragraph: using an SES framework, *resilience* is a system's capability that can be "built" or "fostered" through interventions. On the other hand, in the CAS framework, *resilience* is an expressive term that describes a system state: if the system functions in a certain way, it is "resilient." Thus, while resilience can casually mean many things, its meaning matters in systems science- as discussed later in this section.

Regardless of the semantical details, resilience generally emerges in a CAS or SES during times of system change. System resilience is a consequence of several "requisite functions," or essential patterns, resulting from how a system is connected. According to Per Becker (2014), these are learning, anticipating, recognizing, and adapting:

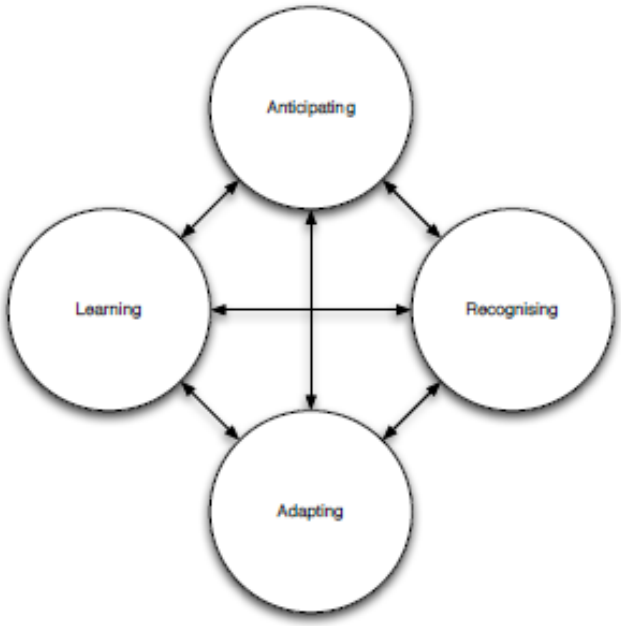

Figure 3. The nexus of fundamental functions for resilience.

Figure 2 from *Operationalizing Resilience and Getting Culture Back* in (Becker, 2014)

As the figure shows, learning is a crucial process to support the emergence of system resilience. Both CAS and EE literature makes this assertion (see Rammel et al., 2017; West et al., 2021, Krasny, 2020; Löf, 2010; Plummer, 2010) and applies the importance of learning in sustainability, risk management, climate change adaption, and land management efforts. In addition, scholars have sought to understand how learning improves the capacity of human-environmental systems to respond to

disturbance (see Becker, 2014) to protect and sustain what is valuable, e.g., clean water, culture, well-being, biodiversity, etc.

Researchers in Environmental Education (EE) conceptualized how EE works as a process in social-environmental systems. EE is "a complex and multifaceted part of a larger system of interacting structures and processes" (Krasny et al., 2010: 665). Krasny, Lundholm, and Plummer describe multiple intersections of EE, learning theory, SES, and the resilience concept (2010). The combination of SES resilience and EE looks at the impact of environmental learning at a systems level, rather than just the learning process and outcomes for individuals (Krasny et al., 2013).

Education as a process in CAS dynamics

In the text Advancing Environmental Education Practice (2020), Krasny states: "SES resilience is the outcome for environmental education." The EE idea emphasizes the SES (SES) framework, situating education as a strategy to foster system resilience in a community & disaster response context. Krasny's original ideas on the subject (see, for example, Krasny et al., 2010) inspired a decade of research, applying the concept of EE-system resilience to case studies, like a program about EE as a response to post-Hurricane Sandy in NYC (Dubois & Krasny, 2016: 257). There is an application in other fields, with limited development by systems science and resilience scholars. The table below sorts multidisciplinary literature citing Krasny et al., 2010 into three conceptual realms: System Resilience, community development, and disaster response:

Table 1: Literature citing Krasny et al., 2010

Concepts	**Themes**	**Use of Krasny et al. 2010**	**Authors**
Community development	Focus on urban environmental education Collective action, EE programs as a response to undesirable environmental conditions Community development youth development	Identify the potential to improve urban/rural community resilience. Engaging young people with environmental policy via EE programs	Russ et al., 2015; Shava et al., 2010; Briggs et al. 2018; Imperiale, A. J., & Vanclay, F. (2016); Hursh et al., (2015)
Disaster Response & Sustainability	EE as a social response to disasters/environmental challenges like Hurricane Sandy & Deforestation System-level Pre-post case studies Build future ability/ resilience neoliberalism/colonization	EE improving system resilience & sustainability EE as a process to foster social collaboration and participation in a social-ecological system Critique of Krasny et al.,	Lee & Krasny, 2015; Dubois & Krasny, 2016; Smith et al., 2016; Imperiale & Vanclay, 2016; Krasny, 2020 Hursh et al. (2015)

System Resilience	Resilience theory Systems theory relationship between environmental knowledge, learning & system resilience the challenge of mismatches in social theory & ecological theory (scale, meaning of resilience)	How social scientists are engaging with concepts of system resilience relationship between environmental knowledge & system resilience only mentions the original ideas	Holdschlag & Ratter, 2013; Ban et al, 2015; Cumming et al., 2013; Miller et al., 2010

The literature that applies the EE-systems concept to real environmental challenges demonstrates an improvement in ecological conditions for communities, building "resilience" to disasters and the potential to adapt to system disturbance. The concept's application in systems science is limited, presenting an opportunity to explore the theoretical foundations of the EE-CAS concept from a complex systems perspective.

Resilience is a moving target. Literature citing the Krasny et al. 2010 work emphasizes EE's potential to develop resilience to disaster and support community development contexts. The lack of empirical cases limits the ability to evaluate system resilience as an outcome in community/disaster contexts. Perhaps this is because of the multiple meanings of resilience that have emerged since the 1970s (Davidson et al., 2016) and the mismatched significance of system resilience in ecology and sociology (Becker, 2014; Lama et al., 2017: 193). Robust, technical critiques of the resilience concept of value to CAS science discourse (see *Social and ecological resilience: are they related?* (Adger, 2000); *Resilience, experimentation, and scape mismatches in social-ecological landscapes* (Cumming et al., 2013); *Why resilience is unappealing to social science: theoretical and empirical investigations of the scientific use of resilience* (Olsson et al., 2015)), but are outside the scope of this dissertation.

The work in this dissertation is concerned with the potential impacts of designating system resilience as a normative outcome of EE. It is maladaptive to cling to previous system states in times of transformation and can perpetuate inequitable structures of power or harmful perspectives about what ought to be. Adaptive change (Panarchy) in CAS dynamics can be desirable, "good" or "bad," based on the perspectives and ontology of the "system observer." A careful, critical reflection of ontology in the EE-systems resilience discourse demonstrates a need to review the philosophical and ontological concerns using system resilience as a desirable outcome (Becker, 2014; Lama et al., 2017; Olsson et al., 2015:1; Lotz-Sisita, 2009). Instead, this critique suggests a system's cultural contexts, values systems, and power hierarchies must inform desired EE outcomes (Cretney, 2014).

The problem with prescribed system resilience: settler futurity in EE

EE can foster ecological knowledge for those engaging with the environment around them, and the learning is helpful in encouraging pro-environmental behaviors. In addition, EE supports the development of individuals, supporting the growth of young people and fostering personal development and personal development (Krasny, 2009: p.4). Thus, the ontology of EE programs ought to be critically reflexive of the multiple, diverse social and cultural contexts housing the research (Lotz-Sisita, 2009). Nevertheless, separation and substances perspectives often materialize in the discourse on the role of EE as a catalyst for learning in CAS and Adaptive Natural Resource Management. Moreover, western European ideologies permeate existing EE-CAS literature, especially in literature emphasizing EE as a solution to ecological crises (Hutchison, 1998: 8-9, 23).

The concern is the affiliation between EE, "crisis mentality," and the desired outcome of "SES resilience." Philosopher Kyle Whyte illustrates the connection between disaster and colonization at the beginning of *Against Crisis Epistemology* (2020)*:*

> Colonization is typically pitched as being about crisis. People who perpetrate colonialism often imagine that their wrongful actions are defensible because they are responding to some crisis. They assume that it is possible to suspend certain concerns about justice and morality (p 1).

This critique brings attention to how the EE-disaster resilience framework risks "further colonization of alternative epistemologies" (Hursh et al., 2015: 308, 314). We see an example of this in a case study about EE, youth development, and cultural competency with Indigenous women in Bolivia (Briggs et al., 2019). EE is seen as the solution to a problem of youth development in rural Bolivia. However, western cultural competencies, such as formalized education, access to markets, jobs, dominated criteria for participant evaluations (p. 45-48). As noted in Hursh et al., EE programs like the Bolivia case tend to ignore the role of capitalism and environmental degradation in responses to crisis and provide solutions in the form of neoliberalism and Western knowledge systems (2015). EE initiatives marketed as "development tools" to prevent "ecological crisis" reinforce dominant cultural ideologies rather than allow for diverse ontological perspectives.

In CAS literature, the concept of system resilience means the ability of a system to absorb a disturbance or shock and return to the previous system state. So, EE programs that develop resilience to disaster or motivation to return to the last system state advocate a return to a system defined by settler territoriality & substance ontology. This can result in pedagogy perpetuating ignorance of Indigenous epistemologies and focusing on settler identities in EE (Calderon, 2014: 29-30).

Alternatively, an epistemology of ignorance in EE results in pedagogy that invests in future system states dominated by settler narratives of the environment, where western European perspectives are "emplaced" on the land.

Settler emplacement is an attempt to legitimize "living on stolen land" by swapping out "the native as the rightful claimant of the land" (Tuck et al., 2014: p. 15). This quote illuminates the prevalence of settler ideology and strategies in EE:

> Replacement and emplacement, to be straightforward, are entirely concerned with settler futurity, which always indivisibly means the disruption of Indigenous life to aid settlement. Any form of justice or education that seeks to recuperate and not interrupt settler colonialism, reform the settlement and incorporate Indigenous peoples into the multicultural settler colonial nation-state is invested in settler futurity (Tuck et al., 2014: p.16).

The push towards EE pedagogy that reinforces western European environmental perspectives and goals of normative resilience is concerning, especially considering the need for diverse knowledges and inclusive approaches to science. For example, suppose system resilience is identified as the outcome of EE pedagogies and defined from a western European perspective. In that case, EE becomes a process of learning that perpetuates systems of inequality and harmful ideas tied to settler control of the land.

Bang et al. (2014) write about how settler ideologies permeate EE and pedagogy of place to promote separation perspectives in the name of sustainability and development:

> We suggest that taking anthropocentrism as a universal developmental pathway privileges settler colonial relationships to land, reinscribes anthropocentrism by constructing land as an inconsequential or inanimate material backdrop for human privileged activity and enables human dislocation from land. One way that the phenomenon of dislocation occurs is through the construction of places as objects or sites, which Bowers (2001) names as fundamentally a problem of anthropocentricism and Gruenewald (2003) suggests is deeply pedagogical. Corbett (2007) explores the ways in which mobile modernity extends the disembedding of peoples from places, a process that Griffiths (2007) has called 'the deforestation of the mind' (25). For Indigenous learners, this conceptual and developmental pathway functions as a form of dispossession and epistemic (and in our view ontological) violence (e.g., Marker 2006; Wildcat 2009). (p. 44)

The prevalence of western ideologies in EE operationalizes learning environments to reinforce separation and substance ontology, pro-colonial sentiment, and white supremacy. These ideologies are not openly mandated in education policy anymore (see Tuck et al., 2014, boarding school era). However, the doctrine continues to subvert EE and place-based education due to the "normative scientific paradigm that has been constructed around the division of nature and culture and is routinely taken up in learning environments" (Bang et al., 2014: 43).

For example, an approach to EE is the pedagogy of place or Place-based Education (PBE). PBE claims to facilitate complex thinking, foster relationships between culture and land, improve social conditions through decolonization, and recover social-ecological health to degraded landscapes (Grunewald, 2008). However, a critical approach to PBE continues objectifying the environment. As a noun, "place" can be viewed as a narrative of ownership and objectification (Bowers, 2008). The concept of place is behind the colonization and settlement of the land, removing Indigenous people and intergenerational relationships (Styres, 2011: 720). Centering a pedagogy on place homogenizes cultural diversity, ignoring Indigenous peoples and traditional associations with the land, thereby perpetuating a colonizing narrative and future (Bowers, 2008: 325; Calderon, 2014). In this way, we are not truly learning from a place but objectifying it for settler futurity and materialism: PBE has potential but needs to address separation perspectives and center other ways of knowing**.**

Solution: Relational Learning in Complex Adaptive Systems

EE can be a point of transformation if the philosophy and pedagogy center ~~I~~ndigenous futurity rather than settler narratives (Calderon. 2014; Denzin, Lincoln, Smith, 2008: p. 150-155). We must engage holistic, land-centered pedagogies that study land-culture connectivity while asking questions about equity in science pedagogy (Anthony-Stevens & Matsaw, 2019; Bowers, 2008). The practice of land education seeks open and diverse knowledge, embraces the complexity of being with land, and learns from intergenerational memory of places (Bowers, 2008: 333). Developed by Indigenous theory, pedagogy of land knows from the "storied relationships that are etched into the essence of every rock, tree, seed, animal, pathway, and waterway with the Aboriginal people who have existed on the land since time immemorial" (Styres, 2011: 721). Authors in "Land Education: Indigenous, post-colonial, and decolonizing perspectives on place and environmental education research" (2014) provide examples of how relational epistemologies work in a Land education pedagogy approach:

> *Relational Ontology:* (concerning the term 'Sea Country') "Country, as the term is taken up in Australia, does not mean 'the environment.' Country is better understood as a vital

> interconnected web of social, ecological, and spiritual relationships; it epitomizes the way of existing in and viewing the world that might be termed the 'relational ontology' of Indigenous Australians." (Whitehouse et al., 2014: p. 58)
>
> *Relational Pedagogy:* "Relational pedagogies are not new… relationships to land are familial, intimate, intergenerational and instructive" (Tuck et al., 2014: p. 9)

A solution to concerns about potential inequality and perpetuating harmful ideology through EE is to thoroughly consider, signify separation perspectives, and inspect the privileges of substance ontology in settler worldview. However, this mindfulness may not be enough to transform the normative approaches to environmental science education and adaptive natural resource governance (Bang et al., 2014: 43).

Shifting Perspectives

The literature reviewed above points out the epistemological limits in adaptive natural resource management and environmental education and knowledge gaps in sustainability that require diverse knowledge systems and perspectives to make meaning of complex system dynamics. Shifts in perceptions can develop learning techniques for all states of the adaptive cycle, including many ways of knowing and being in the world. These solutions outline a methodology to create environmental learning programs for adaptability in CAS (Complex Adaptive Systems) and practice EE (Environmental Education). The outcomes of this approach value relationships and reciprocity, explicitly address colonial-settler ideas about land, center indigenous futures, and prioritize research goals determined by community-based co-design processes.

Land as Pedagogy: learning from being in relation with land

Philosophically, land as pedagogy presents the "initial conceptualization around how Indigenous thought diverges from Western thought" (Styres, 2011: 718). Indigenous epistemologies and philosophies are diverse, inherited from an intergenerational memory and narratives gathered around a land (Styres, 2011: 717; Zinga & Styres, 2011: 61). A pedagogy of land detaches knowledge from imperialist, Western history's written narratives. To embrace the diversity of knowledge emerging from our complex relationship with land (Zinga & Styres, 2011:) is to empower researchers and practitioners to radiate from subversive prejudices embedded in "critical pedagogy of place" (Bowers, 2008). Land transcends spatial and temporal scales, so the knowledge about intergenerational connectivity is often inherited through stories, traditions, and language (Styres, 2011: 722). Intergenerational, complex relationships with the land are the primary connections rather

than a "place" owned by people or something obtained via tenure (Zinga & Styres, 2011: 62; Bowers, 2008).

Styres defines "Land" as an abstraction, more than just material relationships: "Land as Indigenous philosophy or ideology that exists beyond the concrete connection to place" (2011: 718). The Land is witnessed as a living entity, the center, and giver of life, so Land is often capitalized as a proper name for this entity (Zinga & Styres, 2011). The capitalization of "L" in Land as pedagogy recognizes Land as a proper noun, and the learning that occurs from being in relationship with Land itself. To make this clearer, phrases like "Land as pedagogy, Land as first teacher, Land Education" engage with the Land as a proper noun. A 'relational pedagogy of land' will not be capitalized, as it comes from a settler-researcher perspective. This is one of the challenges of working in between

Land as pedagogy engages with" land [as] the context for formal and informal education" (Zinga & Styres, 2011: 61). Learning occurs by exploring the diversity of experiences and complex interconnections of land (Simpson, 2014: 8). The learning relationship is reciprocal: a philosophy of land pedagogy influences the learner while the learner influences the land (Zinga & Styres, 2011: 63). This kind of learning occurs through exploration, observation, and reflection opposite land (see Bang et al., 2015 *Learning through Observing, pitching in, and being in relation to the natural world*). The practice of land as pedagogy happens openly and reflexively. Knowledge is shared through relational experiences and co-created via conversational methods about participants' observations and thoughts (Kovach, 2010; Styres, 2011: 722).

The relational approaches, ontology, and pedagogy of Land education demonstrate our ability to see people-nature systems in a state of "always becoming," like the adaptive cycle. Shifting perspectives away from substance/material realities reorient NRM outcomes and the role of EE as helping support that dynamic rather than managing for a desired, fixed outcome. Land relational pedagogy allows learners to be with a place, each other, and the ecological systems. The opportunity to engage with relationality in EE and Adaptive Natural Resource Management leads us to the driving questions of this research:

1) How can a community-based relational pedagogy (i.e., Land education) facilitate learning about people-nature relationships with 4th-grade students at Lapwai Elementary School?
2) What patterns of interaction give insight into participants' experiences relating to the land?
    a) What did participants experience?
3) How do relational perspectives emerge in participant experiences?
    a) In which conditions, events, processes (social-ecological context) did these land relational narratives emerge?

Conclusion

In summary, this chapter establishes three significant claims: 1) A relational ontology is needed in CAS and NRM, 2) Dominant models of EE are rooted in Western ideologies and material ontologies that seek to manage systems for a particular outcome that may perpetuate setter colonialism and settler futurity, and 3) Land education pedagogy is rooted in relational epistemology and ontologies and offers a learning process that may better support the development of relational ontologies in CAS and NRM. These claims lay the foundation for developing a collaborative, participatory study on how a relational pedagogy of land can facilitate learning about people-nature relationships and foster connectivity between culture and landscapes.

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Chapter 2: Methodology

The purpose of this chapter is to describe the methods used to co-generate knowledge about land relationality in an educational setting, rooted in Critical Indigenous Research Methodology and Land Education Pedagogy. This study, conducted in the spring of 2019, explores student meaning-making in learning through relationships with the Land. A participatory, Community-Based Design Research approach (Bang et al., 2015: 3-4; Bang & Vossoughi, 2016) resulted in two collaborative processes: 1) curriculum design and lesson planning (Bradley & Hollenhorst, 2007; Creswell & Creswell, 2018), and 2) narrative inquiry and conversational method (Kovach 2010; Lemly & Mitchell, 2012). The collaborative lesson planning process created an outdoor, interactive learning environment for a class of 4th-graders to explore a local nature area. Audio recordings of conversations and observations of participants gave insight into their experiences of people-land interaction through a relational pedagogy. The approach links broader inquiries about the role of environmental education in CAS, explores how relational pedagogy and land education interact to promote collaborative knowledge creation within the context of Adaptive Natural Resource Management (Norström et al., 2020).

Study Purpose and Research Questions

The overarching intention of this work was to consider how a relational pedagogy can support a form of environmental education that is rooted in relational ontologies and collaborative relationships in knowledge co-production and how processes of learning emerge from relationality. The questions below are the driving questions for the co-design of a community-centered, land-based curriculum and the questions used to frame understanding about how this process of land education might support learners in developing relational ontologies of place (Country et al., 2015):

1) How and in what ways can a relational pedagogy (i.e., Land education pedagogy) facilitate learning about people-nature relationships with 4th-grade students at a rural Elementary School?
2) What patterns of interaction give insight into participants' experiences relating to the land?
    a) What did participants experience?
3) How do relational perspectives emerge in participant experiences?
    a) In which conditions, events, processes (social-ecological context)did these land relational narratives emerge?

These questions align with Simpson's (2014) statement on pedagogies that foster relationships with land and community: "we should be concerned with re-creating the conditions within which this learning occurred, not merely the content of the practice itself" (Simpson, 2014: 9). Simpson refers to conditions that lead to learning about people-nature relationships through Indigenous epistemologies in a reciprocal way while unsettling settler ideologies about land and place (Calderon, 2014: 33). The educational approach described in this chapter works within a Land-education pedagogy to create opportunities for learning to be *in relationship* with the land. It defies the construction of the purpose of learning as producing learning outcomes like high scores on state standardized test requirements or the fixed state of "SES resilience."

This chapter provides the rationale for the qualitative approach using Critical and Indigenous Research Methodology, and describes the specific methods used to develop a collaborative curriculum and narrative inquiry. It gives an outline of the research site and participants, then an overview of the curriculum design and data generation, including collaboration with partners in Lapwai and approval of a Nez Perce Tribal research permit. I present the methods used for data collection, analysis, and synthesis, as well as the ethical considerations and specific issues of trustworthiness given the paradigms of multilogical epistemology and relational ontology, as defined by Kovach (2009) and Denzin, Lincoln, and Smith (2008), and adherence to Critical Indigenous Research Methodologies. The limitations of the study and a summary of the research design conclude the chapter.

Study Philosophy: Critical Indigenous Research Methodologies

This study is grounded in Critical Indigenous Research Methodologies (CIRM) (Brayboy et al., 2012; Kovach, 2009; Denzin and Lincoln, 2008; Smith, 2013). The CIRM framework "fundamentally begins as an emancipatory project that forefronts the self-determination and inherent sovereignty of indigenous peoples, is rooted in relationships and is driven explicitly by community interests" (Brayboy et al., 2012: 424). This approach centers on the 4Rs of Respect, Reciprocity, Responsibility, Relevance as a guide to navigating a novel scientific paradigm in the Academy and research as a process of knowledge creation (Kirkness & Barnhardt, 1991, p. 103).

In addition to the 4Rs as a guide, the importance of relationships and researcher accountability are clear tenants of the CIRM framework, where all inquiry is "rooted in relationships… a process of fostering relationships between researchers, communities, and the topic of inquiry" (Brayboy et al., 2012: 427). This co-construction of knowledge through relationships is Constructivist, as a paradigm, and aligned with the qualitative methods, Indigenous epistemologies,

and a narrative approach to inquiry (Kovach: 2009:30). Constructivism asserts that our concept of "reality" is not objective but subjective, socially formed, and developed through a collaborative process of inquiry and interpretation (Guba, 1990:27; Lincoln, 1990:79; Kovach, 2009:26). The qualitative, constructivist approach to social science focuses on knowledge co-creation processes via social dynamics. It asks the question "how" instead of "what" and is sensitive to the complexity of human experiences (Kovach, 2009:26). It is a process of meaning-making. This inquiry considers "truth" as the collaborative process of forming knowledge through interactions and relationships (Simpson, 2014: p. 11).

Relationships matter: and relationality is the central theme in this dissertation. The research relationship in the CIRM framework is one of service, where the knowledge generated works to serve the community's needs where they take place (Brayboy et al., 2012: 435-437). Thus, CIRM gives way to community-based research methods. Given researchers' CIRM framework and responsibility, a Community-Based Design Research (CBDR) design is appropriate for this study. The approach is collaborative and participatory, accordant with CIRM principles about "scientific" knowledge creation with Indigenous peoples and lands (Bennett et al., 2017; Campbell & Vainio-Mattila, 2003; Koster et al., 2012; Marin & Bang, 2015, 2015; Norström et al., 2020; Tuck et al., 2014). It is also valuable for the field of collaborative natural resource management and sustainability science (Anthony-Stevens & Matsaw, 2020; Nathan J. Bennett et al., 2017; Campbell & Vainio-Mattila, 2003; Masterson et al., 2019; Norström et al., 2020; Pulver et al., 2018; Raymond et al., 2010). The details of the CBDR approach are discussed more in the research design section.

Based on prior experiences, I assumed that participants' experiences relating to nature, landscapes, and places would be diverse and context-dependent. Thus, curriculum development centering Land education pedagogy (Styres et al., 2013; Styres, 2011; Tuck et al., 2014; Wildcat et al., 2014), and research using conversational and narrative inquiry approaches (Lemley & Mitchell, 2012; Koster et al., 2012; Preiser, Biggs, De Vos, & Folke, 2018; Spies & Alff, 2020; Styres, 2011; Toledano & Anderson, 2020; Walsh, Böhme, & Wamsler, 2021) were most appropriate. Data generation and analysis focused on the patterns that emerged from direct interaction with a local nature area. I discuss the theoretical foundations for this approach later in this chapter, following the research setting and context overview.

Research Site and Selected Participants

The research took place in Lapwai, Idaho, in the Nimíipuu, or Nez Perce Tribe homeland. I conducted research activities in collaboration with community members and fourth-grade students at Lapwai Elementary School during the spring of 2019. The 16 young people in this class were participants in

this study due to pre-existing [and ongoing] relationships (Kovach, 210: 51) with community members developed during my dissertation. In addition, I began working collaboratively with a research partner in 2016, which began with conversations about climate change and designing learning opportunities to support the next generation in adapting to uncertain environmental conditions.

The research partners designed the project to be flexible, and these general processes could be performed in any community. However, through a collaborative decision-making process, my research partner suggested the study be conducted in Lapwai, as he is connected in the community and works in the Cultural Resource department of the Nez Perce Tribe. Thus, the project became tailored to the specific setting of the Lapwai community. The site selection began a period of relationship-building to find willing collaborators to participate in the project, as well as the process of developing a proposal for an approved research permit from the Nez Perce Tribal Executive Council. After two years of relationship building, learning about the history of Lapwai and surrounding areas, the opportunity for collaboration emerged.

The relational aspect of CIRM meant that participant selection was rooted in existing, ongoing relationships. The opportunity emerged in August 2018 after a connection with a 4th-grade teacher at Lapwai Elementary. This teacher was already planning an environmental education or science curriculum project to take students outside the classroom. Multiple conversations with the teacher and school principal clarified a shared vision and collaboration, and we agreed to work together to design a relational pedagogy about place and land.

This collaboration aimed to work with the class (16 students) as participants and co-investigators to learn science in a local, natural area. Three community experts also became volunteers because of pre-existing and ongoing relationships (Kovach, 210: 51). This approach is appropriate given the depth of knowledge generated, relationship building, and willing collaborators (Kovach, 2009). The land is also an active participant in this study, which aligns with principles in Land Education entity; see, for example, "Land as first teacher" (Styres, 2011:717).

Context

As of the 2019-2020 school year, the demographic population of Lapwai Elementary is 85% Native American or Alaskan Native population. Additional demographic statistics about the school district are available through the state government education agency, but we have focused on an assets-based framework. Given the CIRM framework, it was vital for me (as a researcher) to understand the

context of education at Lapwai Elementary beyond state-level metrics. Thus, the context for this study considers the cultural assets of education and valued knowledge in Lapwai as a community.

My description of the cultural context comes from document review from the Nez Perce Tribe and the Lapwai School District, observation of classroom activities, and time spent in Lapwai as a place. One document of importance is the Nez Perce Cultural Pedagogy, developed in 2013 by the State Tribal Education Project (STEP). This pedagogy identified cultural and language standards essential to the Nez Perce Cultural context and identifies commonalities between Nez Perce Pedagogy and Idaho state education standards. The Nez Perce Pedagogy document guided the design of the Landscape Lessons project, aligning project outcomes with the cultural context and priorities in education. This document is part of the Nez Perce Tribal Research Permit, which readers can find in Appendix A.

Through time spent in the community, I learned where to take students for learning experiences and what natural areas would be easily accessible to the fourth-grade class and within walking distance. I identified Lapwai Nature Park as the ideal site for the Landscape Lessons project and one of the sites of our inquiry into the meanings that students made from these educational experiences (the other place was their classroom).

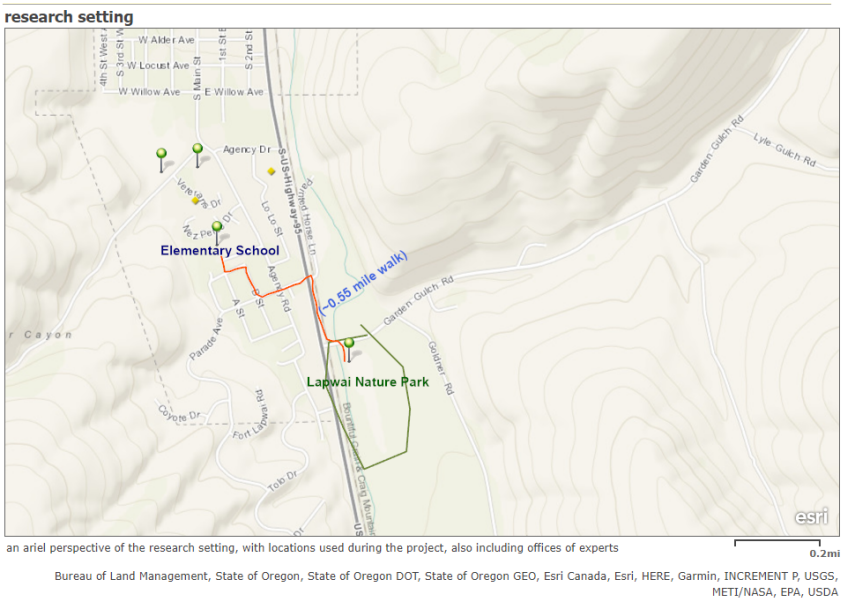

Figure 3: GIS Map of Research Area

Lapwai Nature Park is 0.55 miles from the school, and the Water Resource Department at the Nez Perce Tribe manages the area. A riparian area surrounds the park at the convergence of Lapwai

Creek and Garden Gulch Creek. In 2015, a youth corps built a pollinator garden in the center of the Park. There is cultural history to this park as well, but outside of this study's scope.

Research Design

Because of the importance of relationships in this work, a community-based design (CBR) research method is appropriate for this study. CBR is a participatory and collaborative research relationship between participants and researchers. Castleden, Morgan, and Lamb (2012) describe this relationship:

> Community-based participatory research (CBPR) has been identified as a research philosophy and methodology that has the potential to contribute to efforts to decolonize the university researcher-Indigenous community relationship… CBPR is not a research method per se, it is a process by which decision-making power and ownership is shared between the researcher and the community involved; bi-directional research capacity and co-learning are promoted; and new knowledge is co-created and disseminated in a manner that is mutually beneficial (p. 162).

This process-oriented method demonstrates a pragmatic approach to collaborative, equitable inquiry, aligned with CIRM, CBPR, and CBDR methods. Four Rs of "Respect, Reciprocity, Responsibility, and Relevance" (Kirkness & Barnhardt, 1991), the "research as service" principle of the CIRM framework (Brayboy et al., 2012), and the context of Lapwai as a community guided the design of this study.

Community Based Research Design	
Part 1: Co-design of participatory lesson planning using relational pedagogy of land and place	Part 2: Collaborative data generation through conversational and narrative methods, and arts-based research
Product: "Landscape Lessons" Curriculum	Product: Understanding of the way participants engage in relational ontologies throughthe "Landscape Lessons" educational experiences

Table 1: Research Design

To answer the overall questions of the study, the Community-based Participatory Research approach (Bennett et al., 2017; Denzin, Lincoln, & Smith, 2008, p. 50; Newing, 2011: 14-6) resulted in two inquiry processes. First, there was collaborative lesson planning to create land-relational learning experiences guided by Land-education pedagogy (Simpson, 2014; Zinga & Styres, 2011). Second, a narrative inquiry (Lemley & Mitchell, 2012) and conversation as a method (Kovach, 2010) defined the research framework to understand participant experiences.

The process of curriculum design/lesson planning (Bradley & Hollenhorst, 2007; Creswell & Creswell, 2018) facilitated the creation of outdoor learning experiences for participants and co-creation of data sets. In addition, the narrative inquiry process (Kovach, 2009) enabled the research to understand participants' experiences as they engaged and related to the land. In the next section, three foundational concepts lay the foundation for purposeful study design.

Theoretical foundations of Research Design

Norström et al.'s, *Principles for knowledge co-production in sustainability research* identify a framework for knowledge generation between people to meet rapidly approaching challenges of sustainability (182). According to these authors, successful co-production of knowledge must be guided by principles described as four "processes" of collaboration: context-based, pluralistic, goal-oriented, and interactive. While the 2020 principles are a helpful framework to assess knowledge co-production in sustainability research programs, the paper mentions "education" once (184). Given the lack of principles for education in sustainability and systems research literature, a relational pedagogy of land and place informed the theoretical placing of EE in a system's context. The following principles of Indigenous scholarship on environmental education, land education pedagogy, and conversational-narrative methods guided the study design.

Environmental education needs justice & participatory values to meet the demands of changing climate. Inclusion, participatory virtues, and justice are central principles to developing effective EE techniques, like climate adaptation pedagogy, to support future generations. Justice is a way of living with the world around us, a healing process manifested by personally accepting the responsibility of being a "good relative" by honoring relationships and finding harmony with the human and non-human beings around us (Denzin, Lincoln, & Smith, 2008, p. 518, 435). Justice is a crucial value to drive the participatory design of the learning context and emphasize a process of being in relation with the world around us.

Participatory virtues are "important to a person's readiness to participate well in collective decision making" (Ferkany & Whyte, 2012, p. 426), and participation is an essential aspect to understanding education approaches (Marin & Bang, 2015). Equitable environmental education needs true inclusion and collaboration. Natural resource governance structures, like education, will not succeed long-term if inclusion is "lip-service" and nothing more, resulting in a higher turnover of participants (Ferkany & Whyte, 2012). Therefore, the inclusive and decolonizing approach of Land Education is favored over Place-based education in this study, with an explicit focus on unlearning settler relationships and objectification of the land (Calderon, 2014: 33)

Relational pedagogy is a principle of "land" education, which includes more than just "place." The guiding rationale for the co-design approach is an emphasis on CBDR in land-relational pedagogy literature. Land relational pedagogy is "one that engages with "land [as] the context for formal and informal education" (Zinga & Styres, 2011: 61). A relational pedagogy of land (Bang et al., 2015) and holds the idea of "land" as a different relationship than with "place." The relational approach to pedagogy facilitates learning by exploring the diversity of experiences and complex interconnections related to land (Simpson, 2014: 8).

Land as pedagogy is a process linking people with landscapes through relationship building and inquiry. The practice facilitates learning about the interconnection of social and bio-geo-physical processes, complexity, and change over spatial and temporal boundaries (Simpson, 2014; Zinga & Styres, 2011; Styres, 2011: Bowers, 2008). With Land as our teacher and life-giver, we gather lessons about inherent complexity and interconnection (Styres, 2011: 718).

The cultural traditions and understanding of land transcend place and are remarkably diverse across spatial (space) and temporal (time) scales. These traditions and diversity of cultures are part of the Land and the legacy, or history. Culturally unique in every place, Land invites learnings' traditions and stories to work together in an open, reflexive process of meaning-making (Simpson, 2014; Zinga & Styres, 2011; Bowers, 2008). Land conveys memory through feedback loops, teaching us about change and scale heterogeneity: a Land education pedagogy encounters these loops through observation, exploration, and story (Bowers, 2008: 333; Styres, 2011: 717). This approach of Land education pedagogy compliments the method of narrative inquiry, where stories and conversations give insight into participant relationality with land, experiences of land change, and spatially "mapping" land features (Marin, A. & Bang, M., 2015).

Narrative inquiry & conversational methods are well suited for relational pedagogy. Narrative inquiry is a qualitative method that studies narratives as stories to understand people's experiences, beliefs, and uncertainties (Kovach, 2010: 43; Tzou et al., 2019; Lemly & Mitchell, 2012). Narrative inquiry is valuable cross-disciplines, particularly in CBDR, conservation social science, education research, and even medical research (Richardson, 2015). Sharing narratives and storytelling is a traditional and human way of sharing knowledge via conversation, collaborative meaning-making, and reflexive interpretation (Cajete, 1997; Guba, 1990; Kovach, 2009; Smith, 2012; Newing, 2011; Elliott, 2005). Narrative as a method of qualitative inquiry facilitates a co-creation of knowledge

between the person sharing the story and the listener: no interviewer is asking targeted or leading questions (Kovach, 2009: 30; Elliott, 2005: 23).

Narrative inquiry is different from other social methods in that it does not fragment qualitative data; it gives more profound insight into descriptive experiences shared through story and conversation (Elliott, 2005: 18-23; Kovach, 2009: 30). People make meaning of narratives by listening and telling the story, so meaning-making occurs through the process of conversation (Bennett et al., 2017; Denzin et al., 2014). Lemly & Mitchell write about narrative inquiry in the 2012 text, *Qualitative Research*: *An Introduction to Methods and Designs* and describe the relational nature of the narrative question, "when conducted reflexively, narrative inquiry provides the possibility of researching across the divide between researchers and the researched, giving marginalized communities the ability to take part in telling their own stories" (pg. 230). Thus, the conversational method supported a research process founded in CIRM.

The conversational narrative inquiry method is practical for knowledge generation in western qualitative research and Indigenous methodologies but differentiated in a CIRM framework. Margaret Kovach writes about these differences in *Conversational Method in Indigenous Research:*

> However, when used in an Indigenous framework, a conversational method involves several distinctive characteristics: a) it is linked to a particular tribal epistemology (or knowledge) and situated within an Indigenous paradigm; b) it is relational; c) it is purposeful (most often involving a decolonizing aim); d) it involves particular protocol as determined by the epistemology and/or place; e) it involves an informality and flexibility; f) it is collaborative and dialogic, and g) it is reflexive. (2010:43)

The conversational narrative inquiry method is unique and essential in a CIRM framework, distinct from western approaches due to the intent, purpose, and relationality. The conversational practice centers a tribal context and paradigms where the narrative inquiry happens. The ontology is relational, matching the CIRM framework of research as a "process of fostering relationships between researchers, communities and the topic of inquiry" as well as purposeful, like the "totality of CIRM, driven by notions of sovereignty and self-determination" (Brayboy et al.: 437).

With the epistemological guidance from place and knowledge, combined with its open discourse and reflection, and adherence to principles of CIRM, conversational methods and narrative inquiry result in the co-production of knowledge. In this study, the narrative inquiry involved participant conversations during Land education activities due to the collaborative lesson planning

activities and CBDR. The following section outlines the types of data creation processes during the research process and the joint project design.

Methods

This section begins with an overview of the collaborative lesson planning process to elaborate on creating the learning context. In the following section, I describe the methods used for participants to share narratives about experiences and land relationships within the learning context. Each qualitative method describes the techniques and protocols for knowledge generation and data management. The table below outlines the research questions, the design process, and the methods used for data co-creation:

Table 2: Research Questions, Methods, and Data

Overall Question: **In what ways are land-human relationships supported through a relational approach pedagogy for environmental learning with 4th-grade students?**			
Processes	**Sub-questions**	**Techniques/ methods**	**Data generated/Products**
Part 1: Co-Design of learning context using a Land-based, relational pedagogy	What learning activities will support the development of human-land relationships in a relational pedagogy?	i. Meeting with teacher and collaborators to prepare ii. Review of Nez Perce Cultural Pedagogy iii. Field notes and research journal iv. Interviews with teacher and collaborators	i. Lesson Plans ii. Curriculum iii. Documentation of Field days at Lapwai Nature Park v. Transcripts of interviews
Part 2: Research to understand participant experiences and outcomes from this educational approach, using Narrative Inquiry methodology	What patterns of interaction give insight into participants' experiences relating to the land? In which conditions, events, processes (social-ecological context) did these land relational narratives emerge?	i. Paper field journals w/ prompt ii. Participant observation iii. Narrative Inquiry using Conversational Approach iv. Focus Groups	i. Landscape drawings ii. Focus groups iii. Participant narratives (audio recordings) iv. Recorded focus groups about butterflies (groups of 3) v. Audio recordings of participant narratives (made by participants) v. (Field notes)

Part 1: Curriculum design processes (Part 1)

I gathered documents, including the Nez Perce Cultural Pedagogy, developed by the STEP program in Idaho. The STEP documents allowed me to design a curriculum outline for those aligned with cultural pedagogy and Next Generation Science Standards best practices. The curriculum outline was proposed to be flexible and adjustable and changed through the CBDR approach.

The original plan was designed before this relationship but served as a basis for our first plans. I kept reflexive journals of the research process and associations developed during the design. For example, after the curriculum outline was proposed and waiting for approval, I spent time relationship-building with the class and teacher, volunteering in the classroom helping with phonics, reading or whatever was needed, and helping with the after-school program. The teacher here was accommodating, and before the official approval, we shared ideas about potential projects over a period of three months.

In March 2019, Nez Perce Tribal Executive Council (NPTEC) approved the proposed curriculum outline and research permits [Appendix A &B]. After approval, we determined Fridays in April to explore the nature area with participants and begin our collaborative inquiry. Lessons developed in a circular, participatory planning process (see Chapter 3). Participants shared narratives during lesson plans that placed participants in a natural area to generate these data. The interactions between participants and the landscape resulted in audio-recorded conversations and combined with other data (e.g., reflexive research journal, paper field journals, semi-structured interviews) to triangulate and contextualize these narratives in conversation.

- Review of cultural standards, NP Cultural Pedagogy
- Meetings with Teacher (B.W.)
- Meeting with students, emergent process of "what next"

Field notes

I made field notes immediately after a classroom lesson or field day as a reflexive journal of my experiences**.** The field notes were either written in a running research journal or digital audio recordings I made of me talking about what happened on field days via a voice recorder on my cell phone. These field notes also kept a record of the circular planning processes used to develop the collaborative design of lessons. I would summarize these field notes in an email to the teacher and the local expert collaborators. As previous field day experiences informed the plans and adaptability for the next lesson, all collaborators communicated openly, and I frequently shared field notes with participants. These field notes and autoethnography are stored and used to ensure reflexive interpretation and the data in Appendix D.

Semi structured interviews with collaborators

Semi structured interviews are defined as "open-ended in-depth interviews in which the interviewer is required to follow a list of questions" (Schensul, 2012, p. 88). The semi structured interviews with the classroom teacher and entomologist occurred after the project was complete and provide insight into the CBDR process and curriculum inquiry. These findings are reported in Chapter 3. An interview guide was used to structure these conversations, and the interview guide is included in Appendix C. Transcriptions of the interviews are found in Appendix E.

Part 2: Understanding participant learning experiences of land-relational pedagogy

We selected multiple methods to understand how participants engaged with the learning experience and made meaning of land-relationality. Most of the methods are well known within social science and were selected to lay a foundation for a collaborative approach to knowledge creation: narrative inquiry. Results of this research are the topic of Chapter 4: however, the following section gives an overview of methods selected and implemented for this part of the study.

Participant observation

Participant observation began inside the classroom. I started by observing the teacher, taking notes on their teaching techniques and how they interacted with students in the classroom. This informed my approach to facilitating lesson plans, as I wanted it to be simple for the teacher; I did not want to invade the classroom dynamic. During Field days, I observed what students did on the land, moved through the stations, and made notes of exciting moments. Additional participant observation was collaborative, as the teacher and I took photographs (using our cellphones) of what was occurring in and outside the classroom. The teacher took photos to give context on how the field days went about and the learning dynamic of the class. These pictures are in a shared, private file from the teacher.

Paper field journals

These data provide insight into which aspects of the landscape participants experienced. These participant journals can triangulate data about patterns of interaction emerging from the relational land pedagogy design (exploration and narratives/reflection). I created pieces of paper that had different prompts, and we used them on two separate days. First, participants just drew observations of what they saw on our first field day at the community garden and canoe site (an after-school program with Elementary School and a local non-profit). At the Lapwai Nature Park field days, one of the stations was landscape observations – during these stations, each of the students drew and wrote on a piece of paper with the prompt to draw what they observed. Each group had time at

this station for 15 minutes. I made sure that there was a comfortable place for students to do this landscape observation and brought a tarp for students to sit on if they wanted to. The landscape drawings station was the snack and water station to keep students' energy up while in the field. These drawings are stored physically in a secure place, with digital scans housed in a secured folder.

Focus Groups

Focus groups happened before our final data collection day as one of the field-day stations. The method answers the first research question of how a relational pedagogy can facilitate learning about people-nature relationships with 4th-grade students at Lapwai Elementary School. Three groups of students (5-6) participated in a focus group with semi-structured discussion, with a 15-minute rotation between groups. I asked three questions to guide the conversation with students: "What does it mean to see a butterfly in Lapwai," "How do you feel when you see a butterfly in Lapwai," and "What do you think about doing this project again?". These focus groups gave context into the collaborative lesson design of a relational pedagogy, insight into the students' thinking of the program, and willingness to participate again. In addition, these focus groups supported the creation of the lesson on the final data collection day. I used a digital audio recorder app on my phone to record these conversations called Voice Recorder. I then transcribed these focus groups in Rev. The audio recording is on an SD card.

Participant narratives

We recorded the participant narratives on the final field day at Lapwai Nature Park as one of the data collections stations. This data generated answers the research questions of how descriptions about past and present people-nature interactions appear in participant experiences. Students gathered in three groups to rotate through each station. Groups had about 15 to 20 minutes to record a collaborative narrative while moving through the landscape, so students could share their narrative without being guided by me as a researcher (Denzin et al., 2014: 347). However, I did give some instructions in the beginning about how to use the field recorder. We used a Tascam VR-05 recorder. At the front of this station, I showed students how to turn on and turn off the field recorder and made sure they knew how to use it as a group. The other instruction I gave them was to make sure they shared the recorder and that everyone had a chance to record what they wanted. Finally, I suggested participants could record sounds they wanted, like nature sounds, or tell stories – but mostly that they could do whatever they wanted to record it. Each group recorded about 15 minutes of audio on the SD card in the field recorder.

I edited down these tracks to represent moments of conversation and interaction and condense periods of silence. This indexing process resulted in three tracks and a total of 27 minutes of audio. These tracks were carefully transcribed to help understand what is going on, as there are multiple speaker participants and environmental noises, including participant-land interactions. These audio files are stored in a secure data location, approved by the University of Idaho.

Data Analysis and Synthesis: Qualitative Content Analysis

The overall approach to analysis is qualitative, and comes from a subjective point of view that emphasizes profound interpretation of data to understand the experiences of human-nature interaction and relationships (Preiser et al., 2021: 271). The type of knowledge that emerges is illustrative, as it makes meaning of narratives: the analysis of data through in-depth contextual understanding and interpretation results in rich, storied data. In Part 1 of this study, qualitative content analysis occurred throughout the CBDR processes. Research journals are analysis tools of the simultaneous Land-education lesson planning and intuitive narrative inquiry processes (Styres, 2011: 722; Kovach, 2010: 35). In Part 2 of the research, synthesis between participant narratives, drawing of landscape, and focus gave some insight into what students noticed as they were on the land. Participant observation data contextualizes how participants moved spatially throughout the land, for example, a discussion exploring the creek area and which paths to take.

The audio recordings are central to the study design as the data generated by the narrative inquiry method. Analysis occurred through a process of open, then thematic coding, inspired by the analysis process described in "Conversational Method in Indigenous Research" (Kovach, 2010: 44). The analysis accounts for dialogue and narrative inquiry to understand conversations between researcher and participants that "co-create knowledge." The coding process occurred in this order:

1. ***Open Coding:*** I listened to the audio recordings of participant narratives multiple times and coded the audio by marking certain moments where there was either: This audio coding then informed a round of sound file editing in the software Audacity. These shorter audio files reflected the first round of coding and remained clustered by original participant groups. The coded audio files were transcribed in Rev.com,
2. ***Thematic coding:*** The second round of coding of audio transcriptions was done thematically, marking conversations where there was a) indication of direct participant-land interaction or b) narrative shared between participants (Kovach, 2010)
3. ***Process Coding:*** to understand what happened (i.e., the habits of participants) as they moved through the landscape. These codes reflect moments where participants directly interacted

with the land (e.g., throwing rocks in the creek, running through a field, observing birds). (Toledano & Anderson, 2020)

4. ***Narrative Coding:*** to indicate moments of participants sharing narrative through conversation. These codes are composed of narratives about relationship with the land, an experience of being in that land, stories that remember a place, or made-up playful stories such as being "Ghost Hunters" (Huber et al., 2013; Wildcat & Simpson, 2014)

Because of the emphasis on relationality to land, the final two rounds of coding were looking to conversations and relationality with land, including land as a participant and "Land as the first teacher" (Styres 2011: 711). These codes reflect multi-speaker dialogs participants had and focus on relating through verbs and sharing narratives.

Collaborative Analysis with Research Partner

Transparent and cooperative analysis of data was a necessary stage in the overall methodology of this study, as it furthers the collaborative research relationship between researchers and indigenous communities (Brayboy et al., 2012; p. 431). Thus, after the data was initially analyzed by the researcher (qualitative content), the next step of collaborative analysis occurred in July and August of 2021. Collaborative, open meaning making occurred through a series of unstructured interviews between researcher and the tribal research partner. Unstructured interviews are conducted more like regular conversations, and require the researcher to have considerable skill in focusing the questions so as to collect useful information relevant to the study and keep the respondent engaged" (Schensul, 2012, p. 89). The unstructured interviews, or conversations, were conducted with the tribal research (reported in Chapter 4). The researchers met three times to listen to audio recorded student narratives and discuss the meaning of participant gathered data. Transcripts of these conversations can be found in Appendix F.

Ethical Considerations

There are important ethical considerations when engaging with research with Indigenous People and with young people in education. To address this, I engaged with the framework of the Four R's of "Respect, Relevance, Reciprocity, and Responsibility" (Kirkness & Barnhardt, 1991). I wrote and followed my protocol for each one, included in the Nez Perce Tribal Research Permit (Appendix E). The research agreement with the Nez Perce Tribe includes protocols for ethical research in this study and guides to ensure safety. The Tribal Research Permit approval was necessary before going through the IRB process. The teacher informed parents and gained consent for participation before the study. I asked for verbal permission from participants each field day, with

opportunities to not participate in the research activities if participants were unwilling. Pseudonyms are used in the findings to ensure the privacy of student participants—consent forms and verbal assent documentation for participants and expert interviews in Appendix E.

Other ethical considerations are how to keep the participatory aspect truly collaborative in co-design research (Koster et al., 2012). Collaboration occurred through consistent communication with study participants and a review of the data analysis process and findings by the tribal research partner. This review and contact with the Nez Perce Tribe continue due to my relationship with tribal partners and community members and to ensure that the information shared is per cultural standards and in honor of the research relationship.

Issue of Trustworthiness/Data quality Assurances

Given the constructivist approach to CBDR and emphasis on narrative inquiry, data evaluation must meet the criteria of context, trustworthiness, research credibility, and validity (Kovach, 2009; Smith, 2012; Newing, 2011; Elliott, 2005; Lincoln, 1990: 71-72). A vital part of this is reflexive interpretation, with transparent analysis, self-reflection, and open meaning-making. This is aligned with the constructivist paradigm and CBR approaches because it honors the subjective truths of participants and fosters social construction to knowledge (Kovach, 2009: 131). For the researcher, intuitive understanding of data requires acknowledging how our ideologies make meaning of what we observe; our observations similarly influence our beliefs (Kovach, 2009:33). Thus, the participant narratives share a "subjective accounting" of observed phenomena in the land-relational pedagogy.

A narrative is internally valid or genuine if it gives insights into the description of an experience (Elliott, 2005: 23, 26). Narrative analysis is an equitable method when evaluating qualitative data from diverse knowledge and participants, as lessons shared are self-produced, context-based, and evaluated by an audience (Richardson, 2015). The external validity of narratives means the ability of a data set to recognize and facilitate a "presentation of multiple realities." demonstrating a multiplicity of social constructs that a larger social group negotiates (Elliott; 2005: 27; Kovach, 2009: 30). In narrative research, validity means creating a "déjà vu" experience for the listener (Lincoln, 1990: 73). Preiser et al. (2021) discuss how to determine validity and reliability in this approach:

> In a sense, the researcher deals with ‘warm data, i.e., the subjective perceptions of participants and researchers, relational interdependencies between different actors and human–nature interdependencies, and the contextual experiences of the participants. This

> makes the researcher's task of analyzing the content challenging as it is difficult to verify the results objectively against the scenarios stated by the respondents. As a result, the reliability and validity of the research will not be verified in terms of its reproducibility but in terms of whether or not the findings generated by the researcher provide deeper insights to synergize general themes. (Pp. 278)

If many people agree on the knowledge shared through reflective narrative inquiry, it can be considered part of a cultural framework or a socially constructed norm (Elliott, 2005:27). In other words, the audience feels the truth of the story. This is the idea of co-constructed knowledge that emerges from a shared process of narrative (Kovach, 2009: 133). Narrative inquiry and interpretation also require the narrator to be self-reflective. The truths presented are "held in context," a requirement for a foundational protocol in a narrative as a method (Kovach, 2009; 131).

Internal validity and credibility of the narrative happen through a genuine act of self-reflection by both the inquirer and the narrator and will be subject to intuitive knowing by the audience, described as "inductive reasoning" (Kovach, 2009:33, 53, 111, 130). Therefore, the narrative data shared will be presented in conversational form so that the reader can evaluate the authenticity of the narrative shared and the trustworthiness of my analysis and the collaborative analysis completed with the research partner in July/August 2021.

Limitations of the Study

One limitation of this study is the nature of subjectivity in qualitative analysis, in that I (as a researcher) am contextualizing the experiences of participants in one perspective. Thus, I assume responsibility for my interpretations and invite others to challenge my assumptions to make meaning of the findings.

Another potential limitation of this study was that the narratives gathered and conversations about land relationships occurred in a Western educational context, where field days started and ended in a classroom. Data collected as part of a school day has a different context the narrative data collected from other research contexts, like people visiting a natural area for other purposes. This educational context may have limited the participants' experiences, as the inquiry was associated with school rather than just exploring relationships with the land. The CBDR approach addressed this concern by taking to include a more relational approach to pedagogy design. The inclusion of Land-education practices in our critical curriculum inquiry addressed the need to unlearn settler ideas and western ideology of land relationships in this environmental educational context (Calderon, 2014: 33)

Another limitation was the lack of a local cultural expert to be with participants on field days. Although this was built into the proposal, the timing of field days (Friday mornings) did not allow our cultural resource research partner to join. This is addressed through the continued review of data by collaborators, the Cultural Resource department and focusing on land-participant relationships rather than land-culture narratives.

A final limitation is due to the COVID-19 pandemic. The plan was to bring back data collected in May 2019 with the same student participants in the Spring Semester of 2020, work collaboratively to make meaning of the CBDR results. However, the pandemic disrupted this process, as I did not want to endanger teachers and students by coming into the classroom from another city. I am continuing communication with educators in Lapwai and research participants to find the appropriate time and place to communicate research findings for interpretation from participants.

Chapter Summary

This chapter gives an overview of the methodology used in this dissertation. The CBDR approach resulted in two processes: a) collaborative lesson planning for a land education pedagogy and b) conversational narratives about land relationality. The pedagogy and circular lesson planning design created the conditions for learning about land relationships through exploration, observation, and conversation. The narratives look at what happens when young people engage with relational pedagogy and the experiences through land-education pedagogy projects. This methodology was collaborative with participants, and the knowledge and experiences shared belong to this frame in time and space. Evaluation of narrative analysis is reflexive of both the researcher, participants, and readers for the authenticity and transparency in interpretation.

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Chapter 3: Co-designing a relational curriculum about land and community

The purpose of this chapter is to report on the co-design of a community-oriented, land-based relational pedagogy with 4th graders and relationships with local landscapes. The Spring 2019 collaboration facilitated student-led inquiry about butterflies and resulted in five field trips to a nearby nature area. The purpose of collaborative curriculum design and participatory lesson planning (Bang et al., 2016; Bradley & Hollenhorst, 2007; Creswell & Creswell, 2018) was to develop a place-land relational pedagogy and land-relationality through exploration, observation, and scientific inquiry about butterflies (Simpson, 2014; Zinga & Styres, 2011). The process and findings presented in this chapter reflect the design and implementation of a community-based learning experience to facilitate the development of a land relationship.

These land-based, community-oriented learning experiences were not driven by school policy but by the relationships between researcher and community, alignment with the teachers' educational philosophy, and student participants' willingness. This approach is appropriate given the depth of knowledge generated, relationship building, and willing collaborators (Kovach, 2009). The curriculum co-design process resulted in findings summarized into three discussion points. First, the collaboration between researcher and teacher must be an open process that centered classroom learning outcomes and prioritized communication. Second, multi-year relationship building with community members, student participants, and local experts led to flexibility and context in codesign process. Finally, the process resulted in a learning environment where students applied observations and learnings from the field lessons to classroom lessons and vice versa.

This chapter discusses the overall philosophy and process of curriculum design, particularly focused on the purpose of a community-based, land-oriented approach. Next, an overview of the context and participants sets the background for the curriculum design process, followed by the project implementation timeline with participants. Finally, we discuss the themes and lessons learned from the process and the potential application moving forward.

Curriculum Design

The researcher facilitated a collaborative curriculum design process with the classroom teacher, student participants, and local experts, like a Community-Based Design Research (CBDR) approach. The CBDR approach links participatory lesson planning methods and community-based conservation (Campbell & Vainio-Mattila, 2003) and helps teachers design a science curriculum that

supports culture and reforms pedagogy (Marin & Bang, 2015; Bang et al., 2016). The following sections describe the philosophical underpinnings of the design process, project objectives, and the creation of unique learning experiences.

Philosophy

In environmental education, participatory virtues are "important to a person's readiness to participate well in collective decision making" (Ferkany & Whyte, 2012, p. 426), and participation is an essential aspect to understanding education approaches (Marin & Bang, 2015). Equitable environmental education needs true inclusion and collaboration. Natural resource governance structures, like education, won't succeed long-term if inclusion is "lip-service" and nothing more and may result in a higher turnover of participants (Ferkany & Whyte, 2012). To address ontological concerns about educational research ethics, the Four Rs of "Respect, Reciprocity, Responsibility, and Relevance" (Kirkness & Barnhardt, 1991) guided the development of the CBDR process.

In Chapter 1, we have argued the need to engage with process-relational ontologies in sustainability science and education (Walsh et al., 2021). Relational thinking improves learning about complex SES dynamics (Garcia et al., 2020; West et al., 2020), and EE can facilitate such learning (Pugh et al., 2019). However, previous discussions of learning as a process in SES, specifically in EE literature, largely excludes other ways of knowing and being. Land Education addresses the ontological gap in EE:

> Learning about the natural world is a critical necessity given the socio-scientific realities (e.g., climate change) that are currently and will continue to shape the lands and life that land supports, more specifically for present purposes the lives of both indigenous and non-Indigenous peoples. For us, science education, place-based education, and environmental education are critical sites of struggle because they typically reify the epistemic ontological and axiological that have shaped indigenous histories… we also see them as sites of potential transformings – forming a nexus between epistemologies and ontologies of land and indigenous futurity. In our view, realizing this transformative potential will require engaging with land-based perspectives and resettling dynamics of settler colonialism that remain quietly buried in educational environments that engage learning about, with and in the land and all of its dwellers (Bang et al., 2014: 39)

Land education pedagogy is a philosophy that views learning as a process to link landscapes and people while disrupting settler ideologies about land relationality. Land education and relational

pedagogy are the philosophical foundation of this curriculum design due to its explicit attention to complexity in SES and centering indigenous futures in EE discourse. The practice facilitates learning about the interconnection of social and bio-geo-physical processes, complexity, and change over spatial and temporal boundaries (Simpson, 2014; Zinga & Styres, 2011; Styres, 2011: Bowers, 2008). Land conveys memory through feedback loops, teaching us about change and scale heterogeneity through observation, exploration, and narratives of these changes (Bowers, 2008: 333; Styres, 2011: 717).

Goals and Learning Experiences

The objective of this first stage in the research process was to co-design a land-based learning experience about land founded on ethical obligations to justice, local contexts, and social-ecological systems science. The main goal was to collaborate with a class of fourth graders (16 students), the classroom teacher, and local experts to design a series of educational experiences (i.e. a "curriculum") that would engage students in scientific inquiry about local landscapes around their school. This process aimed to develop a series of community-based lessons that facilitate complex, relational thinking by learning about relationships between land-people outside a Western, standardized science curriculum.

Learning experiences in the classroom set the context for outdoor learning experiences in an open, engaging environment. We designed outdoor field days to enable participants' exploration, observation, and reflection about the connectivity between people and the landscape where they live. In addition, experiential learning stations promoted student-expert engagement by asking questions and learning about the nature area through direct interaction. Readers can find a detailed report of each learning day and specific learning experiences in the implementation section of this chapter.

Participants, context and setting

As of the 2019-2020 school year, the demographic population of Lapwai Elementary is 85% Native American or Alaskan Native population. In addition, 50% of students are from low-income families, 23% have disabilities, and 15% are homeless (idahoschools.org). As a result, Lapwai Elementary test scores are lower than many other elementary schools around the state. The classroom teacher described this context:

> Idaho being a really small state population-wise and that kind of thing, we're not that important nationally. So, when you start thinking about curriculum, you start thinking about initiatives and things like that. Idaho often gets left in the dust… marginalized is barely even a fair thing to say. It's even worse than that… The bigger and the more standardized that

> something gets, the more it negates the individualisms that diversity brings. So people get left in the dust and then the question is often, well, why aren't these kids achieving? Or why is this school so bad? It continues the myth of, well, kids in poverty can't learn, or native kids can't succeed or that kind of thing. It's a self-fulfilling prophecy because a lot of the system wasn't generated and built for them to be successful. So, it wasn't with them in mind (BW, Personal Interview, June 2019)

The teacher mentions the 'myth' of underachieving elementary students and how the more extensive political system can reinforce this "self-fulfilling prophecy." I needed to understand the context of education at Lapwai Elementary beyond the context of state-level metrics. So, instead, I focused on the culture of teaching and valued knowledge in Lapwai as a community.

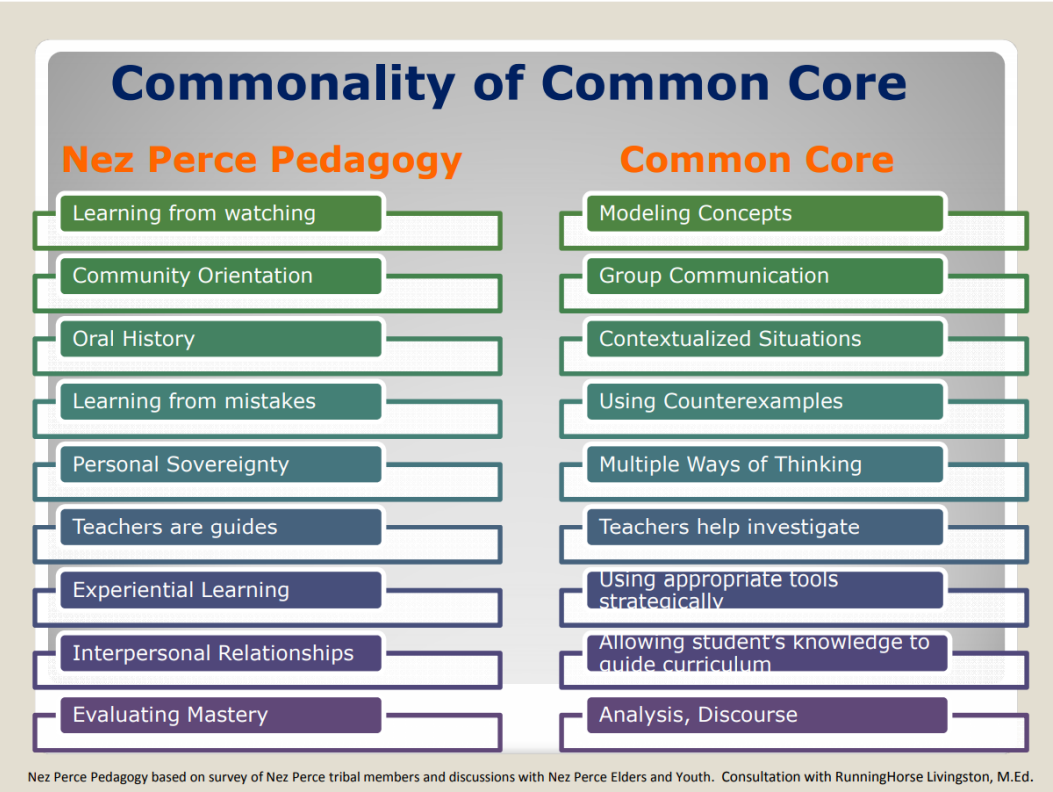
First, the classroom teacher led the foundation of "learning" in this educational context. According to the teacher, students did not come to school to learn new things. Instead, the teacher viewed students as coming with diverse knowledge and experiences, as noted in this quote:

> When I think about school and I think about kids learning, [I] understand that a kid is not a blank slate that rolls in the door and doesn't know anything. It's pretty foundational to the way I approach teaching. So kids come completely loaded with ways of thinking and knowing and doing. If you think of kids and think of a classroom like that, that they come with social skills and content knowledge and address them accordingly, you can build strong relationships with them. You can teach them where they are and what they know. So that's what I try to do (BW, Interview, June 2019)

The teacher reflected on teaching philosophy and how they approach the concept of learning in the classroom. A learning relationship emerges from understanding the knowledge students bring to the school and helping the students engage what they already know to understand the concepts taught in the classroom.

Second, the types of knowledge valued in Lapwai are different than a standardized science curriculum. The Nez Perce Pedagogy emerged from a 2016 State Tribal Education Partnership (STEP) project and outlined a unique framework of learning outcomes for Nez Perce people. The culturally informed pedagogy aligns with "Common Core" learning outcomes, a state education standards program:

Figure 4: A figure from a PPT by Joyce McFarland, Alicia Wheeler, https://mathematize.org/wp-content/uploads/2014/10/NIEA-Nez-Perce-Presentation-Revised-OCT14-rev.pdf



Representatives from the Nez Perce tribal education department developed this pedagogy in partnership with a tribal education professional. The developers of the pedagogy demonstrate how sound the framework integrates into science and mathematics lessons tailored for Nez Perce students.

Initial Designs

The Nez Perce Cultural Education Standards are a set of specific learning outcomes for participants and Lapwai: these standards are necessary to an informed and respectful research design in a Tribal education setting, (Richardson, 2015). The Nez Perce Pedagogy set the educational context and guided Landscape Lesson learning outcomes and program design. Table 3 demonstrates how the Landscape Lessons project proposal aligns with the Nez Perce Pedagogy, and can be found below:

Table 3: Alignment of Learning Outcomes with Nez Perce Pedagogy

Corresponding Nez Perce Pedagogy Nez Perce Cultural Education Standards State Tribal Education Partnership	Landscape Lesson Outcomes Potential learning outcomes given project implementation
Active Visualization -Seasonal Rounds -Being around grandparents	Place-based lesson plan, telling stories about how the land has changed in the landscape itself Intergenerational communication
Community Orientation -Connect to people and lands -Not interrupting conversations (? Listening) -Responsibility to pass knowledge on to future generations	Stories about landscape connection and historical relationships Listening to narratives from elders
Oral History - Sharing personal experiences - Make story come alive	The stories about landscape will hopefully be about passing on personal experiences of land change and how communities have historically responded to land change
Teachers are guides -Everything has meaning -Not forcing ideas	The lessons to be learned are about one's role in a landscape, and how a landscape can change. This is achieved via observation and exploration, rather than lecture Learning will be evaluated by the meaning students make of landscape change via participatory photos (art)
Experiential Learning -Never through books -Hands-on -Immersion	There will be no books involved here, and no writing/note taking either
Interpersonal Relationships -Be inclusive -Listening and engage the family -Know the families	Fosters intergenerational connectivity and community via historical narrative
Evaluating mastery -Ask for their input -Don't just lecture -Can do on their own, teach others	By sharing final photos, participants will be sharing how they learned about landscape change. They will show others the process of the curriculum, and communicate learning with others via art.

This table was created and submitted for review during the Nez Perce Tribe's research permit process. The right side of the table communicated the vision of the project proposed (Landscape Lessons), and identified how the project would facilitate learning outcomes that matched values in the

cultural pedagogy. For example, the use of relational narratives of land matched with the "Community Orientation" and "Interpersonal Relationships" theme, the outdoor field days matched the "Experiential Learning" theme, and the land exploration activities aligned with "Teachers are Guides" aspect in the Nez Perce Pedagogy. In short, the table above described how the existing tribal pedagogy led curriculum development of the project, and the need to position cultural values at the core of learning activities. It important to note that the curriculum did not achieve the ideal of facilitating intergenerational dialogue between tribal elders and youth. This is discussed later in this chapter.

Other materials shared can be found in the Nez Perce Tribal Research Permit, which can be found in Appendix A. The permit proposal included a rough draft lesson plan, as a demonstration of potential avenues and activities that could emerge from the participatory design process:

Table 4 Intergenerational Communication about Landscapes Change (Submitted Draft)

	Lessons	Purpose	Logistics
Part 1	A: Intro to place: observation of biotic & abiotic factors (1h) B: Storytelling: how is it different than reading (1h)	A-Given the place-based nature of the landscape curriculum, participants will be encouraged to develop awareness of their physical place before learning about historical change. B- We will be explicit in talking about storytelling with participants. This is to compliment NP pedagogy, as well as encourage listening in the field.	Can be done in a classroom, we will want to invite someone comfortable with telling stories
Part 2	C: Landscapes: Mapping and topography (2h) *(Drones?)* D: Intro to participatory photography (1.5h)	C-This lesson is about defining scale through maps, and we will explore different types mapping. Once we have defined the scale of a landscape, we may be able to understand how that land has changed. D- this lesson is to give an overview of the methods that will be used in the field the next day	Drones could be included in these lessons We will need access to cameras
Part 3 CORE/ FULL DAY	E: Elders & Community Members share personal narratives on landscape change (3h) F: Participatory Photography (3h)	E- These narratives are core to the curriculum and my research question, given the nature of intergenerational communication. To learn about historical land change through human memory, rather than through records F- Participants will make meaning of the landscape narratives via a method called Photo Voice. They will have time to explore the landscape and take photos.	Field day- location TBD by tribal partners There is funding to pay for transport & maybe lunches

Part 4	G: Present photos to elders/community members (1.5h) H: Reflection and analysis (1.5h)	G- This is another avenue for intergenerational communication about landscape change, as well as communicating findings & place observations H- Participants will make meaning of their photos, and help to analyze themes of landscape change	Desirable to invite members of the community. Could be a "gallery walk"

The proposed lesson plan presented as an example of what the project might look like, and the impermanence of the program intentionally favored an adaptive, dynamics lesson planning process. The resulting lessons differed from the proposed plans, as intended, due to the participatory Community-Based Research design process. The timeline and details of the project are reported in the next section.

These materials satisfied tribal requirements to conduct the participatory research design and facilitate the student-led inquiry project about Lapwai as a community. The project was called "Landscape Lessons" during the proposal phase. During implementation, the participants referred to the field days and participatory design process as "Science Fridays." The resulting inquiry project was called "Butterfly Detectives." These lessons needed minimal materials during implementation. During field days, we brought sheets of paper and pencils for observational drawing, hand lenses for examining plants, and snacks and water to stay hydrated (see Final Day, May 31).

Implementation & Timeline

This section describes the how each lesson unfolded during the project. Each lesson day is described by the date, the location where it took place, the objectives of the day, and the learning activities during the day. Logistics and insights on each day are informed by research field notes, pictures of field activities, and triangulated with semi structured expert interviews. Experiences are summarized into daily reflections on the how lessons were implemented, and the process of co-designing learning experiences. Lessons learned from the implementation of each lesson are synthesized and found in the following section, titled "Findings".

First Day (April 28, Classroom)

The first day of the landscape lessons project happened in the classroom after official permission from the Tribal Council and School. This lesson aims to collaboratively identify the context and topic of the community-oriented, land relational project. The classroom teacher and researcher collaborated to meet the goal through four objectives: a) describe the project and the process of co-design lesson

plans, b) gain consent from participants to join in the project, c) co-define “science” and “landscape” as participants to set the context for the rest of the lesson plan, and d) identify the study topic as being related to place and land. In addition to the goals for the project, I tried to align the classroom lesson with pre-existing science curriculum to address some discrepancies between lesson plans from National Geographic and the Nez Perce Cultural Pedagogy.

The lesson began by introducing my role as researcher-facilitator, as I volunteered in the classroom for months prior. Then, I described my questions and desired to work with this class:

> When I spoke up in front of the class, my goal was to introduce myself as a student that studies the relationships between people and land. "Relationship" was one of their vocab words for the week. First, I told them that I am curious about what people can learn from the "landscape," defined as culture and nature together. Then, I asked if they would be willing to help design a research project to explore the landscapes in Lapwai and learn about what they learn from them. Also, I asked them to help me learn about this place because I am not from there. Finally, to gauge their willingness to participate in the project, I asked them to raise their hands (Field Notes, 2019).

Communication of the research purpose and my role set the context for how participants engaged with the project. I asked student participants if they would be willing to help me with this project, and the class members, teacher, school principal, and tribal council gave consent.

To begin the learning activity, participants described the landscape where they lived, and we began to draw the landscape on the board. Next, we began to identify important landscape aspects and draw them up on the classroom whiteboard, and made connections between the living and non-living things in their community. We then went through and mapped out where these aspects were in the community, using the whiteboard. From field notes after this lesson:

> I drew a line on the board, asked them to think about all the landscape elements in [place name], and drew pictures as they named human and natural aspects. We spent much time naming animals and identified the creek, the road, the school, people, birds, and butterflies. The students told me that [placename] was named after the butterfly, which seems to be a theme and could be a potential project for the class.

The landscape drawing on the whiteboard reflected conversations and worked as a visual prompt for this first lesson. With the support of the classroom teacher, we asked, “what do we want to learn

about the local landscape and community?". Students wrote down their questions on notecards, and we followed up with a discussion.

On the first day, the answers to the question "what do we want to learn" allowed the facilitators to anticipate what to address in the following lessons. The "learning needs" were recorded in the research journal and identified next steps after the first lesson. For example, before going into the field, I needed to meet with the school principal to take students on local trips. After Spring Break, the teacher and I agreed to classroom teaching sessions for weather purposes and continuity in lesson planning (like a science "unit"). We waited for the right timing, and I spent the next few weeks in the classroom and school. I observed classroom dynamics and the teacher's approach to classroom instruction. I noticed the teacher's ability to keep students engaged through unique teaching techniques. The teacher set the tone for how I entered the classroom environment: observation of the teacher and classroom dynamics results in stronger relationships with participants, accepting flexible learning styles, and a deeper understanding of the setting and context of education in Lapwai.

Second Day (May 3, Classroom and Local Community Garden)

The objectives of this lesson were to assess logistics, engage in relational learning, and prepare for future lessons. Practical assessment of participants' capacity to leave the classroom for outdoor learning was essential to navigate future group dynamics as the learning environment changed from classroom to community space. The second objective was to practice land-relational learning skills with participants through exploration, observation, and reflection (see Bang et al., 2015 *Learning through Observing, pitching in, and being in relation to the natural world*). The final goal was to generate knowledge and questions about the landscape to inform and narrow the topic of participatory inquiry.

We began our learning activities in the classroom and set up behavioral expectations: the goals of Friday outdoor lessons, the purpose of doing science as a group, and a collaborative risk assessment of walking as transportation. After this discussion, the group took a walking trip to the local, community garden in order to explore the community space as a relational learning environment. Land-relational learning activities facilitated observation and reflection in the community garden. First, student participants drew something they saw in the garden, and then the group reflected on the drawings by using "I notice…, I wonder…, it reminds me of…" statements. Then, participants were divided into two teams to make up a story that connected their drawings. The stories were a way to connect the diverse sensory observations of place and develop collaborative

meaning-making skills in the landscape lessons. Finally, we concluded our time at the community garden with a quick game to release energy.

After these activities, participants returned to the classroom. The final learning activity occurred in the school and was a solo journal reflection about what they wanted to learn about Lapwai as a landscape and place. We talked about our next lesson in the nature park, and student participants wanted to play a game to see who could find the most insects.

Student participants wanted to learn more about their community's name, history, population size, roaming dogs, pollinators, and the feelings of being around different buildings. There was a discussion about the meaning of the community's name and its relation to butterflies. The other learning from this day confirmed the logistics question about transitioning learning environments between classroom and landscape as learning, keeping each other safe while walking and crossing streets, staying engaged during learning activities outside. Preparations for the next lesson happened collaboratively, and students identified logistical needs and supplies for the next field day.

Third-Day (May 10, Classroom and Nature Park)

The objectives of this day focused on logistics, team development, and continuing the process of participant inquiry through relational learning. First, we needed to determine the logistics of walking from the school to the nature park and identify the safest route. A second objective was teambuilding, extending the group's culture around transitioning learning spaces and working together to stay safe—the final objective of observing insects in their habitat and continuing the participatory inquiry through land-relational learning.

We started in the classroom again and reviewed the previous lesson, focusing on insects and safely transitioning between the school and the nature park. Finally, we left the school and circled up outside to review how to stay safe on our walk, about a mile round-trip. This activity served as a collaborative risk assessment to discuss potential dangers and how to avoid injury. We agreed that there would be an adult to lead the walk and an adult to follow. As we walked, we stopped each time we needed to cross a road, discuss the risks, and do so very carefully. Here is an example of how we managed safely walking from my field notes from the day:

> We walked from [the elementary school] to the nature park. It took approx. Fifteen minutes, and we did have to cross highway 95. we made sure the participants were in control of their bodies before crossing the highway. BW [teacher] and I were the ones to say go. we crossed the highway to the south end of [road name], then walked along the train tracks. students loved to run ahead, so we always asked them to stick together and wait before stepping onto

> any road. Crossing from the train tracks to the nature park took some negotiation-- big trucks would come down [road name]. So we had to be very careful and walk in a single file line across the bridge and into the nature park. (Field notes, May 2019)

Once we arrived at the park the first time, we took a rest break. It was sunny and warm, but there was shade. We stood at the beginning of the park and read the signage about the cultural history of the place.

Figure 5: introducing ourselves to place: cultural and community significance of the park

While we were at the park entrance, two adult expert-participants arrived and met us at the park to help with the insect-finding activity, or a "BioBlitz" activity. The experts were employees of the tribe in the Fisheries and Water Resources Department, respectively, and both Ph.D. students at the University of Idaho. One of the experts brought tape for ecological transects, and the other brought their collection of insects (some specimens were gathered in Lapwai or at the Nature Park).

After talking about the information on the signage, student participants met the "expert" participants (NW and NC). Each of the experts shared what they brought and showed students how to use them to identify the process of finding insects. It was an open learning environment as we became more familiar with the park and the experts, and student participants engaged with experts based on their interests.

After fifteen minutes of learning about insect types and how to do ecological transects, we gathered back together for the BioBlitz game. Students competed to find the most exciting insect in five

minutes at the nature park entrance during this activity. After the time limit, students came back together to share their insects, where they found them, and their experiences participating in the exercise. We did not award an actual winner, as the purpose was to practice finding insects in their habitat. One student found a newt and still brought it to the group, saying, “it’s not an insect, it’s a lizard!”

After the BioBlitz activity, we gathered our things and headed back to the school. Again, we stopped at each road crossing to talk about safety protocols. We went directly into the school upon arrival so students could get a drink of water and cool off. We reflected on the day to wrap up the lesson and revisited the question driving the participatory inquiry. At the end of the lesson, we decided on the project topic of butterflies in Lapwai. We concluded the lesson by reviewing what we did, and talking about our next lesson on insects, and exploring the topic of butterflies.

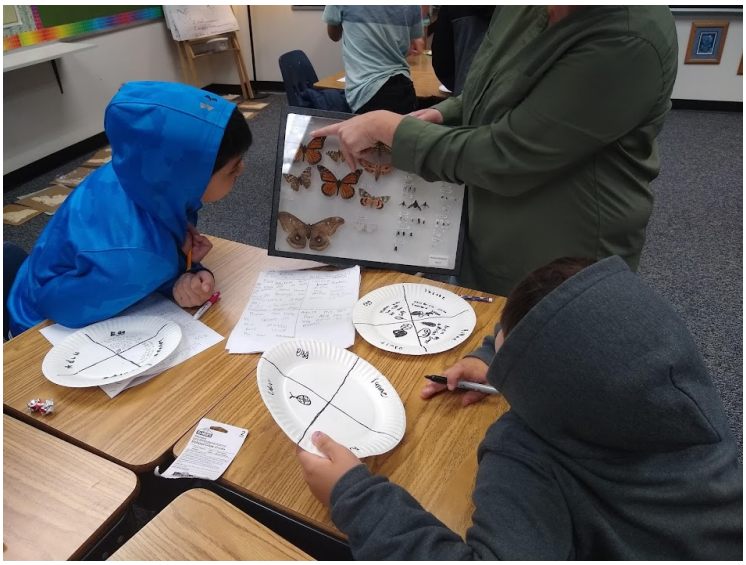
The experiences and knowledge created from this lesson informed the logistics of future lesson plans and set the procedure for safety while in the nature park. In addition, experts worked with students to develop knowledge on insects on the landscape, and participants observed insects in their natural habitat. Finally, we chose the topic of butterflies at the end of this lesson, which shaped the remainder of the project.

Fourth Day (May 17, Classroom, due to weather)

The objective of this lesson was to learn about butterflies and the butterfly life cycle to deepen the groups’ understanding of butterflies, develop questions to lead the participatory inquiry, and identify the theme of the final field days. The classroom learning objectives were set by the teacher and written on the whiteboard as “I can a) carefully read and paraphrase information from a source, b) explore the difference between moths and butterflies, c) learn and show the life cycle of a butterfly” (field notes).

This lesson happened in the classroom due to rainy, cold weather and resulted in a spontaneous collaboration between the teacher (BW), researcher-facilitator (HS), and expert (NW). Monarch butterflies became the lesson's focus, and the teacher frontloaded the activity by going to a citizen science website on butterfly migration (www.journeynorth.org). Migration allowed for discussion about how butterflies move and connected the topic to previous student wonderings about “where are all the butterflies.” Student participants then used internet-connected devices to research the butterfly life cycle. Finally, one of the experts joined us in class with her insect collection, in which she had a bunch of butterflies. She facilitated a discussion about the difference between butterflies and moths.

After the teacher and expert presented, we did a body activity about the life stage of monarchs. This was a quick way to take a break from sitting, and all participants stood to act out the metamorphosis of a butterfly. Next, the teacher introduced a learning activity after the body break. First, student participants drew and colored the butterfly life cycle to represent the butterfly metamorphosis from egg to adult. Then, the adult participants moved throughout the room to help students draw their dioramas:



We completed the drawing activity and debriefed the lesson by discussing what participants noticed or learned about butterflies. The reflection set the context for asking, "What else do you wonder about butterflies?". We ended with a brief review of where we were at in the participatory inquiry and outlined the activity for how to find butterfly eggs in the park. The teacher volunteered hand lenses.

The outcomes of this day identified questions from student-participant to be addressed in the next field day. The student questions about butterflies were diverse and set the tone for inquiry at the nature park.

Questions about butterflies, student-written, and gathered via post-it notes on 5/17:

- I still wonder why there are no more butterflies, and there are butterflies.
- How often do people see butterfly eggs in Idaho?
- Why do they lay so many eggs?
- Are there lots of different butterfly eggs around here?
- What is the first kind of butterfly?
- I wonder why the butterflies have disappeared.
- I still wonder how many monarch butterflies are alive.

- I still wonder if they die after they lay their eggs.
- Do they lay 200 eggs?
- Wonder about moth and butterfly difference
- How come butterflies have four wings?
- I still wonder why does it take four days for the larvae to hatch from its egg.
- I still wonder about butterflies where they lay their eggs.

The theme of butterfly eggs was prominent in the wonderings and specific enough to study at the nature park. A precise topic made it easy to coordinate future lessons with local community members and identified simple methods to find butterfly eggs via ecological transects and hand lenses.

Fifth Day (May 28, Nature Park)

There were two objectives for this lesson that both resulted in data collection. The main research objective was to collect observational data to answer the overall research question about land-relational learning through focus groups and participant landscape drawings. The project objective was for students to gather information in the nature park to answer their questions about butterflies via transects to count butterfly eggs and learn about the park's cultural history. The goal was to meet these objectives through rotating field stations focused on three different types of data creation.

This lesson was the first day of "Landscape Lessons" field stations. The days were getting hotter, so I dropped water at the nature park before the lesson started. We met in the classroom, reviewed the lesson's purpose, and walked to the nature park. Experts met us there, and we divided the participants into three groups, each with an adult who would facilitate the station with a 15-minute rotation between groups. The teacher did not run a station to participate where they wanted, or where they were needed. Field stations represented three data collection situations.

Part 1 Research Activities for students: Butterfly Egg Counts (aka "Butterfly Detectives") was an ecological data collection station. The counts occurred to detect the presence of butterfly eggs in nature the nature park. The station was in a grassy area of the nature park. Natasha (NW) was the facilitator. Hand lenses were used instead of ecological transects due to the ease of setting up the learning activity. Participants found zero eggs during the first Butterfly Detective activity, but the endeavor developed knowledge on identifying eggs on a plant in the park. Student participants were initially disappointed, but we debriefed the exercise with an experiential lesson on uncertainty in data collection in the outdoors.

Part 2 Data Creation Station: Landscape Observation Drawings facilitated an arts-based, nonverbal data point to triangulate participants' experiences. The drawing was an effective learning

activity in the classroom, so I determined it would suit student participants in the nature park. This station was in the shade structure at the nature park. The classroom helper was the facilitator, and participants drew a picture of the landscape on a piece of paper with no prompt. This station also was the snack and water station. Each participant drew a picture of what they observed in or near the shade shelter from the landscape drawings station. Below are some scans of illustrated observations, next to a picture of the location:

Participant Drawings of Landscape (field observation journals)

Figure 6 Landscape observation station on May 28 lesson

A variety of observations occur in the drawings. Some drawings depict the shade structure, where others are about phones, water, snacks, or a grass perspective. One drawn observation of note is the fish, as no fish were jumping at the observation time. There are various observational drawings, with some being close visual approximations of the structure and others more artistic or interpretative.

Part 2 Data Creation Station: Focus Groups about landscape and place took place through semi-structured conversations. I recorded the discussions to learn how youth participants make sense of and relate to butterflies (part of the Land) in their community. Participants spoke about how they felt about seeing a butterfly in Lapwai and what meaning they made from that feeling. The focus groups occurred sitting near the creek. I was the facilitator, and I used my phone to recorded informal focus groups with student participants about butterflies, how they relate to butterflies and how they interpret the presence of butterflies in Lapwai. This was also a way to understand participant perspectives on the field activities and how engaged students felt during the landscape lessons.

Sixth day (May 31, Final day at Nature Park)

This lesson's goal was to complete data collection for the two project objectives: to answer the overall research question about land relational learning and butterfly egg counts for the participatory inquiry. Knowledge was co-created through landscape observation drawings, audio recorded conversations, and butterfly egg counts. The goal was to collaboratively analyze data collected with student participants in the Spring of 2020.

The lesson was the final field day in the nature park. I placed water and snacks at the field site before going to the school. We met at the school to review our objectives and focused on counting butterfly eggs. Experts (NW and MC) met us at the nature park to facilitate field stations. Learning activities happened at three stations, similar to the lesson before. Some differences were the writing prompts on the Landscape Observation drawings paper. Second, the audio-recorded conversations about landscape and place were participant-led, meaning student participants used a field recorder to document their exploration of the creek and nature park, and butterfly egg counts happened in the nature park's pollinator garden. Again, students gathered into three groups to rotate through each station, with 15-20 minutes per learning activity. The classroom helper facilitated the observation station, the conversation station, and the two experts enabled the butterfly egg count station.

It is essential to note the modification of the 'Conversations Station,' as it created a unique data set about landscape and place. I wanted to have an opportunity for students to share their narratives without being guided by me as a researcher; however, I did give some instruction to show how to use the field recorder. We used a Tascam VR-05 recorder. At the beginning of this station, I demonstrated how to turn on and turn off the field recorder and made sure the students knew how to use it as a group. The other instruction I gave them was to make sure they shared the recorder and that everyone had a chance to record what they wanted to use the field recorder. I suggested participants record sounds they wanted, like nature sounds, or tell stories – but mostly that they could record whatever they wanted, and they stayed within eyesight.

After data collection, we returned to the classroom. We discussed the data and planned to review the data after the summer break. Finally, I presented milkweed seeds to student participants in envelopes to take home and plant in their gardens. The milkweed seeds came from the local forest service office and served as a symbol of my gratitude for their participation in the project.

Analysis

Data generation occurred throughout the CBDR processes, as it was gathered, and resulted in different forms of data: Part 1: research journals (field notes), interview with the teacher; Part 2: focus

groups, expert interviews, landscape drawings (from participants) and participant narratives. Data generated for Part 1 was meant to document and describe the curriculum design process. Data generated for Part 2 was meant to document and describe participant experiences to address the research questions about participant experiences and the ways that they related to Land through the curriculum.

Research journals acted as analysis tools of the simultaneous Land-education lesson planning and narrative inquiry processes (Styres, 2011: 722; Kovach, 2010: 35). Research journals provided context for the themes and served as a record to satisfy reflexive assurance and improve the evaluation's validity. Semi-structured interviews with teachers and experts were transcribed and openly coded and triangulated with field notes and resulted in four emergent themes: a) topic relevance, b) co-design process, c) relational pedagogy, d) impact on students. Other data created during the project (Part 2), like focus groups notes and landscape drawings, triangulated the themes from curriculum design process (Part 1). Landscape drawings were coded visually to looking for articles and variance of objects drawn. The illustrations provided additional context on how participants engaged with learning activities at the field site. The results of data created with collaborators are the subject matter of Chapter 4.

Findings

The analysis of data sets through coding and triangulation answered the overall purpose of this project: to co-design a community-based relational pedagogy and facilitate the development of people-nature relationships through a learning experience. This section gives an overview:

The first lesson worked to establish a common understanding of the project and identify what student participants were interested in learning. This was the first day of the project, and I included an aspect of the National Geographic Science curriculum (used by the school) in the lesson. The teacher had told me about it, and I tried to integrate the idea of treasure into landscapes. Finally, I discuss the awkwardness in my post-lesson reflection:

> "After the landscape activity, I looked at their identification of landscape aspects. I was impressed with [noticed] the diversity and depth of aspects identified, cultural (including homeless people) and natural. It seems as if these students are aware of the social-ecological system they live in. I attempted to tie it back to the idea of "treasure" after I defined treasure as a healthy ecosystem…. However, felt weird, and I think I may have misrepresented what I was trying to do, maybe sounding like a settler looking for gold. Nevertheless, the lesson

> learned… I need to keep a critical eye on myself and tie in content from the standard core curriculum (Field notes, 2019)

The attempt to include the idea of "treasure" into a discussion about landscapes as social-ecological systems may have worked, but I was out of place. I recognized that it was not my place and inappropriate for me to tell other participants how to relate to the land as having value. As a result, I adjusted my approach to avoid normative language about land relationality in future lessons and be mindful of my role as facilitator, not teacher.

Participants decided on an inquiry project about insect metamorphosis. Pollinators and butterflies seemed like a great topic that was both ecologically and socially significant. The students did not determine the theme at this point, but I had hoped we would choose butterflies as the topic. Thus, my bias as a researcher was leaning towards pollinators as a topic. At the community garden, it was a bit chaotic trying to keep the whole class's attention. However, brain breaks and games were adequate and helped student participants stay engaged. After this lesson, I considered field stations a potential solution and a field recorder for data collection.

The beginning of the local field trips introduced a unique learning context, where observing the landscape outside of the classroom enriched the learning process. BW (teacher) reflected on how students engaged with the learning activity from our first field day:

> … it was foreign to them to begin with, the idea of observations outside of the school. There was an opportunity for them to express their individual thoughts in our classroom, but when you put somebody out in the real world, there's a lot to observe… I saw life; I saw excitement. And it carried over. (BW, Personal Interview, June 2019)

Observation of the natural environment was exciting and engaged student participants using "real-world skills" as part of their science lessons, following lessons centered on observation, as well as exploration and reflection.

The different learning environments (classroom and nature park) occurred by authority exchange between the teacher and the researcher-facilitator. The teacher was in charge until we went outside the school, circling up to talk about staying safe. The exchange of power from the teacher in the classroom to the facilitator, and thus landscape, helped to denote different zones/realms of learning. The introduction of the experts in the outdoor learning environment also created a distinct power dynamic in participants, whereas these adults were not from the school but the community.

In this project, we were able to walk to the nature area instead of drive or take a bus. The benefits of walking rather than driving were that it minimized the cost of the project, facilitated physical exercise, and created a transitory period between classroom learning and outdoor learning mindsets. Using walking as our means of transportation meant that these lessons could happen more frequently, although crossing the highway was a stressful moment for all participants.

The difference in learning environments provided introduction of community experts to students participants. The expert NW brought her bug collection to share with student participants reflected on her role as an expert. She discusses her training as an entomologist:

> The whole time I am collecting those butterflies, I was having all these emotional issues. Like this Is just for a class, this is just for a grade. So you know, [my professor] and I was chatting one day about it, just me saying, "I just do not feel comfortable doing this," and they needed many bugs. He said, "Well, why don't you use that as a teaching collection?" I have just always had it in my closet as, "Okay, anytime I go teach this, I have this whole bug collection and give another purpose to these lives that have been sacrificed. (NW, Personal Interview, June 2019)

She was motivated to share her collection so that the butterflies she gathered had a purpose. She wanted the student participants to touch and feel the bugs as part of the learning process in science.

The spontaneous collaboration between the researcher, experts, and teacher integrated learnings from the field day and classroom learning activities. For example, I did not realize the students had already been studying metamorphosis and moths:

> This activity (brought by the teacher) was a way for the students to learn more about the metamorphosis of butterflies. Students were already familiar with the four stages because they were raising mealworms. I was surprised when they all pulled larvae (mealworms -from teacher-) to their desks (in plastic ramekins). It seems that butterfly gardens or raising butterflies in class could be a good activity in future years, aligned with the 4th-grade science curriculum.

The topic aligned the classroom science curriculum with our participatory inquiry project. Perhaps this is why student participants engaged with the subject quickly. I considered a future curriculum for this school that emphasized butterflies as a topic and think it could be an opportunity for future land-relational pedagogy.

This day was also one of the more challenging days for student engagement. NW reflects, “I think the only activity that was a struggle was when we did the plates [drawings] of the butterfly life cycle. I think you could see some of the kids self-limiting in that activity” (Personal interview, June 2019). In addition, this was the only lesson inside the classroom, so the learning environment was not centered on the landscape.

A local cultural expert was unavailable to join us for field days. Without a local cultural expert, the participatory inquiry was more focused on the ecology and habitat of the butterfly. The cultural contexts of butterflies in the landscape were present in participants’ experiences outside of school, most likely from their families.

In the drawn landscape observations, there is a drawing of the fish in the upper left-hand corner. As you can see, no fish are jumping at the nature park shelter. Maybe it is because the nature park reminded the participant of fishing, or the observer likes to draw fish. As the focus groups on butterflies, these observational drawings show diverse perspectives on how student participants engaged with the project.

The focus groups resulted in some basic answers showing various levels of engagement. Perhaps the range of responses is a result of how engaged student participants were with the topic. However, it could also result from exhaustion/tiredness from walking to the nature park and being in the field for three hours. The descriptive language provides some insight into the experiences of observing a butterfly, while the mentions of butterfly appearance are about the relationship between culture and butterflies.

I determined that the focus groups method was not adequate to gather participants' authentic experiences. I led the discussion by asking guided questions, so my biases permeate the focus group data. After this lesson, I changed the everyday activity to be participant-led and create data triangulating the participants’ experience via mental, emotional, and physical information (Ch 17 of Critical and Indigenous Methodologies (p 347). I wanted to have an opportunity for students to share their narratives without being guided by me as a researcher.

Finally, the lack of butterfly eggs on the first try resulted in an opportunity to measure change during the next lesson and a teachable moment about the scientific process. The expert (NW, entomologist) who ran the butterfly egg station this day reflected on this lesson as their favorite because it felt the most scientific. NW described the experience in a post-project interview:

> I think the best day or the best time that I had was, and this is going to sound sadistic, but the day that we went to catch bugs and they didn't catch any bugs. In my head, I'm thinking, "This is me almost every time I do research." I think I said that to them a couple of times. I'm like, "Some days science doesn't work out." Just seeing the students be able to understand scientific failure even though... I think people put scientists on a pedestal, and they don't ever think that scientists fail, and most of our job is failing [laughter]. So they put on this "Oh, they're glorified. Oh, they're so smart." No, science is just about asking questions and having one or two successes in your lifetime. (NW, Personal Interview, June 2019)

During this station, the learning process was evident to NW, as she related to the experiences of non-linearity in learning about the environment. The frustration of only finding an ant when looking for butterfly eggs was a learning moment and also demonstrated perceptive engagement in the activity.

Our final field day was successful in creating all the data we set out to gather. The data created during this final field day informs Part 2 of the research questions. These are reported in Chapter 4. However, some of the data gathered on this day also provides insight into the curriculum design process. For example, responses to written prompts on the landscape drawings gave another layer to understanding how student participants engaged with the learning activity. However, the written prompts may have changed what the students drew, as it was more of a worksheet than an open response. For example, the pressure to answer "correctly" created a bias in responses and can help understand the various forms of engagement. Collaborative analysis of data created did not occur with student participants in the Spring of 2020 due to the COVID-19 pandemic. However, all participants said they would be willing to do this project again, including the teacher and experts.

Discussion

Established relationships between the researcher, teacher, and community resulted in willing partnerships and successful facilitation of outdoor learning environment. The success of this project emerged from pedagogical alignment and clear communication about project intentions

Teacher-Researcher collaboration

Part of the "success" of this project was finding a teacher-collaborator whose classroom pedagogy aligned with the project's aims. After the program ended, the teacher and I discussed their educational philosophy about community as a learning space and the impact of taking the classes outside, as the community members can see how education is happening:

> Learning can happen wherever. Going out and literally trying to be in these spaces and places so that people look at you and they go, "Oh my gosh, the school is not what I thought it was. They're not trying to pull my kid away from me. It's still not the same old school that tells me that they're getting out. They're doing the things that matter and they're in places and spaces that matter.… if community's a big deal to the kids, then learning in the context of community should maximize my mission here academically. It should only help do that. (BW, Personal Interview)

It is essential to note the context of this quote as a response to a question about the teacher's pedagogy before the project. Preparing the project's intention took time but laid a foundation for an easy partnership with a teacher facilitating community-oriented, landscape-based lesson plans. Having clear aims also made it easier logistically, where both teacher and researcher were wanting taking student participants outside of the classroom for exploration-observation activities.

The teacher found the collaborative lesson planning process easy, stating, "There was nothing I didn't like about doing that." Next, the teacher reflected on how I worked as a research facilitator in the classroom and made the collaboration work:

> I was worried that things wouldn't happen and you wouldn't even be able to get off the ground. So when I say, "Ambitious," just knowing, having gone down that road myself before and trying to do action research and I was just frustrated to no end because I couldn't get things the way I wanted them and when I want it and that kind of thing.
>
> So I thought that we had a slow start but then again, I thought that the collaborative planning, I thought one of the cool things about it was that ... your willingness to have a direction in mind and do a lot of the legwork on your own and come up with time-honoring ways to get things done and to do things. That was good. (BW, Personal Interview)

The teacher also reflected on his role in the collaboration and the ability to maintaining his role throughout the project:

> It is not just because I know I am a rule follower to some degree, and within the school there are just so many goals and directions and expectations that we have. I'm sure you sense that in conversations, but I appreciated the fact that you kept that in mind. I have no complaints about any of that. It's clear that you had a certain plan in mind and wanted to do and then when things weren't exactly as they were, the demands that you had, you still sought

> my input, but you didn't increase the demands on me to fix or make something happen. I really appreciated that. (BW, Personal Interview)

As a facilitator, I wanted to meet the teacher where they were at, so it was an easy collaboration for them with minimal stress on their classroom and relationships with the administration. The ability to listen, learn and incorporate the context of education keeps the partnership reciprocal. Existing lesson plans framed the introduction of relational learning outdoors and met the classroom teacher's needs. This aligns with the need for a researcher to be involved with participant spaces, eager to enter and participate (Preiser et al., 2021). It also validates the importance of relationship building and how much time it takes to do this participatory study.

Relationship building with community members led to flexibility

Years of relationship building with community members and leaving intentional space for unknown events resulted in flexibility in the planning process (e.g., finding local community members to participate as experts). The open nature of the planning process was a bit uncomfortable but ended up in unanticipated collaboration with local experts**.** The intention was to invite older community members to join us if they could, but in the end, the timing of the lessons interfered with many people's workdays (Friday mid-day). This ambiguity and openness caused a bit of hesitation but did not impede the codesign process, according to the teacher:

> Well, I thought it was ambitious and I thought it would probably ... Honestly, I thought we would have more interactions with elders from the community, which is my initial impression. So I thought, "All this will be great." I don't have tons of community contacts and I thought, "Oh my gosh, she's going to put us in touch." It turned out that it wasn't so much an elder connection as other experts in other fields in the community, so that turned out to be a surprise. It was, I thought, like I said, it went right in line with the idea of opening things up, going here, going there, having people come in. I thought that that would be a good fit for the way we do business (BW)

Despite the ambiguity of who would join us, we still ended up collaborating with local experts, which the teacher had for the classroom. Rather than a cultural focus, collaboration with local experts resulted in an ecologically focused inquiry- looking at the landscape as both a natural area for people and as a butterfly habitat.

Indoor-Outdoor transfer of learning

Observations and learnings from the nature park were brought back into the classroom. One surprise was how the student participants began to relate field day explorations to classroom tasks. The teacher remarks on how the development of observational skills from the field deepened other discussions:

> What the first thing I noticed is that kids were honestly excited. They were honestly excited about the things that we were talking about and learning about. And it was foreign to them to begin with, the idea of observations outside of the school. In our classroom there was an opportunity for them to express their individual thoughts but when you put somebody out in the real world, there's a lot to observe.
>
> So just those, some of those real-world skills, so I saw life, I saw excitement. And it carried over. The other thing I noticed with that was once we started getting out and going and doing that, providing that as a backdrop to what we were learning, it made a lot of the stuff that we were doing in the classroom not a classroom activity but a way to enhance what we were trying to have the kids discover and things that they were leading ... going towards from out in the field (BW, Personal Interview)

The integration of butterflies as a learning topic for non-project classroom time was not intentional in the project's design, but it became part of the class. The teacher reflects how the subject from the co-design lessons fulfilled a requirement for 4th-grade science curriculum and inspired research using online resources. The teacher goes on to talk about the way classroom time was refocused on the topic of the participatory inquiry chosen by the class:

> Well, we're studying butterflies and milkweed and moths." When I would suggest reading that it was suddenly it was purposed, it was purposeful and there was going to be an application piece.
>
> That was one of the big things that I noticed about it. That's ultimate. That's ultimate engagement (BW, Personal Interview)

The ultimate engagement of students came from a topic that arose from a relational pedagogy of landscape and place: butterflies. The subject of butterflies was a surprise, and student participants invested their inquiry in a topic relating to land and culture. As a result, the learning process became

"suddenly purposed," as the topic of investigation was complementary to the classroom goals and science curriculum.

Conclusion

There was a lot to learn through this process, and there were surprises during the co-design process. However, a pre-determined topic could have resulted in pre-planned lesson outlines and dedicated community experts. Additionally, the open co-design process resulted in many collaborators/participants who were "volunteers." Therefore, future studies like this, or approaches to collaborative lesson planning, could intentionally select participants with specific expertise to create the desired research topic.

This initiative results from relationships and collaboration, which applies relational pedagogy of land and place, resulting in the participatory process of co-designed lessons. The significant findings are: a) co-design process must be open and centered relationality between people-land, b) the conditions that led to a community-oriented, land relational pedagogy, 3) instruments engaged in understanding participant-land relationality in the field, 4) outcome of students relating learnings from land exploration to classroom, and vice versa. Other lessons learned include an emphasis on positionality in education research, specifically with land insights

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Chapter 4: Understanding relationality through Narrative Inquiry and Conversational Method

This chapter reports the results from an investigation that used narrative inquiry to understand participants' experiences in local interactions with the land and resulting people-land interconnectivity (See Preiser et al., 2018: Principles 1 & 2 of CAS). The research provides insight into the interactions between land and participants and how the narrative of relationality emerges. Patterns of interaction represent processes of synchronous learning that emerge during field days at Lapwai Nature Park. "Interactions" are identified as physical, sensory, cultural, and temporal exchange processes between participants and the landscape.

Introduction

The study takes a qualitative approach to conversational data analysis motivated by narrative inquiry and storytelling in land education. The study looks to the *Conversational Method in Indigenous Research* (Kovach, 2010: 44) text as a guiding method. Data analysis occurs through a qualitative coding procedure, buttressed by narrative analysis (Elliott, 2018). In addition, participant-drawn landscape observations accompany the conversational data to provide contextual data for conversational analysis. Two questions guided this research:

> ***a) What patterns of interaction give insight into participants' experiences relating to the land?*** This question is about finding a way to understand the processes of land relationality as part of the co-designed curriculum. This analysis emphasizes process and pattern, thereby looking at the "verbs" in the narratives rather than the nouns (Hertz et al., 2020). An inquiry focused on processes and verbs, rather than nouns, supports a turn towards intersubjective thinking in CAS science and moves from substance ontology (Garcia et al., 2020).
>
> ***b) In which conditions, physical space, events, processes (social-ecological context) did these land relational narratives emerge?*** This question is about the patterns of narrative that come up in conversations about how participants relate to the land. Rather than focusing on the data's content (or substance), this question examines how linking processes emerge between landscape and learner. In environmental education, a focus on processes can illuminate how (the doing, being) links between humans and the land are nurtured.

Study Purpose

This study aimed to understand how youth participants orient themselves and each other with the land. More broadly situated, the purpose of this study addresses the need to engage with process ontology in CAS science (see *Adopting process-relational perspectives to tackle the challenges of social-ecological systems research,* Garcia et al., 2020) and develop methods and case studies that develop holistic systems methodologies (see *Towards a relational paradigm in sustainability research, practice, and education.* Walsh et al., 2021). It also addresses the need to challenge the quiet "dynamics of settler colonialism" in environmental education and sustainability science research methods (Bang et al., 2014:39) and encourage pedagogy that involves learners with the environment via interaction (p. 43).

Positionality

Given my positionality as a researcher in this context, it is necessary to identify myself as a white settler researcher in an indigenous context, using Critical and Indigenous Research Methodology (CIRM) as a broader philosophical framework. In this chapter, I present data generated in collaboration with Indigenous peoples and accordance with the United Nations Declaration on the Rights of Indigenous Peoples: "Recognizing, in particular, the right of indigenous families and communities to retain shared responsibility for the upbringing, training, education, and wellbeing of their children, consistent with the rights of the child" (General Assembly, 2007, p.3). As a research partner, I am committed to upholding the eight principles of "Anti-colonial methodologies and practices for colonial-settler studies" (Carlson, 2017: 6-8) in the discussion and application of this research.

Chapter Overview

An introduction of relational ontology and land education pedagogy set the philosophical grounding for research presented in this chapter (S. Styres et al., 2013; S. D. Styres, 2011; Tuck et al., 2014; Wildcat et al., 2014). A brief discussion of the study background, participants, and setting (the same as Chapter 3) follows the philosophy and conceptual framework. After the study background, two sections describe how data was collected (methods) and analyzed (Lemley & Mitchell, 2012; Koster et al., 2012; Preiser, Biggs, De Vos, & Folke, 2018; Spies & Alff, 2020; Styres, 2011; Toledano & Anderson, 2020; Walsh, Böhme, & Wamsler, 2021; Geertz, 1973). Next, thematic categories work to organize results, representing the four patterns of interactions that give insight into participants' experiences of relational land pedagogy. Results are reported with conversational segments and landscape drawings and contextualized using a thick description technique (Geertz, 1973). Finally, a discussion interprets results via the conceptual framework, followed by the conclusion of this chapter.

Study Philosophy and Conceptual Framework

The philosophical context of this study results is a relational ontology & pedagogy of land, where-in the observed is a part of a more extensive, dynamic system of interactions. 'Process and relational ontology' mean a worldview where mutual connections define reality or the study of *being* as a *process of relations* with other beings. In other words, mutual relations and collective-cooperative behavior define what is "real" (Mancilla Garcia et al., 2020: 2). Land relational pedagogy is defined in *Land Education: Rethinking pedagogies of place from Indigenous, postcolonial, and decolonizing perspectives*: "relational Pedagogies of Land are not new… relationships to land are familial, intimate, intergenerational, and instructive (9). Land as pedagogy links people with landscapes through relationship building and inquiry. The practice facilitates learning about the interconnection of social and bio-geo-physical processes, complexity, and change over spatial and temporal boundaries (Simpson, 2014; Zinga & Styres, 2011; Styres, 2011: Bowers, 2008).

In terms of education and complexity theory, there is much to explore about how we learn from complex systems in & outside of the classroom (Jacobson et al., 2001; York et al., 2019; Mitchell, 2009). Theoretically, learning is a crucial process to the adaptability of complex systems, where learning serves as a cooperative process that connects people with important information about the change (Ekins, 2020; Krasny et al., 2010; Löf, 2010; Carpenter et al., 2002: 193). Substance ontology focuses on the material aspects of reality, meaning reality is constructed by physically concrete items. Alternatively, Process-relational ontology recognizes the importance and movement toward collective behavior and cooperation models (Mancilla Garcia et al., 2020: 2). As explored in previous chapters, environmental education can benefit from relational ontology and pedagogy of land. Thus, environmental education can assist in developing relational ontologies and perceptions of social-ecological systems as complex, dynamic, and adaptive (rather than ascribing fixed attributes or materialist ideology)

Land education is informed by Indigenous epistemology, ontology, and axiology. A pedagogy of Land education diverges from the Western narrative of knowledge, the duality of truth, to accept Relational Perspectives. The pedagogy facilitates learning about complexity, interconnection, and the dynamic history of the land itself- providing insight into the future of the Land. These principles and lessons align with the characteristics of complex adaptive systems. Land relational pedagogy is "one that engages with "land [as] the context for formal and informal education" (Zinga & Styres, 2011: 61).

A land pedagogy detaches knowledge from imperialist, Western history's written narratives. A special issue of EER (2014) addresses the settler colonialism embedded in critical pedagogy of

place: Indigenous (and non-Indigenous) education scholars describe the dynamic practice of land education as distinct to Western techniques (Tuck, McKenzie, McCoy, 2014). A relational pedagogy of land (Bang et al., 2015) holds the idea of "land" as different than "place." Other land education scholars refer to learning about intertwined people-nature dynamics while unsettling settler ideologies about land and place (Calderon, 2014: 33). The difference between "land" and "place" as a focus of learning is best described by Bang et al., in a chapter from the *Land Education:…*text:

> From a critical settler-colonial reading, place-based education, in which there is an Indigenous absence, even when relational pedagogies are prescribed, enables 'indigenizing settler majority' identities (Pearson 2002; Veracini 2011). For example, some place-based work theorizes that in order to counter the ways in which language use and institutions deny peoples' connections to place (Bowers 2002; Gruenewald 2003; Sobel 1996), innovative pedagogies that focus on the need to build personal relationships to place – to specific locals to 'rejuvenate carnal, sensory empathy with the living land that sustains us' (Abram 1996, 69) – must be developed. (2014: p. 38)

The difference between "land" and "place" informs the pedagogy's focus, whereas land explicitly embodies the union of people and land to include indigenous realities in the learning process. According to Styres, "Land… is an expression of space that exists in dynamic storied relationships that are always shifting, evolving, struggling and transforming" Thus, learning from the "land" lessons fosters dynamic thinking outside of "place" (Styres, 2011: 728).

Land education pedagogy relies on indigenous-oriented histories and is flexible with diverse social-cultural structures. Relational land pedagogy facilitates learning by exploring diverse experiences and complex interconnections related to land and incorporating a diverse memory of the place with land exploration. For example, Leanne Betasamosake Simpson discusses a story about a young person named Kwezens who engages in a traditional practice of gathering maple sugar (see 2014 paper *Land as pedagogy: Nishnaabeg intelligence and rebellious transformation).* As a result, Kwezens learns about herself, her place in the community, and the process of making maple sugar through her observations of and interactions with the land. The learning is positioned within the Nishnaabeg culture while centering the bond between the young person and the land itself.

To decolonize the concept of land-based pedagogy or place-based pedagogy, we again learn from Simpson's pedagogy, which insists on Land as Pedagogy (2014). The pedagogy challenges western science education because it fosters non-linear thought (8). It builds intellectual sovereignty for the learners and the "capacity to uphold and move forward our political traditions and systems of governance" (Simpson, 2014: 7); “The knowledges and meanings made from the land are for and

from the generations of people in that land, so indigenous education must happen in the way of that people (9)". This way of science education is not land-based: but "Land as Pedagogy."

Conceptual Framework

The application of ontology and pedagogy in this dissertation explores the perspective of learning as a link between people and nature. The condition of "relationality" is necessary to understand complexity in adaptive natural resource systems (García et al., 2020; Hertz et al., 2020; Lejano, 2019; Spies & Alff, 2020; West et al., 2021). A conceptual framework intertwines ontology with examples from land education pedagogy, thereby outlining how the study in this chapter facilitated connectivity between land and learners. In other words, here is the conceptual framework that describes how education can connect social and bio-geo-physical processes, complexity, and change over spatial and temporal boundaries with young people (Simpson, 2014; Zinga & Styres, 2011; Styres, 2011: Bowers, 2008). Ultimately, the outcome of land pedagogy is to be "holistically in balance with the land." Thus, this conceptual framework purposefully outlines how learning from the land will "develop an understanding that all things exist in complex, interconnected relationships" (Styres, 2011: 722).

The patterns of interaction between student participants and land are the process of relationality- notated by sensory/physical and temporal/cultural conditions. These interactions simplify a pattern of a) impermanence and uncertainty as the initial ontological premise, b) interaction through senses or temporal memory, c) observation, d) information gathering, e) response and experimentation. Each step of the process connects the conceptual framework of land relational ontology and pedagogy to describe broad patterns of interaction that occur in the land relational pedagogy sense**.** The framework outlines the process of synchronous learning as being a part of holistic CAS (a *dynamic, non-linear, cross-scalar* system) (Styres, 2011: 720). Thus, the following outline presents a context to interpret learners' interactions and landscape, as presented in the results section.

As an ontological setting, relationality is the necessary premise for discussing the experiences of student participants during this study. Uncertainty, impermanence, and change are the ontological premises for participant experiences reported in the study's Results section. Relational ontologies mean the entanglement of relationships construct reality and are constantly in flux, outside of material reality, and maintained via connectivity (Hertz et al., 2020: 332). In short, relational ontology is a study of non-material metaphysics.

Given these conditions, "relationality" means a social orientation, or the conditional starting point of each interactional pattern reported in the results section. Relationality characterizes patterns of interaction between learner and land. For example, Styres defines "land" as an abstraction, more than just material connections: "Land as Indigenous philosophy or ideology that exists beyond the concrete connection to place" (2011: 718). Land is witnessed as a living entity, the center and giver of life, and reality emerges from associations with the landscape (Zinga & Styres, 2011). In other words, recognizing peoples' interdependence with land determines one's understanding of the nature of "existence."

Learning corresponds with complex processes of land-participant interactions. Complex interconnectivity is the primary connection to land because an intergenerational locationality on the landscape is intergenerational, instead of a concrete "place" which may be owned by people or something to be obtained via tenure (Zinga & Styres, 2011: 62; Bowers, 2008). Processes of interconnection typify the "moments" or conversational segments used to demonstrate the during an "event." Events are almost the same as processes but are experienced by participants firsthand. Events are described as action-oriented processes in the CAS literature, particularly in the 2020 article *From Nouns to Verbs: How do process ontologies enhance our understanding of social-ecological systems understood as complex adaptive systems.* The authors identify the role of understanding people-land orientation in CAS interaction as an event:

> In process ontology, reality consists of 'processes'. Processes interact with many other processes which jointly give rise to 'events.' Processes and events are fundamentally the same thing; the only difference is that events are sets of processes that are experienced by a being, which delineates them from the overall flow of processes (Hertz et al., 2020: 332).

The moments reported in the result section reflect "events" that occurred within learning processes to understand the patterns of interaction that occurred during the study. Land education pedagogy engages with "land [as] the context for formal and informal education" (Zinga & Styres, 2011: 61). Learning occurs through exploring the diversity of experiences and complex interconnections of being in relation with land (Simpson, 2014: 8). Thus, learning and exploring land are reciprocal processes, meaning that the philosophy of land pedagogy influences the learner while the learner influences the land (Zinga & Styres, 2011: 63).

Observation of events occurred with complex dynamics of the nature park, resulting in encountering non-human entities as part of the system. Land conveys memory through feedback loops, teaching us about change and scale heterogeneity. A Land education pedagogy encounters

these loops through observation, exploration, and story (Bowers, 2008: 333; Styres, 2011: 717). Learning occurs through a direct connection with the environment-via exploration, observation, and reflection opposite land (for example, see Bang et al., 2015 *Learning through Observing, pitching in, and being in relation to the natural world*). The practice of land as pedagogy happens openly and reflexively. Knowledge is shared through experiences and co-created via conversational methods about participants' observations and thoughts (Kovach, 2010; Styres, 2011: 722). Pugh et al. discuss how this intertwines learning about social-ecological dynamics in their 2019 article *Relational epistemologies in land-based learning environments: reasoning about ecological systems and spatial indexing in motion* (2019):

> In our work, we have been particularly interested in how relational epistemologies and cultural frameworks about human–nature relations may be impacting complex socio-ecological systems reasoning. We suggest that relational epistemologies in motion, or on the move (see Headrick Taylor and Silvis 2017), are an important area of study and can afford new understandings about how the process of sense-making works in the practice of walking, reading, and storying the land.

The Pugh et al., 2019 study demonstrates how observation is crucial in land education pedagogy and contributes to cognitive patterns of reasoning and spatial indexing. Researchers recorded Indigenous youth groups at a summer outdoor science camp, focusing on how students made sense of ecosystems through land-based education methods. The Pugh et al. study demonstrates how learner-driven, land-based activities (observation, conversation, and exploration) engaged students in non-linear reasoning about complex human-environmental systems and worked together to make sense of complex ecological dynamics and people-land interconnectivity.

Information gathering, or interpretation of observations, in event processes, occur collaboratively in this data set, in conversations between participants (Kovach, 2009). The practice of land as pedagogy happens openly and reflexively. Knowledge is shared through experiences and co-created via conversational methods about participants' observations and thoughts (Kovach, 2010; Styres, 2011: 722). Land is a condition for learning that engages storytelling and collaboration to work together in an open, reflexive process of meaning-making (Simpson, 2014; Zinga & Styres, 2011; Bowers, 2008). In *Power and Place*, Vine Deloria Jr discusses the process of "Indian information gathering" as a pattern of observation, experience, 'correspondence, and correlation' (2001, p. 26-27).

Observers gather information about the environment by observing the linkages of an experience. According to Deloria, Indian information gathering engages with learning patterns about the structure of reality. The information gathered helps predict what will happen, rather than to explain what happened in a western sense: Indian information gathering results in a type of knowledge that is tribal and environmental. For example, the story about Kwenes and the maple trees (Simpson, 2014) shows the patterned process of information gathering, observation, and collaborative interpretation of observed phenomena in the environment.

Response to observed events occurs after interpretation, leading to a pattern of participant action or experimentations in an interdependent system. The experience of an event is not a "significant finding" or fixed event (e.g., the discovery of a spider, recognizing that not all spiders are dangerous). Instead, as one finds similarity with the pattern or garners significance in the experience, the event fosters experience, which informs awareness about how to act in future scenarios: the response is experimentation with safety and danger, while the pattern of relating is a practice of the young person's perception of risk. The result is a contextualized risk assessment, a process that occurs under an elder's supervision. For example, the ability to assess the risk of a spider bite can improve the intuition of a young person as they continue to observe and connect with the natural area (Deloria, 2001, p. 27; Bang et al., 2015).

The role of adults in this step is one of facilitator and supervision. Rather than authority controlling learning outcomes, a teacher can be equal to learners as a collective exploration of Land, as a pedagogy. If adults (teacher) engage as mediators, then adults can empower students to experiment and decide what ought to occur (Bowers, 2008: 332). Thus, the pedagogy works to co-construct intergenerational knowledge about system complexity, flexibility, and holistic ontologies (see the conclusion of Zinga & Styres, 2011 paper). An adult mediator needs to facilitate conversations and encourage thinking about interdependent people-nature systems: for example, "how different aspects of cultural common impact natural systems" (Bowers, 2008: 333).

In summary, the framework presented above outlines how student participants engaged in a land pedagogy through observation and interpretation. The moments shared in the results section show how relational pedagogy accentuated student participants' innate processes of cognition, sensory and temporal relation, and observation. Eventually, these processes allow the practice of intuition, developing autonomy, gauging social-political norms in a place/land, and engaging with deep cultural processes around power dynamics and governance of the natural area. Finally, Megan Bang discusses the strength of land relational learning and social-political processes in *Culture, learning, and*

development and the natural world: The influences of situative perspectives (2015), and how the practice empowers the process of "folk-biological cognition," or social-ecological thinking.

Participants and Setting

This collaboration worked with a class of 4th graders (16 students) as participants and co-investigators to learn science in a local, natural area. Again, pre-existing and ongoing contacts determined the selection of community experts (Kovach, 210: 51). This approach is appropriate given the depth of knowledge generated, relationship building, and willing collaborators (Kovach, 2009). The land is also an active participant in this study, which aligns with principles in Land Education pedagogy, where the land is a living entity; see, for example, "Land as first teacher" (Styres, 2011:717).

Thick description is a research technique used to ensure external validity of ethnographic and anthropological data reporting (see Gertz, 1973). In this study, the researcher was also a participant and played the role of "Facilitator" in conversational data. Given the multiple roles of the researcher, written results include a Thick Description. The thick description provides a rich accounting of the social-ecological contexts where conversations happened and the attention to detail and physical context to improve the rigor of interpretation by the researcher and the reader (Grande, 2008; p. 233). A thick description interprets the conversational data and "moments" found in the results section throughout this chapter. Here, the researcher informed thick description through field journals and insight from research collaborators.

Setting

This study took place at a natural area 0.55 miles from the student participants' elementary school. Participants would meet in the classroom and walk to Lapwai Nature Park to gather data about butterfly eggs and the park as a relational landscape. Lapwai Nature Park is the ideal site for the Landscape Lessons project as a place of nature and cultural significance. A local riparian area and social-ecological system contextualize inquiry into students' meanings from these educational experiences. The other place was their classroom and the path walking to the park. The GIS map below identifies the distance and path from the school to the field site (Lapwai Nature Park):

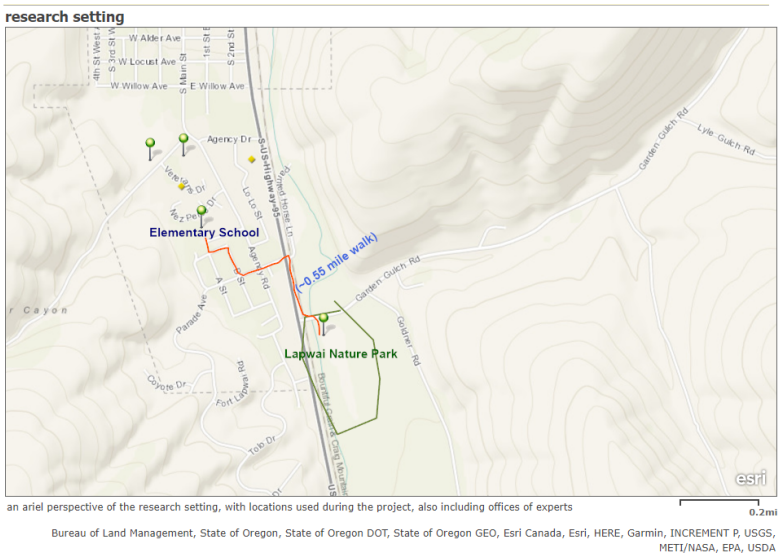

Figure 7: Map of the path from the school to the park. Green pins represent other sites explored during the curriculum design process (see Chapter 3).

The Nez Perce Tribe's Water Resource Department maintains Lapwai Nature Park. The Park contains a pollinator garden in the center of the park. Details about the Lapwai Creek Watershed are available on the Nez Perce Water Resources Website (https://nptwaterresources.org/lapwai-creek-watershed/). A riparian area surrounds the park at the convergence of Lapwai Creek and Spring Creek. Lapwai Creek flows on the west of the park, and Spring Creek flows on the north. In 2015, a youth corps built a pollinator garden in the park's center. According to the interpretive sign at the entry of the natural area, "Nimíipuu (The People), also known as the Nez Perce, have been inhabitants of this area since time immemorial. The Nimíipuu resided here seasonally to fish and gather, near the natural spring now called Spring Creek". The sign also indicates the location of the Lapwai Rodeo Grounds, frequented by the cultural figure and World Champion Mustang Rider, Jackson Sundown (May 2019, photo, field notes).

Methods – Data Gathered and Implementation

The overall design of this research is a result of a community-based research design project (see chapter 2). This study relies on principles of Narrative Inquiry to guide the methods selected. Narrative inquiry is a qualitative method that studies narratives as stories to understand people's experiences, beliefs, and uncertainties (Kovach, 2010: 43; Tzou et al., 2019; Lemly & Mitchell, 2012). Narrative inquiry is valuable cross-disciplines, particularly in CBDR, conservation social science, education research, and even medical research (Richardson, 2015; more examples). Sharing narratives and storytelling is a traditional and human way of sharing knowledge via conversation, collaborative meaning-making, and reflexive interpretation. (Cajete, 1997, Guba, 1990; Kovach,

2009; Smith, 2012; Newing, 2011; Elliott, 2005). Narrative as a method of qualitative inquiry facilitates a co-creation of knowledge between the person sharing the story and the listener: no interviewer is asking targeted or leading questions (Kovach, 2009: 30; Elliott, 2005: 23).

Narrative inquiry is different from other social methods in that it does not fragment qualitative data; it gives more profound insight into descriptive experiences shared through story and conversation (Elliott, 2005: 18-23; Kovach, 2009: 30). People make meaning of narratives by listening and telling the story, so meaning-making occurs through the process of conversation (Bennett et al., 2017; Denzin et al., 2014). Lemly & Mitchell write about narrative inquiry in the 2012 text, *Qualitative Research*: *An Introduction to Methods and Designs* and describe the relational nature of the narrative question, "when conducted reflexively, narrative inquiry provides the possibility of researching across the divide between researchers and the researched, giving marginalized communities the ability to take part in telling their own stories" (pg. 230). Thus, the method helps support a research process founded in CIRM.

The conversational narrative inquiry method is practical for knowledge generation in western qualitative research and Indigenous methodologies but differentiates in a CIRM framework. Margaret Kovach writes about these differences in *Conversational Method in Indigenous Research:*

> However, when used in an Indigenous framework, a conversational method involves several distinctive characteristics: a) it is linked to a particular tribal epistemology (or knowledge) and situated within an Indigenous paradigm; b) it is relational; c) it is purposeful (most often involving a decolonizing aim); d) it involves particular protocol as determined by the epistemology and/or place; e) it involves an informality and flexibility; f) it is collaborative and dialogic, and g) it is reflexive. (2010:43)

The conversational narrative inquiry method is unique and essential in a CIRM framework, distinct from western approaches due to the intent, purpose, and relationality. The conversational practice centers on a tribal context and paradigms where the narrative inquiry happens. The ontology is relational, matching the CIRM framework of research as a "process of fostering relationships between researchers, communities and the topic of inquiry" as well as purposeful, like the "totality of CIRM, driven by notions of sovereignty and self-determination" (Brayboy et al.: 437).

With the epistemological guidance from place and knowledge, combined with its open discourse and reflection, and adherence to principles of CIRP, conversational methods and narrative inquiry result in the co-production of knowledge.

Focus Groups

Focus groups happened before our final data collection day as field-day stations. The method answers the first research question of how a relational pedagogy can facilitate learning about people-nature relationships with 4th-grade students at Lapwai Elementary School. Three groups of students (5-6) participated in a focus group with semi-structured discussion, with a 15-minute rotation between groups. I asked three questions to guide the conversation with students: "What does it mean to see a butterfly in Lapwai," "How do you feel when you see a butterfly in Lapwai," and "What do you think about doing this project again?". These focus groups gave context into the collaborative lesson design of a land-centered pedagogy, insight into the students' thinking of the program, and willingness to participate again. In addition, these focus groups supported the creation of the lesson on the final data collection day. I used a digital audio recorder app on my phone to record these conversations called Voice Recorder. I then transcribed these focus groups in Rev. The audio recording is on an SD card.

Drawn Landscape Observations

These data provide insight into which aspects of the landscape participants experienced. These participant journals can triangulate data about patterns of interaction emerging from the relational land pedagogy design (exploration and narratives/reflection). I created pieces of paper with different prompts, and we used them on two separate days. First, participants just drew observations of what they saw on our first field day at the community garden and canoe site (an after-school program with Elementary School and a local non-profit). At the Lapwai Nature Park field days, one of the stations was landscape observations – during these stations, each of the students drew and wrote on a piece of paper with the prompt to draw what they observed. Each group had time at this station for 15 minutes. I made sure that there was a comfortable place for students to do this landscape observation and brought a tarp for students to sit on if they wanted to. The landscape drawings station was the snack and water station to keep students' energy up while in the field. These drawings are stored physically in a secure place, with digital scans housed in a secured folder.

Participant narratives

We recorded the participant narratives on the final field day at Lapwai Nature Park as one of the data collections stations. This data generated answers the research questions of how descriptions about past and present people-nature interactions appear in participant experiences. Students gathered in three groups to rotate through each station. Groups had about 15 to 20 minutes to record a collaborative narrative while moving through the landscape, so students could share their narrative without being guided by me as a researcher (Denzin et al., 2014: 347). However, I did give some instructions in the beginning about how to use the field recorder. We used the Tascam VR-05. At the

front of this station, I showed students how to turn on and turn off the field recorder and make sure they knew how to use it as a group. The other instruction I gave them was to make sure they shared the recorder and that everyone had a chance to record what they wanted. Finally, I suggested participants could record sounds they wanted, like nature sounds, or tell stories – but mostly that they could do whatever they wanted to record it. Each group recorded about 15 minutes of audio and was on the SD card in the field recorder.

I edited these tracks to represent moments of conversation and interaction and condense periods of silence. This indexing process resulted in three tracks and 27 minutes of audio. In addition, these tracks were transcribed to help understand what is going on, as there are multiple speaker participants and environmental noises, including participant-land interactions. Audio files are stored in a secure data location, approved by the University of Idaho.

Analysis: Qualitative Coding and Conversation as Method

The synthesis between participant narratives, drawing of landscape, and focus gave some insight into what students noticed as they were on the land. Participant observation data contextualizes how participants moved spatially throughout the land, for example, a discussion exploring the creek area and which paths to take. Process coding resulted in themes describing interactions and activities relating to the land via physical, cultural, and temporal actions. This focus on processes in conversation related to the push for relational ontology in SES research, as invited in the 2020 article *From nouns to verbs: how to process ontologies enhance our understanding of social-ecological systems understood as complex adaptive systems* (Hertz et al., 2020).

The analysis accounts for how data sets were interpreted to contextualize the patterns of interaction through drawn observations and conversations between study participants. The coding process occurred in this order:

1. ***Open coding:*** I reviewed landscape drawings, focus group discussions and listened to audio recordings of participant narratives multiple times to identify moments of interest and patterns of conversation about people-land interactions. The segments of interest were noted in all data sets and provided the foundation for further rounds of coding.
2. ***Thematic coding:*** The second round of coding of audio transcriptions was done thematically, marking drawings, focus groups, and conversations, where there was: a) indication of direct participant-land interaction or b) narrative shared between participants (Kovach, 2010)
3. ***Process Coding:*** to understand what happened (i.e., the habits of participants) as they moved through the landscape. These codes reflect repeated moments where participants interacted

with the land through action (e.g., throwing rocks in the creek, running through the field, observing birds). (Toledano & Anderson, 2020). The process coding approach was also used to review patterns of interaction present in focus group discussions about butterflies in Lapwai.

4. ***Conversational coding:*** conversations were coded to indicate moments of participants' experiences. These codes are composed of narratives about the land, or an experience of being in that land, stories that remember that place, or even narratives that share made-up playful stories such as being "Ghost Hunters" (Huber et al., 2013; Wildcat & Simpson, 2014). Alternatively, they also reflect moments of discussion about land associations or landscape discussions between participants. The purpose of this coding is to contextualize participants' experiences during the inquiry and b) to identify interactions of interest or that reflect thematic elements to be reported in findings chapter

Because of the emphasis on process, intersubjective experiences, and patterns of interaction, the final rounds of coding emphasized: a) processes (or action words), and b) conversational narratives about land relationality (Styres 2011: 711).

The way things are said, and the contexts in which they are said, inform the overall analysis of these recorded narratives. Syem & Nelson (2015) outline a proper protocol for evaluating reliability in a qualitative narrative analysis of this type:

> Narrative studies that examine talk in interaction often rely on the insights of a single analyst (e.g., Bamberg, 2004). This research looks different from much of the other narrative research referenced thus far, as it uses discursive analytic techniques. That is, the analysis does not only consider what is said, but how individuals say it (e.g., intonation, pauses, hedges, and discourse markers). Similar to Josselson, extensive excerpts are included in the final articles, along with a deep analysis of the excerpt (e.g., Korobov & Bamberg, 2004). Ironically, this makes for a cleaner distinction between data and analysis than what is often seen in quantitative-based studies, where much of the data themselves go unseen by the reader. (p 383)

The audio recordings are central to the study design as the recordings contain participant-created data in the narrative inquiry method. Analysis occurred through a process of open, then thematic coding, inspired by the analysis process described in "Conversational Method in Indigenous Research" (Kovach, 2010: 44).

Review with Collaborator: Conversational Approach

In this study, the narrative inquiry involved participant conversations during Land education activities. Analysis of this data occurred with a collaborator, and I asked for feedback on using three questions: *what are student participants doing as they record themselves talking and moving around? What is going on in these conversations? How are student participants experiencing and relating to the nature park?* No coding processes were discussed or introduced with the tribal research collaborator during conversational analysis. Instead, we listened to the recordings and discussed the feedback questions. The collaborator conversations were recorded, transcribed, and thematically coded as part of the analysis. The themes reflect specific interactions of interest identified by the research collaborator while providing insight into the cultural context of the data.

The collaborative analysis of these conversations resulted in additional themes identified by the tribal research partner. These themes are: a) "kids being kids" – to be "agents of their senses," b) Engaging and experimenting, discovery, c) Danger and safety dance, d) testing boundaries, authority e) complexity and evolution of a human being, f) landscape as the learning environment – "helps kids develop intuition," g) different levels of group engagement with the field recorder and with learning activities, h) laughter, i) native students talking about their culture, pow wow, native songs. The themes emerged from analysis with research partners and resulted in four thematic categories representing the interaction patterns occurring in this land relational pedagogy.

Results

Overall, the themes recognized in process coding and collaborative analysis demonstrate how learning occurs socially, in conversation with other participants, and through direct interaction with the features of the nature park. This finding validates the choice of conversational method, as participants in this study made meaning through conversation and story. Of particular interest were how the narratives shared through conversation “time-agnostic”, where narratives take place in the past, present, and future during the same conversation. Many conversations help narratives about how participants related to land and occurred in the past, present, and future. Below are three examples from conversations that illustrate participants' experiences related to the nature park and the process of collaborative meaning-making through discussion.

Throughout all the data, four patterns of interaction were apparent to all research partners: a) Observation and surprise, b) navigating potential danger, c) understanding and testing authority structures (development of autonomy), 4) and conversations that situate learning social-cultural dynamics. These processes represent how young people made meaning during the learning exercise.

Each theme is described and supported by synthesized data sets. These themes are interrelated and reported to scale from individual learner to socio-cultural awareness.

Observation & Surprise

Patterns of observation and surprise during participant-land interaction give insight into the process of learning or discovery. Observation and surprise arise in this study because of repeated visits to the nature park and conversations about the significance of butterflies in Lapwai. As discussed in Chapter 3, student participants were engaged in a community-based inquiry at the nature park, as they were curious about "where all the butterflies went." In classroom learning activities, student participants discussed what they wanted to learn about butterflies. Here are some of the initial ponderings that led to field-based inquiry: "I still wonder why there are no more butterflies, and there are butterflies", "I wonder why the butterflies have disappeared.", "I still wonder about butterflies where they lay their eggs.", "Are there lots of different butterfly eggs around here?" (Email to collaborators, 5/17/2019). Through repeated visits to the park and data collection stations that facilitated patterns of observation, participants discovered butterfly eggs in Lapwai.

In focus groups at the park (5.28), student participants discuss the social-cultural context for wondering about butterflies in Lapwai. The conversation below took place at the nature park entrance, on the second to last field day, where focus groups were one of three data stations (focus group, 5.28.19, 01:56-02:21).

> Facilitator: What I'm trying to ask is just, like, what does it mean to see butterflies in Lapwai? What does... What does Lapwai mean?
>
> Asra: It's Lapwai.
>
> Facilitator: Yeah.
>
> Asra: Uh, so when you see... When you see a butterfly, it's basically, the butterfly is coming back to their land because it's Lapwai's [said in Nimiipuutimpt name], but now it's Lapwai [prounounced in english]
>
> Asra: I see that we don't have no more butterflies.

In this conversational segment, the facilitator asked student participants the reflect meaning of observing a butterfly in Lapwai, where the students live, and the meaning of the place name. The student participants responded and shared knowledge about the interactions between culture and

ecology, as the interaction influences the presence of butterflies in Lapwai (as Lapwai means "Land of the butterflies"). Finally, Asra said how the community has "no more butterflies."

Another student drew a butterfly in a landscape observation (Figure 9). It is uncertain why a butterfly appears in this drawing, as it may not have been ecologically present. However, participants drew butterfly life cycles in the classroom the week before this field day, which indicates a linked process between in-classroom learning and nature park learning.

Figure 8 Landscape Observation from 5.28 field day

Synthesis of the conversational data and drawing demonstrate a dual perception of the fundamental nature of butterfly presence in Lapwai, like the initial question reported at the beginning of this thematic category. The duality indicates a relational ontology as an initial condition of a pedagogy of land, and the positionality of the learner to land and butterflies as a non-human animal. In summary, the culture sets the context for ecological observation to lead to discovery or surprise.

The following conversations took place in a different focus group on the same day. At this point in the study, we had not found any butterfly eggs or observed a butterfly in the park as a group.

Facilitator: 01:25 How do you feel when you see a butterfly in Lapwai?

Blake: 01:26 I feel kinda surprised 'cause people are saying 'cause that, they're getting, um, they're endangered.

Facilitator: 01:34 They're endangered?

Blake: 01:34 Yeah.

Facilitator: 01:35 Yeah.

Rory: 01:35 I'm curious about how butterflies keep people safe in the culture?

Facilitator: 01:45 Okay. So like-

> Rory: 01:45 No, I meant how people ... I meant how they keep, how they keep, um, I meant, I just meant how butterflies make us people [inaudible 00:01:54] the food sources, 'cause usually they make food for us.
>
> Facilitator: 01:57 Oh yeah, so like, what <clarifying question> what do butterflies do in the ecosystem?
>
> Rory: 02:01 Yeah.

Student participants observe their surprise at butterflies in Lapwai because they perceive them as endangered and believe there are lower populations than before (part of the students' story). It seems as if this knowledge comes from an external source, present through memory and recollection. Next, Rory asks about the kinship between butterflies and people, specifically how the butterfly keeps people safe through food production. After this, participants discuss gathering nectar and pollination, where the student participants describe the process, and the facilitator asks questions about the process. The conversation is an information generation activity to continue setting the context for answering the question about the presence of butterflies in Lapwai.

On the final field day in the nature park (5.31), student participants found a total of 115 butterfly eggs in the nature park on the final day of data collection (5/31/2019). The number of eggs found by each group differed by narrative groups: 1 (Group 3) + 80 (Group 2) + 34 (Group 1) according to the participant recorded conversations between students and experts. While finding butterfly eggs does not mean mature butterflies, the participants found butterfly presence in the nature park on milkweed. The act of observation, exploration, and discovery resulted in success in answering some of the initial questions about butterfly eggs- a surprise for all participants.

Danger & Safety

For human people, navigating the landscape means learning about the importance of safety and danger. Student participants are experimenting with balancing potential risks with potential discovery. The process of working together to assess potential risks results engages young peoples' intuition- a necessary part of human survival. Three conversations demonstrate the various ways participants interact with risk: hearing rules from an adult, student-led discussion, and sharing stories.

The first conversational segment represents a conversation pattern where student participants work together to navigate potential danger. The selected moment occurred with a group of students by Lapwai Creek, who encountered a spider on one of the rocks near the creek. Students gathered to investigate the spider and discuss the potential danger presented by the spider (student narrative, 01:38- 01:58):

Kendall: Whoa [Loud exclaim], that's a huge spider!

Tristan: Where?

Kendall: Right there. Kendall

Jesse: Whoa, what the...

Kendall: Go get my cup. I want to catch it.

Jesse: Oh, it's a water spider. That one's venomous, watch out, watch out, that's venomous.

Tristan: Where is it?

Kendall: It's right there.

Tandy : Oh my goodness, that's a big one.

Kendall: Kill it?

Tandy : Guys. Guys, and it-

Jesse: It's a water spider.

Tandy : Guys, guys, don't mess with it, it might bite you.

Jesse: Yeah, venomous.

Kendall: Where is it? Where...where'd it goes

Jesse: It's poisons.

Tristan: Okay, one, two, three, (rock thrown on rock) okay let's move on.

In this passage, we see different reactions to the spider. After Kendall discovers the spider, students decide if they should kill it, catch it, or avoid it. This spider was most likely a non-venomous water spider, as there are only two species of spider venomous to humans in Idaho (the Black Widow and the Hobo Spider). However, students note the potential danger presented, and they work together to figure out how to interact with it. In the end, the students leave the spider alone and continue interacting by the creek. Here is the moment viewed in the conceptual framework: *Observation*, Relation to spider presents a potential danger, "it poisons" "it can bite you."; *Information gathering,* there was not a teacher telling students to stay away from the spider. Conversation to make meaning collaboratively; Reaction *or experimentation*, "kill it, catch it, do not mess with it."

This moment gives insight into the "safety-danger dance," noted by the tribal research partner after listening to this moment:

> …there's an apparent sense of danger, and respect for things like snakes and spiders, you know, and that's where the kids are kind of, like feeling out, like, the difference between, like, dealing with a spider wanting to catch it, but then another kid kind of coming in and say, No, no, leave it alone, you know? Yeah. I think that's where there's, there's, there's a little bit of a dilemma and like, what do you do with those kinds of things, you know, because there's a, there's certainly a result from curiosity, and capturing things and like, seeing how they behave and how they react to different stimuli that kids have to have an interaction with and, I mean, everybody's done it, capture something, scoop it up, let's see how it behaves. See what it does, you know, I think that this kind of thing that, you know, to a certain extent kids are supposed to do that.

The lesson of the spider emerges because of interacting with the biotic and abiotic elements of the nature park, where the creek and rocks and spiders provide context for learning. Here, the spider typifies the balance between safety and danger and the importance of respecting the links between human and non-human beings (see *Nature–culture constructs in science learning: Human/non-human agency and intentionality.* Bang & Marin, 2015).

Learning to navigate the dance between safety and danger is an essential part of growing up, as it helps a young person develop experiences and responsibilities for the potential risks that exist in a landscape (under adult supervision). Note the lack of an adult with teaching authority at this moment. The young people converse to make meaning of the spider as dangerous, even though it may not have been poisonous, without a teacher or grown-up with more extensive experience to explain the spider. Thus, the knowledge that emerges comes from the participants themselves. The research partner described navigating danger as a vital part of being a kid:

> This is this is the dance that goes on. As a parent, you want to protect your kids from danger. But you don't want to keep them from experiencing the very real threat of danger. Because that's where you run into a dilemma of like harboring your kids too much…. And the intuition doesn't develop, unless you're in the presence of, you know, something that can harm you. And so that's what these kids are kind of experimenting with it, kids are much better at that intuitive responding to intuition than adults. Because they, I mean, I can't explain it, they just know. Like, you know, not knowing not wanting to mess with a spider. And I think that, in general, kids need to just do more of that, you know?

Navigating potential danger is a necessary process for young people. Relating to the land requires us to understand what may harm or help us. Respect for potential risks is developed by not being protected from certain dangers- the bond develops from interacting directly with an unknown entity. Figuring out on one's own (under adult guidance) can be linked to an aptness with earth processes. The experiences engage participants' intuition and sensitive and personal connection with complex, dynamic earth processes to understand the interaction.

Developing intuition is a necessary process for survival, and it also allows adults to "trust" how a young person interacts with and relates to the land. Interactions in natural areas improved the young people's autonomy by developing an intuitive understanding of how to be in kinship with the land, in the current moment and the future. One conversation from a focus group shows how student participants share landscape knowledge with the facilitator. This conversation (5.28) takes place next to Lapwai Creek and is the first time the participants visit the creek as a group during the field days (Focus Group, 2:33-02:52):

Kendall: Have you swam in this water?

Facilitator : I haven't swam in it [Lapwai creek] yet.

Kaylor : I have.

Facilitator : Yeah?

Kaylor : Yep.

Facilitator : That's cool.

Kaylor : Yeah. But sometimes you have to be careful because this one time, um, this guy, he cut his foot...

Facilitator : He cut his foot in the water?

Kendall: Yeah. And then he [inaudible 00:02:52] and then he died. I'm just kidding, no.

While at the creek, a student participant (Kendall) asks if the adult facilitator has swum in Lapwai creek. A second participant voluntarily shares two types of information relating to human-creek interaction. First, Kaylor shares their own experience of swimming in the creek. Then, Kaylor cautions the facilitator, telling a story about a person who swam there and was injured. Kendall, who asked the question, interjects with an exaggerated ending to the story, "and then he died." While the man in the story did not die from the foot injury, participants shared the narrative to convey the

importance of navigating danger on the landscape. The student participants shared understandings of people-creek interaction, and potential, with an adult who had not visited the creek before. Thus, learning to navigate safety and danger on the land is not directional, as in, it does not always come from the adult telling the children how to interact safely. The knowledge is imbued by the location of being next to the creek.

In summary, intuition is the first step to encouraging young people to understand their relationships with the environment. Participants worked together to interpret potential dangers in the nature park and collaborate on risk assessment. The risk assessment process is built through generational or conversational sharing of experience and associates personal understandings of potential risks, . All participants, students, and adult facilitators, engaged in the "safety-danger dance" (JP, Aug 2021), which is necessary for survival and the practice of intuition, with the natural world.

Authority-Autonomy & Agency

Young people assess autonomy of action and permissibility of behavior in a specific place through observation of adults and direct sensory-motor interaction with the landscape. This process gives young people an understanding of how to behave in a particular place, which results in personal agency in a place/landscape

A conversation about rules took place in a focus group conversation (5.28) before walking from the park entry to Lapwai Creek. The facilitator records the conversation on the phone to ask questions about butterflies in Lapwai. However, the facilitator is also attempting to set expectations about four student participants will behave by the creek, as the group had not yet visited the creek together (02:45 – 03:03):

Jesse :	Can we touch the water, that's it?
Blake:	Wait a second, teacher <to Facilitator>.
Max:	Yeah, can we touch the water?
Facilitator :	You can put your hands in the water, and that's it.
Blake:	Can I put my feet in?
Facilitator :	Not on my watch.
Jesse :	Can I put my whole body in there?
Aiden:	Can we put our feet in?

Facilitator : Not on my watch.

Max: Put my head in?

Jesse : Swim like a mermaid?

Facilitator : No. I said that we can go down to the crick and check it out.

Aiden: Can we put our head in?

Facilitator : You can only put your hand in the water.

Here, the facilitator sets behavioral expectations for student participants at the creek to avoid walking back to the school with wet socks and shoes. Student participants test the adult's rules, evaluating what is allowable under the adult facilitator's supervision. Student participants stayed dry throughout the study.

The next conversational segment differs from the rules about swimming, as it emerges from student-led recordings. The facilitator did not tell students how to behave by the creek but supervised them to avoid injury. The agency-building pattern of interaction starts with observing what older people are doing in that place, experimenting with their actions, and eventually leads to young people developing authority on how to behave in a space. In this (5.31) narrative, a participant (Rory) recorded their experience while standing next to the creek. Rory talked about how their dad and grandfather had been there before. Researcher-facilitator starts skipping rocks in the background, and another participant (Tanner) also talked about their dad and how the second participants father also skips rocks:

Rory: [Narrating] So, we are over by the creek….Uh so, so up by the creek. My dad used to swim. It was back in the, uh, 90s. My dad wasn't back in the 90s but-... like up above like ... more like pa-ash-a[inaudible 00:05:49]- right here. Like right here. Like right in this spot where I'm standing at, was right here where my dad was

Facilitator: [background speaker] Hey check this out (skips rocks on water)

Tanner: [background speaker]....my dad can skip rocks...

Rory : last time a-[inaudible 00:06:04]. um, how my, how my grandpa died here. This how my grandpa died here.

Tanner : [background speaker]... my dad can do that (skip rocks) ...

Rory : He < participant's grandfather> died, he died long time ago.

This conversational segment began with a student participant (Rory) narrating their experience and recognizing the creek as a place where their family had been before. In the background, the adult facilitator skips rocks into the water. At 05:49, Rory uses an inaudible word. Another participant (Tanner) joins the conversation, relating how his father also skips rocks on the water. As the two participants recall memories of their fathers, they observe another adult interacting with the creek by skipping rocks on the water.

The presence of adults in this segment is both in the immediate moment (facilitator skipping rocks) and b) participant's memory (narrative) indicate how young people look to older people to learn behavior. The information shared in conversation regards how adults in their lives interact with the creek, noting that some adults skip rocks in the water. Observing adult behavior results in a young person understanding the political structures that govern behavior in this place. In short, the moment provides insight into an autonomous pattern of observation, union, sensory-motor interaction, and experimentation with authority and governance of the creek.

In other words, both conversational segments about the creek show how young people watch adults interact with the world to assess the acceptability of certain behaviors. Conversations weave narratives that relate previous interactions with land via memory and family history. In addition to relating place to experiences with family, there is a discussion of throwing rocks into the water. Pinkham (tribal research partner) reflects on the complex interactions of relating through physical/sensory processes of throwing rocks and cultural/temporal processes or remembering family history:

> But it seemed like one of them brought up their father swimming and being in the water there. So at some point, I mean, there's just a slight reflection for one of the kids and then mentioned, one of the kids mentioned their grandfather dying, like, a long time ago, or something along that line. ….Because there's a there's a structure that we call culture that kids are brought up in. And many of them aren't aware of how complex that structure is. And that's kind of what life experience is about, as you know, testing where that structure is, and seeing what they can do. It's not necessarily what they can get away with. But that might depend more upon the personality of the kid. But, kind of like getting out there and doing things and seeing how adults react to it. Because then they're starting to learn about how that structure kind of governs their behavior. And other adults might get after and kid about throwing rocks in the water. And other adults might join in, you know, skip rocks or something, you know, I mean, it kind of depends on the adult. And so that's how they have to figure out the world is like by gauging one adult against another. One adult might be a parent

wouldn't be a teacher, and they react differently. What do you do? You know, that's kind of the process of life, right? – JP 7.23

The complex process of relating to land reflects the development of authority in these young people by testing the "structure which governs their behavior" in the nature park near the creek. The "structure which governs their behavior" is the social-cultural processes that determine the allowable activities on the land. The sensory interaction of throwing rocks also stimulates a temporal interaction with the landscape, with memories of how adults have interacted in that physical space before. Through conversation, young people identify previous behaviors and culture of being on that aspect of the landscape, next to the creek. This learning process facilitates experimentation with cultural boundaries to determine the proper way to "govern" behavior in that natural area. Finally, student participants engaged their agency in a system by autonomously throwing rocks.

The development of agency and authority in the nature park is evident in one of the landscape drawings. A student participant drew a part of the park on the final day in Lapwai Nature Park (5.31). These drawings were done on paper with a prompt and reflection question: "*Please find a part of the Lapwai Nature Park Landscape that interests or intrigues you. Observe and draw a picture of it below. Why did you draw this?"* Figure 10 is a scan of one student's drawing of the Spring Creek Interpretative sign, which stood in the parking lot of the nature park. An interpretation of the student's meaning-making process accompanies the picture below:

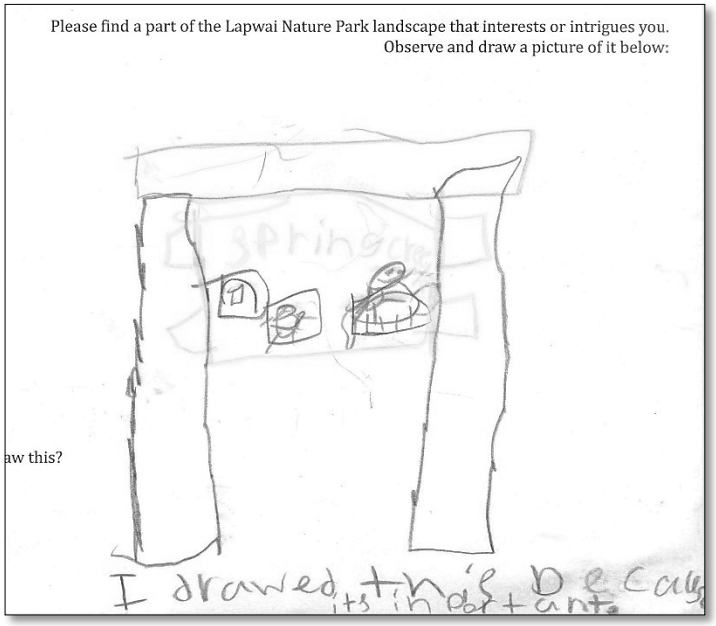

Figure 9: Landscape Drawing 5.31

Drawn observation: Signage at park entry with student participants, pictured below (May 2019).

Information shared: Sign as part of the landscape—structure, and composition of information on signage.

Response: Student participants drew the sign (5.31) and responded to the prompt about why they drew it. The student participant wrote (see Figure above), "I drawed this (Spring Creek Signage) because it is important."

At first, this appeared to be an arbitrary structure in the park. Upon further analysis, I read the words "*spring cre…*" written on the sign and realized that the student had drawn part of the landscape outside the park entrance. There is something about this sign, or Spring Creek, that this participant appreciates, "because it's important." All our time spent exploring the park was along Lapwai Creek, so this drawing brought my attention to the importance of Spring Creek as a *place* of significance. The participant had the autonomy to express the importance of this place and conveyed a personal authority about what it means to be in the Lapwai Nature Park. A young person demonstrated their understanding of the park, perhaps because of their socio-cultural ties to the landscape as a place. The drawing is more than just a physical observation; it observes enmeshed complex socio-ecological dynamics and an awareness of the learner as an agent in a holistic system. Thus, the relational pedagogy approach encourages agency development and sustains a personal and familial tie with Spring Creek.

Social-Cultural Dynamics

Young people were able to approach the learning activities as individuals and as members of a social group. The process of relating to land as a member of a social group and culture strengthens the resilience of cultural values

In this first segment, three participants walked a trail in the nature park area, moving away from the creek to the west and towards another area. Again, they are being playful and intentionally heading towards a known "picnic" area. The location seems to remind one participant of a pow-wow. The participants discuss how long it takes for them to get to the spot and suggest running to get there quicker (Group 3 Narrative, 3:47-4:17):

> Blake: We are just messing around (laughter).
>
> Sam: And I am rememb-[inaudible 00:03:50] at the Q[k]inta powwow. Okay. And we are going to like a picnic spot type thing.
>
> Blake: spot... (said in unison with Sam).
>
> Sam: and we're on our way there....

Max : How far is it?

Sam: this one <referring to picnic spot>

(4:09-4:12, Background walking sounds, bird song)

Max : (complaining) how much farther [inaudible 00:04:12]

Sam: Do you wanna run and get there faster?

Max: Yeah, yeah. (running)

The participants walk towards a picnic spot, leading the group there. The facilitator is in the group's back to make sure the group stays together. Sam mentions a memory of a pow-wow, which may or may not have happened in that spot. Regardless, sharing information about the pow-wow in the narrative indicates a personal level of comfort in the learning activity, where the process of relating to the land happens in a cultural context. Blake is also aware of this picnic spot, as Blake says "spot" simultaneously as Sam. Another participant, Max, responds to the information by asking how long they need to walk to get there. Sam suggests running as a way to speed up the time. Max agrees, and the participants begin running, which is present in the audio recording.

The conversational segment demonstrates participants' process of relating to the nature park as a place of cultural significance. In another recording, students are singing a "native song"- not a Nez Perce song but an Indigenous song (JP, collaborator interview, 2021). Both the mention of the pow-wow and singing of a native song demonstrate cultural comfort during the exercise at the nature park. The tribal research partner provided insight into the cultural layer, describing the significance of a "social atmosphere:

> "Okay, native kids…Well, the adults do this too. But they, they adjust the intent of what they say, according to their social atmosphere. And when they talk about things like pow-wows, that's one indicator. I don't know if that's worth calling out. But I think that's a little bit of a comfort thing. Because like in a mixed group of like, non-natives, that I tend not to talk about pow-wows, just simply because it takes a bit of more establishment of context in order for people to understand that. And it's certainly not, you know, an intelligence thing for kids. It's just, you know, like, they're not, they're not assuming Well, they won't understand what a pow-wow is. They're just like, not talking about it, because they feel other things that are relatable, or most of more socially, not acceptable or appropriate, more. understandable, I guess. (JP, collaborator interview, 2021)

The process of relating to the experience through a cultural lens shows a cohesion between the learning environment (land-centered, based in a nature park) and the individual identities of student participants. As a result, student participants approached the land as holistic individuals in a Western education setting and members of Native culture. JP best summarizes the link between land learning and cultural processes, "*I think, when they get out there and engage with the world, they're figuring out who they are, because that's a part of them."* In addition, student participants experienced the park as individual learners in a system and as members of a more extensive social network. Thus, a social-cultural interaction pattern emerged from nature parks as a teaching landscape.

Socio-cultural dynamics are also present in landscape drawings. Many of the drawn observations noted structures and other evidence of human activity. For example, one student participant included contemporary communication technology (cell phone) as part of the landscape (see Figure 11). There were no written prompts on the paper, so participants drew whatever part of the park they desired. The participants' process of interaction is interpreted next to the picture, paying attention to the importance of connecting human and non-human landscape elements:

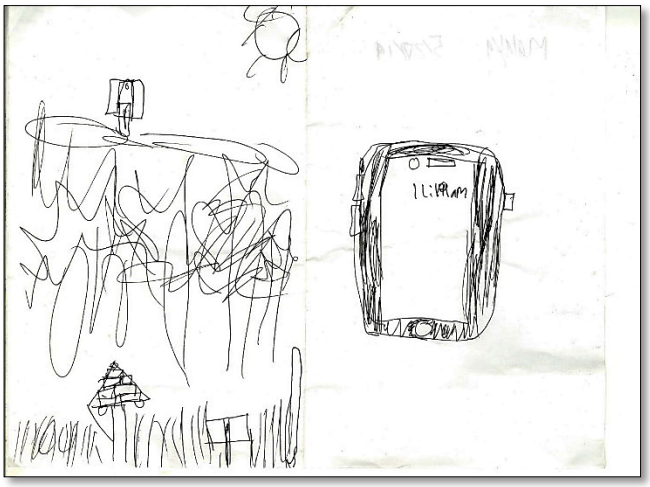

Figure 10 Two Landscape Drawings 5.28, landscape (left) and cellphone (right)

Drawn Observation: The figure below shows two different drawings, one with the landscape on the left, and one with a drawn cell phone

Information shared: Cell phone displaying time of day, details of cell phone include speaker & camera

Response: No written response, however, the choice of drawing a cell phone indicates it is an object of significance to the participant

The two drawings demonstrate the dual perspectives in how young people relate to the nature park. On one side, the natural area is drawn with human structures, plants, and even the sun in the top right corner. On the right side, a student drew a cell phone as they observed it. The drawings differ in visible perspective while representing the inter-relatedness of social-ecological dynamics as seen by student participants.

Consider the social-cultural interpretation of the young person, including a cell phone as part of a landscape. A cell phone is comprised of global materials (physical composition) and allows one

to communicate vast distances at the touch of a button (social technology). Essentially, a cell phone is "globally social" and a relatively new thing, given the advances in technology since the 1980s. Nevertheless, this generation of young people is growing up when cell phones, the internet, and computers are an inherent part of reality. The participant related something as globally social as a cell phone to a nature park in rural Idaho. The process of interaction with the cell phone in the park is significant to the student, as the cell phone represents a tool for interacting with vast social networks via communication. Thus, technology is inherently part of the land-learning process.

Finally, student participants situated social-cultural dynamics to interpret the combined dynamic forces of people and pollinators. The following conversational segment occurred during a focus group (5.28) in the nature park, where the group talked in the parking lot. The facilitator prompted the conversation by asking if students had other questions about butterflies to revisit the students' topic of inquiry. One participant (Rory) asks directly about the link between people and butterflies, and a complex conversation follows. Note the facilitators' style or pedagogical technique that does not answer questions to encourage participants to engage in discussion (Focus Group, 03:04- 03:38):

Rory : I'm curious how people, how are people endangering butterflies?

Facilitator : So how are people endangering butterflies?

Blake: I know, I know, I know.

Facilitator : What?

Blake: Um, they're, um, like, invading the milkweed-

Jesse: Did you hear that?

Blake: <said with other student> 'cause butterflies mostly eat milkweed. And, um, they're growing other plants and they're invading the space of the milk ...

Facilitator : Yeah.

Jesse: Well, I'm not that smart.

Rory: You just see that woodpecker? It went ...

Jesse: [inaudible 00:03:30] kid. <to Blake> Go back to fifth grade.

Facilitator : Uh, okay.

Blake: I'm- I'm in fourth <response to Jesse>

Facilitator : So <continuing conversation about butterflies....

Jesse: <to Blake> You were in fifth.

Rory shares a narrative about people endangering butterflies and questions the human factors and processes that impact butterfly populations. The participant embeds an observation about the influence of human behavior on butterfly (more-than-human) wellbeing. The question focuses on the enmeshment of people and butterflies in general. Blake and another student share information, as per their understanding of the loss of butterfly habitat. Another student (Jesse) is listening to the conversation and interjects an opinion- but Jesse's opinion is not about human-butterfly dynamics. Jesse tells Blake to "go back to fifth grade," presenting a challenge to Blake's answer and spurring a confrontation between fourth graders. Blake's quick response about milkweed and habitat loss is a valid answer to Rory's question, social-ecologically speaking. Jesse felt the need to challenge Blake on the merit of personal validity. The intricate, peer-to-peer political world of 4th graders is outside the scope of this dissertation. However, this conversational segment includes the last interaction to demonstrate the diverse ways participants observe, interact, and understand social-ecological links..

In summary, student participants interacted with the landscape as individual members of a social group/culture (pow-wow example), as a young person with access to global technology and communication (cell phone example), and demonstrated their ability to recognize connectivity between people and nature (endangered butterflies). Participants shared knowledge through conversation and collaboration, situated in social-cultural realities. Their experience of the nature park includes their social-cultural experiences outside of the park, and thus the land-learning reiterates the young people's perception of their role as members of a social group.

Discussion

Overall, participants intuitively describe processes of bonding with nature through collaborative conversations. These narratives demonstrate how the study engaged participants in sensory ways of challenging previous assumptions about butterflies, developing intuition, practicing autonomy, and deepening their bond with the nature park. The results show how relational pedagogy can create spaces for young people to practice intuition or psychological closeness to nature (Unsworth et al., 2012: p. 17-18). Developing intuition on the land is necessary for survival (JP, collaborator interview, 2021

Participants went through an intuitive, collaborative process to understand how safety and danger entwine. In the end, the group decided not to engage with the other being in this way, also demonstrating respect for more-than-human beings. Over time, similar interactions aid the young

person in developing a familiarity with complexity, uncertainty, and dynamic patterns in a landscape system. The development of intuition (or psychological closeness with nature) works intergenerationally to build trust in the child's ability to survive on the landscape while fostering the child's autonomy over a personal connection with the natural world (JP, personal interview, 2019). If intuition develops during a young person's childhood, the study showed how intuition helps develop personal agency through sensory learning and potential risk. Instead of typifying interactions and events as "good" or "bad" in the area, students were able to flex their intuition (under adult supervision) to navigate the complex dynamics of the natural area. Thus, the exercise served the purpose of seeing what happens when participants navigated the landscape as a whole system- where the observer is an active part of the landscape.

Autonomy and agency emerge in the process of observing and assessing authority structures with behaviors ('how to be") at the creek in the nature park. Assessing authority structures is directly influenced by a relational ontology of place and time, where memories of past observed human behavior influenced the participants' information gathering and sensory-motor activities. Many students had been to the creek before in the *Throwing Rocks* moment or had family stories of being near the creek. The discussion of skipping rocks and family comes up in experimentation with governance structures- indicating a test of how to act in a specific place (JP, collaborator interview, 2021).

Relational pedagogy can facilitate agency development, primarily due to adults present in these learning environments. Young people observe how different adults act and begin to experiment with their actions in a place. In a land relational learning setting, children also have the agency to make their own decisions and learn from the consequences- good or bad. Thus, there is no adult teaching, just patterns of behaviors that are observable. At that point, it is up to the learner to interpret and come to conclusions. Zinga & Styres reflect on the agency building process in land pedagogy:

> One of the challenges in sharing our journey is that we cannot tell you how to journey yourself or what lessons you should draw from the process… you must choose how you will engage with what emerges (2011: 78)

Zinga & Styres identify how a land pedagogy results in open, diverse, and emergent knowledge. Learners engage with the emergent knowledge by their intuition, or psychological closeness, with the land and thereby empower agency. It is interesting to compare the process of land education with storytelling, where the story (land) exists in itself to interact personally with the listener (learner).

In neuropsychology, the feeling of agency improves one's intuitive understanding of being an actor in a system (Weiss et al., 2014: 82). A person can experience a sense of agency because of controlled cognition over sensory-motor function or action. After observing what older people are doing in a specific place or land, young people engage in sensory-motor functions similar to what they observe. For example, remembering your parent skips rocks may encourage you to skip rocks, which increases the feeling of personal agency and autonomy with a place.

The pattern of autonomy-agency in the *Rocks* example shows a process of relating to the creek (place) through recalling observed adult behavior and indicates a social structure of what is allowable in the space. The physical activity of throwing a rock increases the feeling of agency, and the observed result contributes to the initial understanding of complex system dynamics. Imagine if a young person has experienced skipping rocks at a location near a creek and then were told to stop by an authority figure, the autonomy of the rock-skipper would be challenged by an externally imposed power structure of "authority" rather than empowered by the internally driven process of sensory-motor function. Perhaps there is a reason why, but the young person would need to judge if the reason made sense to their orientation with the creek and the rocks. To finish making this point- if the young person asks, *"why can't I throw rocks"* then the answer *"... because I told you so"* would likely fail as a valid explanation, especially if other adults support the young person's agency to throw rocks in a creek.

Land relational pedagogy develops young people's sense of agency and autonomy as they explore a landscape. Agency, power, and authority over the land tie to CAS science, as seen in the article *Politics of complexity: Conceptualizing agency, power, and powering in the transitional dynamics of complex adaptive systems* (Kok et al., 2021). The "relational power of nature" is a crucial argument in the 2021 article, demonstrating how agency and authority are forces within CAS dynamics. This pedagogy develops agency, whereas the learner is directly engaging with a system while developing authority (responsibility) for a given CAS. Thus, patterns of interaction that allow young people to relate and engage with a landscape physically theoretically increase a CAS ability to transform and adapt in times of system transformation, whereas agency is a "force-field" in power dynamics that interact with other types of power (p. 6)

The development of authority and responsibility in CAS land systems is valuable as social-political and cultural processes. This experimentation with governance and authority also helps maintain responsibility for a place- as the younger people grow up, they learn the values of the elders through observation and practice. The learning processes teach complex dynamics while maintaining social values and governance over time. The development of intuition, responsibility, and

understating acceptable behavior develop the reciprocal cultural processes of land governance. Cultural processes in this study are unique to the Nez Perce people that live and steward the land. The tribal research partner reflected on this process from a Nez Perce worldview:

> If you think of it in terms of like Nez Perce people, we have a structure called culture that, you know, is ancient, very ancient structure, that is a composite of a bunch of different values held in unison by all the adherence to that culture. And … each one of them is constantly under threat for modification. And internally, what those individuals are responsible for is, how do we govern that value hierarchy, so that we can pass that on to the next generation. So one pathway is like gender, sex, takes care of genes, all that tend to do bye, bye, bye, that kind of thing. But on the other side of it, the more complex, yeah, I guess I would consider that more complex is how does an individual a family and a people govern the manipulation of that value hierarchy, and they're going to test it from within. So you see that structure is both tested from outside by stimuli, like Internet, computers, cell phones, you know, cars, I mean, all kinds of stuff is basically like, testing that system, externally. But internally, it's tested by individuals that see the outside stuff, and they try to bring it in and modify it in some way. And that's, that's a much more fascinating thing to me, because I'm a part of an in group that that is responsible for, like, not only being aware of what that value structure is, but how people intentionally and unintentionally modify it.
>
> And so these kids are like, they're coming into that, and they have no idea, no idea. But they're out there doing it. And so to bring this back full circle, I think, when they get out there and engage with the world, they're figuring out who they are, because that's a part of them (JP, collaborator interview, 2021)

The tribal collaborator points out how cultural learning processes maintain the Nez Perce culture. He also confirms how the land relational pedagogy we facilitated allowed student participants to approach learning about complexity within a landscape (*Spider*) in the complexity of their cultural context (*Pow-wow)*. Thus, the outcomes for learning about the complexity of culture and land are concomitant.

Limitations & Implications

Of most importance is to note that the cultural processes and structures of the Nez Perce people are unique and specific to place. Learning about land-culture interdependence is an emergent process, conditional on the social-cultural contexts of a mutual group of people in a time and place. The insights from this study are not generalizable to other situations. The discussion and insight in this chapter answer initial questions about 'what happens in a relational pedagogy of land with 4th graders in rural Idaho'. My perspective limits interpretation and discussion results as an outsider of the community and an anti-colonial scholar. A thick layer of description adds detail and (hopefully) satisfies the need for "verisimilitude," or authenticity, in interpretation. Participants and collaborators will review the findings and interpretation presented in this chapter to provide feedback, verify the interpretation to find false assumptions and personal biases, and suggest further analysis if needed (Preiser et al., 2021: 297)

The implications of this work apply to the discussion of developing pedagogy for CAS dynamics (chapter 5). The study also indicates the ability of relational pedagogy to address the most complex environmental problem we face as a globe: climate change (Lehtonen et al., 2018). Finally, a practical application of this work addresses the need for innovative approaches to environmental education and diverse scientific epistemologies in science education, as described in Bang and Medin's 2010 article *Cultural processes in science education: Supporting the navigation of multiple epistemologies.* (2010). Bang and Medin challenge the assumption that science is "acultural," given that science and learning are cultural processes situated in place contexts.

Per the discussion of emergent cultural processes during the Lapwai land relational pedagogy, a practitioner or researcher can design learning environments flexible with multiple epistemologies, not centered on Eurocentric ontologies. We urge practitioners and researchers to engage with communities to invite adults to participate in learning activities in similar studies. Young people observe how adults act concerning the earth, and so the presence of adults with desired cultural values or knowledge will aid in the cultural process of land learning.

The final implication of this work is to bring attention to the scholarship and practice of land relational pedagogy in environmental education and CAS science. In 2020 and 2021, systems scholars at the Resilience Alliance (Canada), Stockholm Resilience Center (Sweden), and the University of Stellenbosch (South Africa) recognized the need for relational approaches in CAS research methodologies. Thus, this study is a community-based example of how pedagogy can be viewed from a CAS perspective. More importantly, it engages with the work of Ingenious scholars and peoples to

amplify their leadership in the development of alternate epistemologies, ontologies, and understanding of complex social-ecological system dynamics.

Conclusion

The research presented demonstrates how relational pedagogy allowed young people to experiment with knowledge development via practiced intuition, autonomy-agency, and participating in learning activities that structure their culture. Conversation analysis and thick description provide insight into how patterns of participant-landscape interaction are both sensory and temporal and facilitate learning about social-ecological processes. The four conversational segments presented in the Results section demonstrate how relational processes occurred as part of the Lapwai land pedagogy. Findings from this chapter can inform discussion on the role of relational learning in CAS dynamics, climate adaptation, and complexity. The chapter also works as an example or case study of facilitating a relational pedagogy in partnership with communities and the importance of anti-colonial methods in environmental education.

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Chapter 5: Conclusion

This chapter concludes the work presented in the entirety of this dissertation. The work in the dissertation addressed the overall research questions (see p. 2-3) to understand how environmental education can facilitate learning as a process within CAS. Through the design and implementation of a community-based research project, we explored a relational pedagogy of land. Land, in this sense, means the bio-geo-physical features that humans are inherently a part of, socially and ecologically. Through designing and implementing a land-relational pedagogy, we found learning is a concomitant, or naturally accompanying, dynamic between the environment and learner that can build the adaptive capacity of a CAS. Land as pedagogy increases learners' capacity to understand complexity, non-linear system dynamics, and resilience as properties of CAS while developing intuition, agency, and autonomy in complex social-ecological systems.

This chapter also takes the opportunity to connect the work I have accomplished to the broader SES Research Methods discussion, amplify the previous work of Indigenous Scholars in land education and relational pedagogy, and present a novel case of EE as a process in SES science. I conclude with the potential for new science and collaboration to emerge by continuing the engagement of relational worldviews in natural resource management. Relational worldviews are useful in understanding complex adaptive systems as interconnected, and thus we conclude that EE ought to develop relational pedagogies of land and support Land Education (Lees et al., 2021) to guide the development of 21st-century science and land stewardship practices. In addition, the work addresses contemporary climate science, given the complex social-ecological challenges that emerge from the rapid climatic change in the early 21st century. Finally, this dissertation presents a logic model, or theory of change, for developing relational pedagogy and collaborative instructional design.

Overview

The philosophical chapter (Chapter 1) synthesized natural resource management as a CAS and environmental education, outlining the need for relational approaches to improve the adaptability of SES. The methodology chapter (Chapters 2) presents a Critical Indigenous Research Methodology approach to engage relational pedagogy education research and SES research. Finally, Chapters 3 and 4 reports two parts of the study, where Study A of this dissertation (Chapter 3) provides the community-based approach to curriculum design and a student-led participatory learning process. Chapter 4 (Study B) begins with a conceptual framework for how relational pedagogy fosters knowledge about CAS dynamics through land education. The findings demonstrate how relational

pedagogy can be engaged in EE to facilitate learning that accompanies principles of complex social-ecological systems. Namely, the collection action of land relational pedagogy creates conditions for learning about surprise, autonomy, and role in complex system dynamics.

Next, the methodology and results are summarized and contextualized in contemporary academic and social conversations.

Methodology (Chapter 2)

Chapter 2 demonstrates appropriate methods to engage relational ontology in the 2021 SES Research Methodology, while simultaneously developing a community-based pedagogy design. A robust SES research methodology did not exist until the end of my dissertation. However, the work I have accomplished during my studies fits quite well within the framework. In July 2021, a group of international SES scholars published *The Routledge Handbook of Research Methods for Social-Ecological Systems* to inform the future of SES Research. In the words of the editors (Drs. Reinette Biggs, Alta de Vos, Rika Preiser, Hayley Clements, Kristine Maciejeski, and Schluter), the text is:

> The first book to provide a guide and introduction specifically focused on methods for studying SES, and this book will be of great interest to students and scholars of sustainability science, environmental management, global environmental change studies, and environmental governance (i)

This book provides an overview of how to learn about SES complexity, what questions to ask, and what techniques are most appropriate.

In this book, the term *relational* appears 27 times, as well as a citation of Kovach's 2010 paper "Conversational method in Indigenous Research". This validates my use of conversational data within a social-ecological systems framework. More importantly, it provides support for the choice to use Indigenous Scholarship and relational ontology in a complex SES research framework (see Case Study 7.1, p: 114). Methods for researching the conditions for SES resilience are present, but there is no mention or discussion of the EE-SES resilience case brought forward by Krasny and others (Krasny et al. 2010; 2020). The authors make the case for the alignment of complex adaptive systems theory with relational worldviews and use of Indigenous methodology. The lack of a robust discussion of EE as a process within CAS presents a timely opportunity to discuss the broader implications of my dissertation work.

The choices in design, selection of research methods, and qualitative analysis found in Chapter 2 of this dissertation are validated in Chapters 7-9 and Chapter 19 of the Biggs et al. research

handbook. This SES research framework provides context for how EE can work within a complex adaptive systems framework. With this perspective, applying a relational worldview in SES via land education provides significant insight into a) SES components and linkages, and b) assessing power relations, specifically links and power relations in environmental education. Each method is presented with a 'summary table' to situate the method in a broader complex SES context, as seen in the book (Biggs et al., 2021: p. 72). The 2021 handbook situates our discussion with an explicit focus on relational world views, land-education pedagogy, and CIRM in SES discourse. Future researchers can examine the robustness of this claim by engaging with a similar research methodology.

Research (Chapter 3 & 4)

The research questions for Study A (Chapter 3) asked: how and in what ways does a community-based relational pedagogy (i.e., Land education pedagogy) facilitate learning about people-nature relationships with 4th-grade students at Lapwai Elementary School? The results presented in this chapter come from analysis of the curriculum design process itself (as opposed to the results of student participation in the curriculum, which are presented in the following chapter). The teacher-researcher alignment and collaboration were essential to the design. Additional supports for the curriculum design process included time spent building relationships with community members prior to the project, and specific attention to the transfer of learning type from the indoor classroom to the outdoor field site. In future co-design approaches, the topic of inquiry can be predetermined to increase community participants and experts; alternatively, more time might be taken in between the student choice of inquiry and the field study, to allow for arranging more community participant and expert participation.

The research questions for Study B (Chapter 4) asked: what patterns of interaction give insight into participants' experiences relating to the land? How do relational perspectives emerge in participant experiences? By focusing on conversation, some patterns emerged through a relational process of land-centered learning. Significant findings from Chapter 4 directly relate to the CAS characteristics: a) observation and surprise, b) danger and safety, c) authority and autonomy, and d) social-cultural dynamics of land. Each finding demonstrates how land education pedagogy facilitates relational thinking in environmental education while actively supporting the development of intuition in young people. Recommendations from this work apply to the design of learning experiences framed through land relational pedagogy. Like many authors before us who have engaged in community-based and land-based learning, practitioners and researchers ought to engage adults in land relational learning activities because they provide social-cultural contexts to the learning process.

Some limitations to this research resulted from my role as researcher-facilitator-learner of settler descent and an outsider to the community of Lapwai. As with most research traditions, my own subjectivity meant that I interpreted the participant's cultural traditions and understanding of land through my own eyes. I attempted to mitigate this limitation by engaging in collaborative analysis with a research partner who is embedded in the community. The results of this study are particular to the context in which the study took place (Simpson, 2014; Zinga & Styres, 2011; Bowers, 2008).

Context/Application: Instructional Design for Climate Change Education

Chapter 4 of this dissertation indicates the ability of relational pedagogy to address the most complex environmental problem we face as a globe: climate change (Lehtonen et al., 2018). The Intergovernmental Panel on Climate Change (IPCC) establishes the strong relationship between human behavior, social dynamics, and climate change drivers. Therefore, human behavior, culture, and technology development are all critical components of climate mitigation, according to the upcoming report, "AR6 Climate Change 2022: Mitigation of Climate Change" (IPCC Working Group 3, 2021). Of most concern is "Unique and Threatened Systems," which are often areas of high biodiversity and cultural uniqueness.

Teachers, researchers, and adults ought to conceptualize and teach the complexity of future threats to these unique human-nature systems in a gentle way, in order to build adaptive capacity for future generations to remain flexible in face of uncertainty. As demonstrated in this dissertation, relational ontology and pedagogy influence how young people learn about relationships with the earth- helping develop intuition, agency, and autonomy relevant to being in a land and/or place (Chapter 4). Chapter 3 gives an overview of a curriculum co-creation process that may transfer to the use of instruction as an adaptation strategy.

Given the complexity of a topic like climate change, many learners can become overwhelmed with new information. Instructional design is an intentional process that works to reduce the cognitive pressure of learning new information and skills. The practice is based on cognitive science, and the theory of design is described in Sweller's 1988 article, *Cognitive Load During Problem Solving, Effects of Learning*. Problem-solving skills are directly related to experience level with various tasks. Thus, the more time one engages with a task, the easier it becomes. So, the landscape as a learning environment focuses on teaching complex system dynamics is also an ideal place to develop problem solving skills in natural resource management.

Climate change is a complex and "wicked" environmental problem. I suggest that climate pedagogy can benefit from an instructional design approach, informed by community-based research

design, relational ontology, and land relational learning. A pedagogy of climate that engages with diverse environments and complex tasks can influence human behavior. The need for climate education pedagogy addresses the United Nation's Sustainable Development Goals (SDGs). Development and application of relational ontology and pedagogy are not limited to Goal 4 (education) and can address many SDGs. While this is a global framework, it demonstrates how the instructional design of relational learning environments can address global social-environmental issues.

Rather than viewing education as an outcome of studying complexity, our field views education as an embedded process in a social-ecological system (Krasny et al., 2010). The learning in EE is observable and has substantial implications for environmental behavior and collective action. Krasny calls this model a "theory of change" (2020). Krasny outlines a theory of change for EE and looks at the ability of pedagogy to improve environmental health and foster social-ecological system resilience (Krasny 2020; Krasny et al., 2010: 666). Krasny suggests that other educators should be explicit about their theories of change and has suggested a framework for developing and communicating a TOC framework (see Figure 11):

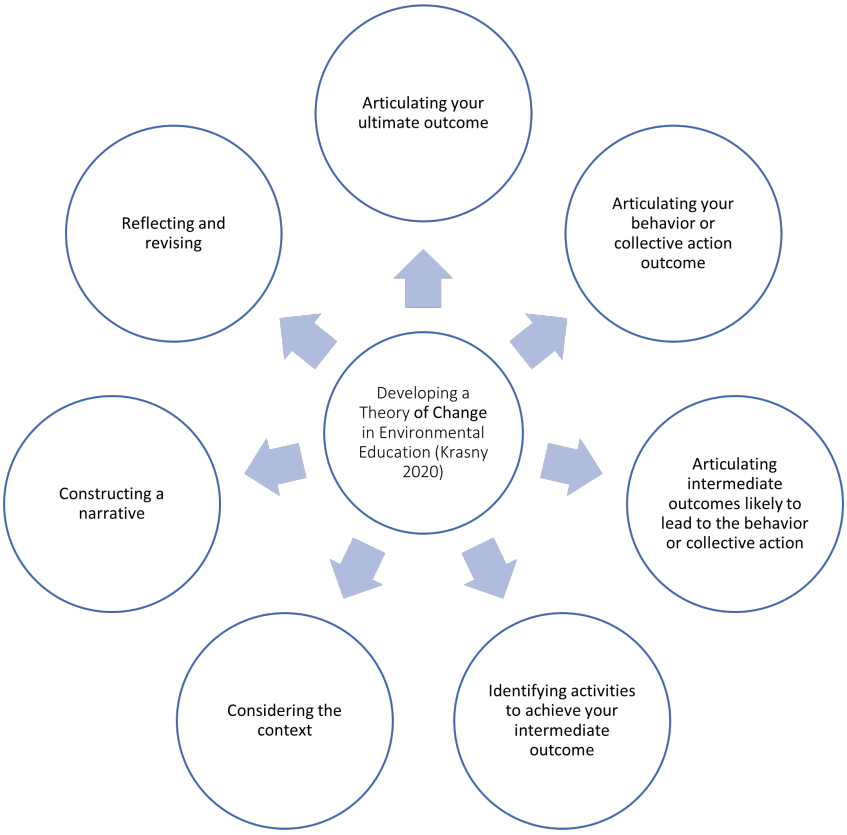

Figure 11: Representation of Krasny's approach for developing a TOC in Environmental Education for SES Resilience (2020)

Using the figure above, the following sections outlines a TOC logic model about how land education pedagogy can support the outcomes one would like to see from an educational process that helps people to live and manage complex adaptive systems that are resilient in the face of a changing climate.

Theory of Change: Relational pedagogy of Land/land in Complex Adaptive Systems

This TOC can be used in EE to foster relationships between people and the environment through exploration, observation, and reflection. As a logic model, the TOC for land relational pedagogy demonstrates conditions, both external and internal, in which learning about complexity and human-environmental relationships emerge. Each aspect of the model is listed below, with detail:

The ultimate outcome: relational building between people and Land/land

The outcome of this theory of change is simple: "to be holistically in balance with the land." (Styres, 2011: 722). The outcome that we'd like to see from environmental education is that people

can live with and work with complexity and change within a system. This is achieved through relational pedagogy of land as a process, which links people and landscapes through relationship building. In this pedagogy, Land/land and is witnessed as a living entity, as the center and giver of life (Zinga & Styres, 2011). This inverts the assumption of Krasny (et al., 2010; 2020) about the linear influence of EE as a process in social-ecologic & complex adaptive systems. Pedagogy of land, as a process, is multidirectional in its influence (Styres, 2011: 722). As a result, learners develop an understanding of themselves as in relationship with a dynamic system, they are better able to become citizens and managers within that system.

Behaviors and collective action outcome: embracing complexity in SES

Learning from the land will "develop an understanding that all things exist in complex, interconnected relationships" (Styres, 2011: 722) by engaging in the conditions for relational learning. The practice facilitates learning about the interconnection of social and bio-geo-physical processes, complexity, and change over spatial and temporal boundaries (Simpson, 2014; Zinga & Styres, 2011; Styres, 2011: Bowers, 2008). From these experiences demonstrated in study (Chapters 3 and 4) we found that land relational pedagogy supports learners to understand, from a personal perspective, what it means to be part of dynamic system. Part of this behavior occurs through collaboration with the landscape and other learners, so it is a collective action of building relationality with the land. For example, facilitating a land relational pedagogy resulted in learning about complex system dynamics, like the elements of surprise, negotiation of autonomy, references to history and present, etc. that were seen in the study.

This can facilitate the outcome of collectively recognizing evidence of the past through present human-nature connections with land/Land. This point goes further than a discussion of pedagogy and education, and is an underlying theme in changing ontological assumptions about the natural world and the environment. A land-relational pedagogy embraces the complex spatial memory is held within Land and conveyed through feedback loops, teaching us about change and complexity of scale. Learning from this memory can inform future conditions of the land, and empower learners with the agency to make decisions about behavior and collective action (Tuck, McKinsey, McCoy, 2014: 2; Styres, 2011: 728)

These feedback loops teach about the complexity of scale through the learner's observation & exploration and the sharing of narrative (Bowers, 2008: 333; Styres, 2011: 717). Storytelling and narratives assist learners in navigating complexity, diverse knowledge systems, and personal relationality (Marin & Bang, 2015). By telling and listening to stories about a connection to land, we

understand human-environment relationships. This facilitation of relationality is aligned with ethics of social justice and decolonizing education (Marin & Bang, 2015; Denzin, Lincoln, & Smith, 2008, p. 518, 435) The narratives we share about practicing this pedagogy will be diverse and complex but demonstrate the flexibility of the pedagogy when engaging with diverse bits of knowledge and complex system dynamics (Zinga & Styres, 2011: 78)

Intermediate outcomes to lead to the behavior or collective action: EE to foster relational learning in Natural Resource Management

The intermediate learning outcomes of Land as pedagogy are abstract concepts: observing that change is constant, developing pieces of knowledge about the interconnectivity of the Land. As our teacher and life-giver, we gather lessons about inherent complexity and interconnection (Styres, 2011: 718). The practice facilitates learning about the interconnection of social and bio-geo-physical processes, complexity, and change over spatial and temporal boundaries (Simpson, 2014; Zinga & Styres, 2011; Styres, 2011: Bowers, 2008).

There are also outcomes of agency and empowerment, which are constructs to support democratic behavior and collective action: "One of the challenges in sharing our journey is that we cannot tell you how to journey yourself or what lessons you should draw from the process…. you must choose how you will engage with what emerges" (Zinga & Styres, 2011). This statement identifies how the emergent property of knowledge empowers agency. The outcome of agency and autonomy is exciting, as equity is embedded in the practice of Land as pedagogy. It resonates with the philosophical roots of the pedagogy, which will be discussed later. These outcomes are also aligned with decolonizing public education structures, with the purpose of "creating citizens equipped to exercise their freedoms and competent to question the basic assumptions that govern democratic political life," (Denzin, Lincoln, Smith, 2008: 187).

Activities to achieve intermediate outcomes: land-centered lesson planning and activities

Our theory of change finds lessons through activities that facilitate a cycle of exploration, observation, and reflective narrative (Zinga & Styres, 2011: 63; Kovach, 2010: 35). Land as the first teacher constantly gives us feedback about our influence and relationship (Zinga & Styres, 2011: 63; Kovach, 2010: 35). The activities are a way to listen to that feedback. There are various activities to practice this theory of change, diverse and complex as the Land itself (Zinga & Styres, 2011). The types of activities will vary with the Land and the people from that land (Simpson, 2014). These approaches are bounded by the relationship between land and learners and cannot be generalized in a credible way (Bowers, 2008).

The initial activity is simple: explore the Land with mindfulness and intention to cultivate an understanding of the interconnections and complexity through relationality (Styres, 2011: 718). Specifically, activities like exploration, conversation, and reflection are key to the success of a land relational pedagogy. The results of Chapter 4 outline how activities of exploring natural areas, facilitating conversations, and land-based inquiry projects foster relationship building between learners and the landscape. For example, the focus on butterflies in Lapwai facilitated learning about the interconnections between human and non-human people, as well as the non-linear dynamics of change over time. The conversational analysis demonstrated the process of collaborative meaning making about complex system dynamics, like surprise and uncertainty, and gave key insight into how reflection works to achieve outcomes of interconnectivity.

In land relational pedagogy, the circular process of reflective inquiry facilitates the development of individual experiences in landscape, and the process of co-constructing knowledge (Zinga & Styres, 2011; Styres, 2011: 722). Knowledge is developed through exploration and self-reflection and shared via narratives of our experiences. The sharing of these narratives with others initiates a circular co-construction of knowledge from the land (Simpson, 2014). This is the process of reflective narrative (Zinga & Styres, 2011:). Cultural stories, art, and legends are also teachers in this practice. Culture and tradition interweave the intergenerational relationships of people and Land into diverse stories and art (Styres, 2011). We can share the stories and art across social scales, but they are only "true" for the Land and people where they emerge (Simpson, 2014).

Consider the social-cultural context of learning: centering Indigenous futures in EE

The context of Land dismantles western assumptions about the environment. Styres defines "land" as an abstraction, more than just material relationships: "Land as Indigenous philosophy or ideology that exists beyond the concrete connection to place" (2011: 718). Land/land refers to more than a social construct of place, it is more than the physical manifestation of connections between animals, soil, air, and water. It is about the intergenerational connectivity of holistic systems. The land contains "the storied relationships that are etched into the essence of every rock, tree, seed, animal, pathway and waterway in relation to the Aboriginal people who have existed on the land since time immemorial" (Styres, 2011: 721). This context departs from a western conceptualization of the environment and fosters relationality to the landscapes where we live. Non-native peoples, especially those from settler-colonial cultures, ought to work to include and center Land/land as a teacher of complex histories to understand the changing dynamics of social-ecological systems.

Constructing the narrative: the story of Land in EE, and the meaning of land for non-Indigenous learners

This theory of change shifts narratives toward Indigenous philosophies of land, which accept and facilitate a diversity of knowledge emerging from our complex relationship. This narrative of Land as teacher can empower researchers and practitioners to radiate from the subversive biases embedded in some EE techniques, like adventure education or critical pedagogy of place (Zinga & Styres, 2011; Tuck, McKenzie, McCoy, 2014; Bowers, 2008). Non-indigenous learners can engage with land-relational pedagogy in environmental education by centering Indigenous futures in climate adaptation planning.

We view EE through the lens of Land as pedagogy as a process facilitating direct connection with holistic systems. Here, a teacher is equal to learners as a participant in the activities: a mediator or facilitator of learning, engaging in a process that empowers students to decide what ought to occur (Bowers, 2008: 332). This way co-constructs knowledge and does not pivot on normative learning outcomes\. Instead, it allows for complexity, flexibility, and holistic inclusion. Moreover, the mediator needs no training to facilitate conversations and encourage thinking about coupled relationships, like "how different aspects of cultural common impact natural systems" (Bowers, 2008: 333).

Educators are equal to learners rather than delivering an authoritative narrative to control learning outcomes. The practice of Land as pedagogy constructs a collective experience of learning, where everyone actively participates in the process. This reinforces Krasny et al.'s initial ideas about education as a process in a socio-ecological system, fostering a connection between learners and the environment (2010). This narrative also honors the condition of social justice, equity, and inclusion to advance EE theory and practice, highlighted in Krasny's 2020 book as an "invaluable contribution" to the development of EE. The narrative of Land as pedagogy embraces the complexity of being with Land, recognizes the idea that education is a rooted process within a holistic system, and subverts power hierarchies in science and EE.

Reflecting and revising the approach: evaluation of a dismantled pedagogy

Land as pedagogy has no centralized or assigned curriculum. Learning from the Land facilitates diverse experiences and knowledge about our relationships to land. It also empowers learners with agency. There are no policy outcomes and no standardized evaluation of which emergent knowledge is true or false. But the evaluation of this theory of change can be conducted through the same activities in Land as pedagogy cases: through the sharing of reflective narratives

Stories and narratives shared about Land as pedagogy can be evaluated for the outcome of being in a holistic balance with the land (See Chapter 4). The narrative is a method to share a "subjective accounting" of observed phenomena, and we can determine if the meaning made from a narrative is internally valid (genuine). It gives us insights into the description of an experience of a narrative (Elliott, 2005: 23, 26). Moreover, narrative analysis is equitable in evaluating diverse knowledge, as lessons shared are self-produced, context-based, and evaluated by an audience (Richardson, 2015).

A genuine act of self-reflection by both the inquirer and the narrator determines the internal validity and credibility of the narrative and will be subject to intuitive knowing by the audience, described as "inductive reasoning" (Kovach, 2009:33, 53, 111, 130). In addition, the narrator assumes responsibility for their narrative by willingly sharing it with others, so we can assume validity if the narrator is authentic in their account (Elliott, 2005:24). Finally, the internal validity of narratives is evaluated by a "rhetorical criterion" or a sturdy structure for a well-formed narrative and clear presentation (Lincoln, 1990: 73-74). Nevertheless, the rhetorical structure of a narrative is less important than the authenticity and reflexivity of the narrative shared, describing the process of learning from the Land (Elliott, 2005:22).

The external validity of narratives defines the ability of a narrative or case to recognize and facilitate a "presentation of multiple realities," demonstrating a multiplicity of social constructs that a larger social group negotiates (Elliott; 2005: 27; Kovach, 2009: 30). This is measured by creating a "déjà vu" experience for the listener (Lincoln, 1990: 73). If many people agree on the knowledge shared through reflective narrative inquiry, it can be considered part of a cultural framework or a socially constructed norm (Elliott, 2005:27). In other words, the audience feels the truth of the story. This is the idea of co-constructed knowledge that emerges from a shared process of narrative (Kovach, 2009: 133).

TOC Conclusion

To further develop this theory for instructional design, it needs collaboration to refine and revise the approach for a decolonizing methodology in EE and application to climate change as a CAS. Education theorists and practitioners may find more opportunities to contribute to the interdisciplinary discourse on adaptation, land management, and complexity theory.

One interesting question is the overlap of Land as pedagogy as a process to facilitate knowledge generation. This could tie into the idea of knowledge as an emergent property of being with complexity- an idea that prompts an intriguing question: can we substantiate that knowledge is

an emergent property of a complex adaptive system? If so, does Land as pedagogy foster the emergence of knowledge?

Initially, EE researchers expressed concern about the number of cases needed to support developing theory in the EE-dynamic systems relationship (Plummer, 2010). Since the special issue in 2010, we have seen the emergence of innovative and decolonizing environmental education techniques, specifically in Science Technology Engineering and Mathematics (STEM) pedagogy (Grunewald, 2008; Simpson 2014; Eitel et al., 2014; Anthony-Stevens & Matsaw, 2019; Zinga & Styres, 2011). Perhaps these cases can be reviewed through logic models we present, alongside cases in Krasny's 2020 text *Improving Environmental Education*. Continuing the idea, we encourage others to engage and develop interdisciplinary cases that incorporate education in social-ecological system resilience frameworks (Krasny, 2020).

New Literature Cited

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Ham, J., & Midden, C. (2010, June). Ambient persuasive technology needs little cognitive effort: the differential effects of cognitive load on lighting feedback versus factual feedback. In *International Conference on Persuasive Technology* (pp. 132-142). Springer, Berlin, Heidelberg.

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive science*, *12*(2), 257-285.

Appendix A - Tribal Research Permit

RESEARCH PERMIT SIGN-OFF SHEET

Name of Research Project: Intergenerational learning of landscape change on NP Traditional Lands.

Project Representative: Hannah L. Smith 975 W. 6th Street Moscow, ID 83844

Project Representative Address & Phone No.: 208-890-4646

Project Funder: Ehreinrich Family Foundation, Hannah L. Smith

The attached research application has been reviewed by the individuals below with recommendations as follows:

1. Program Director Signature: Approved See Attached →

   Program: _____ Date: _____

   Recommendation _____

2. Branch Director Signature: Approved See Attached →

   Department: _____ Date: _____

   Recommendation: _____

3. Executive Director Signature: _____

   Date: 1.30.19

   Recommendation: Approved

4. Office of Legal Counsel Signature: _____

   Date: 2.13.19

   Recommendation: Approved

Received: 2/4/19

NPTEC presentation by: (Department Manager or Executive Director):

Nez Perce Tribal Executive Committee Authorization:

DATE: 3-28-19

RESEARCH PERMIT SIGN-OFF SHEET

Name of Project Intergenerational learning of landscape change on Nez Perce traditional lands
Project Representative Address & Phone: Hannah L. Smith, 975 W 6th St, Moscow, ID 83844. 208-890-4646
Project Funder: Ehreinrich Family Foundation, Hannah L. Smith

The attached research application has been reviewed by the individuals below with recommendations as follows:

1. Program Director [signature] 12/10/18
   Program:
   Date:_____ Recommendation RECOMMEND FOR APPROVAL

2. Branch Director [signature]
   Department: DNR Admin
   Date: 12/17/18 Recommendation:
   approve for subcommittee

2. Branch Director _____
   Department: Date:_
   Recommendation:

3. Executive Director _____
   Date:_____
   Recommendation: _____

4. Office of Legal Counsel: _____

Corresponding* Nez Perce Pedagogy Designed by NP STEP program *Needs external review	Landscape Lesson Plan
Active Visualization -Seasonal Rounds -Being around grandparents	Place-based lesson plan, telling stories about how the land has changed in the landscape itself Intergenerational communication
Community Orientation -Connect to people and lands -Not interrupting conversations (? Listening) -Responsibility to pass knowledge on to future generations	Stories about landscape connection and historical relationships Listening to narratives from elders
Oral History - Sharing personal experiences - Make story come alive	The stories about landscape will hopefully be about passing on personal experiences of land change and how communities have historically responded to land change
Teachers are guides -Everything has meaning -Not forcing ideas	The lessons to be learned are about one's role in a landscape, and how a landscape can change. This is achieved via observation and exploration, rather than lecture Learning will be evaluated by the meaning students make of landscape change via participatory photos (art)
Experiential Learning -Never through books -Hands-on -Immersion	There will be no books involved here, and no writing/note taking either
Interpersonal Relationships -Be inclusive -Listening and engage the family -Know the families	Fosters intergenerational connectivity and community via historical narrative
Evaluating mastery -Ask for their input -Don't just lecture -Can do on their own, teach others	By sharing final photos, participants will be sharing how they learned about landscape change. They will show others the process of the curriculum, and communicate learning with others via art.

Additional meetings to design research methods will be held often and will continue to be open to community members.

Through this open and adaptive collaboration, we will modify the lesson plan presented. We will also discuss and agree on appropriate methods for gathering information. In these meetings. I will advocate for the participatory photography methodology and analysis described above. I have some ideas for methods that may work, but they may not be useful when applied to Lapwai and Nez Perce worldviews. The collaborative process will also

DESIGN:

If approved, I will meet with teachers, parents, and community members to learn about working with Lapwai Elementary and potential landscapes to explore. Research partners will facilitate open discussions around a shared vision. The shared vision that emerges from the research design team will inform the modification and implementation of the curriculum proposed below:

Intergenerational Communication about Landscapes Change
Rough Draft Lesson Plan

	Lessons	Purpose	Logistics
Part 1	A: Intro to place: observation of biotic & abiotic factors (1h) B: Storytelling: how is it different than reading (1h)	A-Given the place-based nature of the landscape curriculum, participants will be encouraged to develop awareness of their physical place before learning about historical change. B- We will be explicit in talking about storytelling with participants. This is to compliment NP pedagogy, as well as encourage listening in the field.	Can be done in a classroom, we will want to invite someone comfortable with telling stories
Part 2	C: Landscapes: Mapping and topography (2h) *(Drones?)* D: Intro to participatory photography (1.5h)	C-This lesson is about defining scale through maps, and we will explore different types mapping. Once we have defined the scale of a landscape, we may be able to understand how that land has changed. D- this lesson is to give an overview of the methods that will be used in the field the next day	Drones could be included in these lessons We will need access to cameras
Part 3 CORE/ FULL DAY	E: Elders & Community Members share personal narratives on landscape change (3h) F: Participatory Photography (3h)	E- These narratives are core to the curriculum and my research question, given the nature of intergenerational communication. To learn about historical land change through human memory, rather than through records F- Participants will make meaning of the landscape narratives via a method called PhotoVoice. They will have time to explore the landscape and take photos.	Field day- location TBD by tribal partners There is funding to pay for transport & maybe lunches
Part 4	G: Present photos to elders/community members (1.5h) H: Reflection and analysis (1.5h)	G- This is another avenue for intergenerational communication about landscape change, as well as communicating findings & place observations H- Participants will make meaning of their photos, and help to analyze themes of landscape change	Desirable to invite members of the community. Could be a "gallery walk"

Alignment of Learning Outcomes With Nez Perce Pedagogy

5. Will an honorarium be offered to tribal people interviewed? Yes X No

   Project will provide a stipend to participating community members who share historical landscape narratives. I would be asking speakers for approximately 10-15 hours of time, spread over a few weeks. Some of this time would be telling the narrative, and the other part of the time would be working with the students & photography to explore landscape change.

6. Sources of funding to conduct study, survey or research:
   Enrienrich Family Fellowship

7. Project or actual cost of project: $ 3500

8. Name and addresses of all persons authorized to be involved and/or participate in conducting the project: (*Include those that will not be present on site*).

   a. Hannah Smith, College of Natural Resource, UI, 975 W 6th St, Moscow, ID 83844
   b. Mr. Josiah Pinkham, Nez Perce Tribe, P.O. Box 365, Lapwai, ID 83540
   c. Mr. Beau Woodford, Nez Perce Tribe, P.O. Box 365, Lapwai, ID 83540
   d. Ms. Johna Boulafentis, Nez Perce Tribe, P.O. Box 365, Lapwai, ID 83540
   e. Ms. Karla Eitel, McCall Outdoor Science School, PO Box 1025, McCall, ID 83638

9. Proposed dates of study: From: Nov 2018 To: May 2019

10. Location of project and sources to be researched: Lapwai Elementary, Landscape with cultural and ecological significance (Butterfly Garden?)

11. Methodology for conducting this project (*be concise*): Decolonizing Methodologies, Indigneous Approaches to Educaiton, Participatory Action Reseach , Community Based Research Design, Place-based Narratives in Education, Modified Photovoice Methods, (If Approved: Tape recordings of narratives told)

Potential for data collection and student-driven research (in lieu of research questions)

The legacy of American Indian education research (mostly conducted by non-natives) does not typically honor participants and culture where they work. But in this study, the integrity of people involved is more important then desired research outcomes. I lack the experience to understand the community where this work will take place, and look to the collaborative process to design a project in harmony with the people and the landscape. I have found partners who are willing to participate in designing the initiative and seek to learn more about the historical and contemporary contexts of education in Lapwai. The story of the study will be shared with the community through a celebratory event, like an art exhibit. Conclusions will be made collaboratively, and presented to study participants for approval. If its appropriate to share findings outside of the community, they may add to a growing body of literature about the use of place-based learning approaches in landscapes, to equip future generations in community-based climate adaption. It is also possible to contribute to literature on innovative scientific methods that facilitate equitable research in complex human-natural systems, if approved by participants (Balvanera et al 2017).

If this initiative is approved for data collection by tribal council, I will work to ensure the research process is transparent and accessible. I want the story of this work to be one of collaboration to heal landscapes and decolonize knowledge systems for future generations. My responsibility in this work is the impact it has on the participants and community. This means reserving intellectual property rights to participants for works produced from the study, and omitting any sensitive information in reports. If approved by the collaborative and participatory research design process, there are opportunities to collect data in two ways:

> *Perceptions of landscape change*: To measure intergenerational perceptions of landscape change, we may use a modified PhotoVoice approach, using photography and creative writing to make meaning of landscape change. I can facilitate this process, but participants will choose what to share through the creative process. Study participants will determine which findings can be communicated outside of the community context, e.g. what to include in the research report. All data created will belong to participants, and storage of the data will be determined by the community or school.
>
> *Historical landscape narratives:* There is an opportunity to record these stories for cultural resource preservation. These stories belong to the landscapes where they come from, and I am not interested in gathering this information for my research. If approved, this data collection will be led by Mr. Josiah Pinkham. Interviews or field recordings will be stored with Nez Perce Cultural Resources.

Is this projected conducted for profit? No

If yes, explain: **Not applicable**. If this project is not for profit now, could this information be used in a profit seeking venture in the future? If so, how?
I will not seek any profit or venture from this work.

Research Permit
Nez Perce Tribe

1. Name of Applicant: University of Idaho, College of Natural Resources

2. Address: c/o Hannah L. Smith, PhD student, 975 W 6th St, Moscow, ID 83844 Phone Number:208.310.7081 E-mail: hlsmith@uidaho.edu

3. Type of Application: ___Individual ___Agency ___Other ___ Corporation X Institution

4. Purpose of study, survey, or research (*Be concise*):

My name is Hannah Smith and I am a PhD student from the University of Idaho, College of Natural Resource. I am originally from Central Idaho, and I am working here in climate change adaption for community well-being in landscapes close to my home. I have been working on climate adaptation, youth leadership development, and collaborative conservation initiatives around the world for a decade. I returned to Idaho in 2015 to learn about climate adaptation in my home state. Quickly, I understood tribal nations are leading these efforts. It is my intention to learn from this leadership and to support tribal sovereignty and climate adaptation efforts as best I can. With respect to the Nez Perce Tribal Nation, I ask for permission to conduct the study proposed in the following document

I recently completed a certificate in Science Communication and Environmental Education through the McCall Outdoor Science School (MOSS). As part of that program, I designed a potential collaborative study to facilitate intergenerational, place-based exploration of landscape change. The aim of the study is to design a learning experience about human-nature relationships and how they change over time, for the purpose of climate adaption and justice to future generations. This study was designed with Lapwai in mind, and learning outcomes are inspired by the Nez Perce Cultural Pedagogy.

If approved, this proposal will move to a Participatory Action Research method with identified partners. A Community-Based Research Design process will be facilitated to determine all aspects of the study are conducted in alignment with community participants, parents, teachers, and Lapwai School District adminstrators.

My role in the research process is as a facilitator and participant. I am privileged to come from a well-educated background. My privilege is a result of colonizer ancestry. I recognize the generosity of the Nez Perce people by allowing me to travel in their lands, and ask for permission to work here. I accept my responsibility to the decolonization of knowledge systems and will honor the collaborative research relationship.

Research Regulation Ordinance
Process

To obtain a written permit

1. Applicant must complete and present to the appropriate Program Director or Department Manager, the attached forms at least ninety (90) days prior to proposed study, survey, or research project start date.

2. Applicant must read and obtain a working understanding of the Research Regulation Ordinance and its contents.

3. Applicant must prepare multiple copies of a brief and concise written prospectus (one page) of project, or a verbal presentation to the appropriate Tribal Council Sub- Committee. The project representative will be placed on the agenda through the appropriate Department Manager or Program Director.

4. **Only** written permits will be official and must include the authorizing signature and tribal resolution number.

5. The Nez Perce Tribal Executive Committee sign off will be the final approval/ disapproval for the request. A $75.00 permit fee will be paid upon final approval of the request.

Any person attempting to conduct research not specifically requested or contracted by the Nez Perce Tribal Executive Committee or permitted pursuant to provisions of the ordinance shall be subject to any and all civil or criminal remedies available pursuant to the Law and Order Code of the Nez Perce Tribe, including but not limited to: exclusion from tribal property, criminal trespass, and civil remedies provided for in the Nez Perce Tribal Law and Order Code.

Date:_____

Recommendation: _____

_____

_____

NPTEC presentation by: (Department Manager or Executive Director):_____

Nez Perce Tribal Executive Committee Authorization:

_____ _____

_____ _____

_____ _____

_____ _____

_____ Date: _____

work to identify a final product to be shared with the community, driven by study participants. The relevance of the study and knowledge produced will be observed by how the community responds to the shared results, and determine how findings are communicated outside of the study (if at all).

If the community-based design process decides to use landscape narratives as a lesson plan, we will choose a landscape that has cultural and ecological significance to the community. We are currently discussing a potential natural area, southeast of Highway 95 and Garden Gulch Road junction. It is nearby the elementary school and would be feasible for a field trip, as well as having significance for butterfly habitat and historical context (potential ties to the legendary Jackson Sundown?). This is open to community input, and something to be decided by the collaborative team.

PROCEDURES:

1) Development and implementation of place-based education lesson plans for Lapwai Elementary 4th Grade re: human/nature interactions

3) Participatory Action Research & Community-Based Research Design for an environmental, community learning project to be explored in Spring 2019

3) Intergenerational communication about landscapes around Lapwai with cultural and ecological significance

4) Community celebration event to share learnings from Procedure #3

5) Findings reported to Lapwai Elementary and Nez Perce Cultural Resources. Additional reports will be approved during procedures #4 and #5

SUBJECTS:

Curriculum proposed will be designed by students, parents, teachers, and administrators from Lapwai School District, as well as interested community members. Youth participants will be the 2018-2019 Lapwai Elementary 4th Graders. Community participants will include community members interested in sharing oral histories of landscape change.

PRIVACY LEVEL:

It is our priority to honor the gifts shared during the proposed project, and we recognize our responsibility to protect the rights of participating community members. Study findings will be discussed collaboratively to review cultural aspects brought up during the study. These discussions will determine what will be shared in reports, and how I (as a researcher) speak

the Journal of American Indian Education and one about use of place-based methodology in STEM education.

14. *How will the results of the project be used?*

Results of the project will be used to facilitate a conversation about the significance of landscapes in the community of Lapwai. They can also inform future curriculum development in Lapwai to facilitate learning about complexity, place, and change.

There is also an interest in communicating results with other researcher working in place-based methodologies and decolonization, and potentially inform the future of landscape education and development of place-based pedagogies in different cultural contexts.

15. *How will this project benefit the Tribe?*

This project can cultivate a community-based lesson plan for learning about place and human-nature relationships. This lesson plan can be developed for the 4th grade class at Lapwai Elementary for 2018-2019. If desired by community partners, the lessons could be established as part of the 4th grade curriculum or adapted for other age groups in the community. Additionally, the project can help young people practice creative skills and scientific processes through creative writing, photography, and intergenerational communication. Additionally, a community art exhibit led project participants can share knowledge about historical landscape change, and potentially inspire conversations about the future of landscapes important to the Nez Perce Tribal Nation.

16. *Proposed tribal program(s) and/or employee(s), member(s) identified to assist/ supervise in project:*

Program:	Contact Person:
Cultural Resources	Mr. Josiah Pinkham
Education Department	Mr. Beau Woodford
Natural Resource Department	Ms. Johna Boulafentis
Nez Perce Tribal Executive Committee	Mr. Shannon Wheeler, Tribal Chairman

17. **Assurances**: I give my assurance that the rights of individual tribal members, their families, and the Nez Perce Tribe will be protected throughout the duration of this project. I understand that I am subject to the Law and Order Codes of the Nez Perce Tribe as it pertains to the research. I further understand that the Nez Perce Tribe has a drug free policy and will adhere to the policy as it pertains to the participants, researchers and others involved in this project. I will employ or utilize local resources, with tribal members given first preference, in the project study,

about this work outside of our process, including how I represent the community and research partners. Links between subject's identity and created responses will be maintained by Hannah Smith and Mr. Josiah Pinkham, and will remain confidential unless approved by the review process. Participants will retain intellectual property rights to all photographs and words created, and the community will retain rights to the place-based lesson plan. Any cultural data gathered belong to the Nez Perce Tribe, such as recordings of the landscape narratives. Sensitive personal and cultural data will be secured and will not be shared in communication or reports.

EXEMPTION CATEGORIES: Category 1: Research conducted in established or commonly accepted educational settings, involving normal educational practices, Category 2: Research involving the use of educational tests, survey procedures, interview procedures or observation of public behavior.

CATEGORY RATIONALE: This research will be conducted in a commonly established educational setting, or in the community using participatory research procedures. However, it will be conducted with members of the Nez Perce Tribe and we recognize the need to work through the Tribe's IRB process. We are going through that process simultaneously and I'm not sure if this condition makes this project ineligible for exemption.

DATA COLLECTION METHODS: Oral narratives (listening), Oral narratives (recording managed by Mr. Josiah Pinkham), Participatory Photography, Focus Groups, Participatory data analysis, Co-production of Knowledge

EXPERIMENTAL METHOD: Collaborative, Adaptive, Ethnographic, Adaptive. A lack of hypotheses allows for the co-production of findings.

12. *Describe the intended final product of this project:*

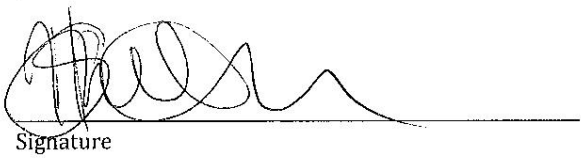
We anticipate several final products to come from this work:

1) Recorded narratives of historical landscapes (led by Mr. Josiah Pinkham)
2) A community art exhibit of photos and words created by intergenerational collaboration and communication about landscapes
3) A place-based, adaptive lesson plan for teaching change and complexity in a landscape near Lapwai
4) Fostering skills for complex problem solving and climate change adaptation thinking in young people
5) Potential manuscripts for publication, if approved by study participants and larger community

13. *Is publication intended? If yes, explain:*

If appropriate, we will likely prepare two manuscripts for publication, one intended for

survey, and research. I have read and understand the Nez Perce Tribe's Research Regulation Ordinance and agree to adhere to its contents. I further attest that the information provided on the application for research permit is true and correct, and I understand that false information may result in denial or cancellation of a research permit.



Signature

29 Nov 2018

Date

PhD Student

Title

University of Idaho

Organization

NEZ PERCE TRIBAL EXECUTIVE COMMITTEE
INTER-OFFICE
M E M O R A N D U M

TO: NPTEC Members

FROM: Casey L. Mitchell, Secretary

SUBJECT: Administrative Actions - February 26, 2019

DATE: February 26, 2019

The following Administrative Actions were approved by the Nez Perce Tribal Executive Committee meeting in Special Session, February 26, 2019 in the Richard A. Halfmoon Council Chambers, Lapwai, ID. You are hereby authorized to disburse funds and/or take proper action.

HUMAN RESOURCES SUBCOMMITTEE-FEBRUARY 14, 2019

1. Women's Wellness Day Approve six (6) hours of Administrative Leave, per the Human Resources Manual, for Nez Perce Tribal employees to attend the Women's Wellness Day on April 11, 2019 at the Clearwater River Casino from 8:00 a.m to 3:00 p.m.

NATURAL RESOURCES SUBCOMMITTEE-FEBRUARY 5, 2019

2. Monthly Report Authorize to accept the Conservation Enforcement Division monthly report.

3. Research Permit Authorize a research permit for Esky Bibble Productions, LLC, for a feature film project presently called, "Rise Above" for a period of January 2019 through December 2019.

4. Research Permit Authorize a research permit for Hannah L. Smith for, "Intergenerational Learning of Landscape Change on Nez Perce Traditional Lands," for a period of November 2018 through May 2019.

BUDGET & FINANCE SUBCOMMITTEE-FEBRUARY 19, 2019

5. Spring 2019 General Council Administrative Leave Authorize administrative leave on May 2-4, 2019 for enrolled tribal member employees with supervisor approval to attend the Spring 2019 General Council meeting at the Wa-A'Yas Community Center, Kamiah, Idaho.

any corporation, agency or institution designing to conduct or participate in the conduct of the study, survey or research project.

B. Purpose of the study, survey, or research, including whether it is being conducted for profit.

C. Source of funding and amount of funding of the study, survey or research project.

D. Methodology to be used in conducting the project.

E. Names and qualifications of all persons authorized to be involved and/or participate in the conduct of the project, whether or not those persons will actually be present on the Nez Perce Reservation during the term of the project.

F. Dates between which the study, survey, or research project will be conducted on the Nez Perce Tribe and indication of the location of sources of information to be investigated during the term of the project.

G. A description of the intended final product of the study, survey or research project, whether or not publication is intended.

H. How the individual, agency, or institution conducting the study, survey, or research project intends to use the results thereof.

I. An indication of steps to be taken to insure the protection of the rights of individual tribal members and their families and the rights of the Nez Perce Tribe.

J. A performance bond in circumstances deemed appropriate by the Nez Perce Tribe.

Section 6: Cancellation of Permit

The permit issued pursuant to this ordinance is conditional and may be canceled at any time if it appears that the individual, corporation, agency or institution conducting the study, survey or research project has deviated from the study design approved in the granting of the permit or from provisions of the required underlying agreement upon which issuance of the permit is based.

RESEARCH REGULATION ORDINANCE

Section 1: Authority

This regulatory ordinance is established by the Nez Perce Executive Committee under authority contained in the Constitution and by-Laws of the Nez Perce Tribe, including the amendments therein.

Section 2: Purpose

The purpose of this ordinance is to regulate studies, surveys, research and service delivery projects on the Nez Perce Tribe in order to preserve and protect the rights of the Nez Perce Tribe and their tribal members, their privacy, integrity and their interests in the results and products of such studies, surveys, research and service delivery projects.

Section 3: Permit Required

Any individual, corporation, agency or institution, whether public or private, wishing to undertake a study, survey, or research project for any purpose, on the Nez Perce Tribe, must obtain a permit approved through The Research Regulation Ordinance process as stated herein. This does not apply to those entities specifically requested or contracted for and by the Nez Perce Tribe.

Section 4: Written agreement required for issuance of permit

No permit will be issued for any study, survey, or research project, without a written agreement with the Nez Perce Tribe. (Verbal agreement are not authorized agreements). The agreement shall contain assurance of protection of individual as well as tribal rights, methodology of the research, timeliness, study results, review opportunity prior to publication, final authorization and parameters for publication, and if product is published for profit, the percent of royalty due to the Nez Perce Tribe. A $75.00 permit fee will be assessed and payable upon final approval of the permit.

Section 5: Information required for issuance of permit

No permit shall be issued to conduct any study, survey or research project until the following information has been provided to and approved by the Nez Perce tribal executive Committee:

A. Name and signature of individual applicant or authorized agent of

Appendix B - Curriculum Outline and Lesson Plans

Proposed Curriculum

Corresponding* Nez Perce Pedagogy Designed by NP STEP program **Needs external review*	Landscape Lesson Plan
Active Visualization -Seasonal Rounds -Being around grandparents	Place-based lesson plan, telling stories about how the land has changed in the landscape itself Intergenerational communication
Community Orientation -Connect to people and lands -Not interrupting conversations (? Listening) -Responsibility to pass knowledge on to future generations	Stories about landscape connection and historical relationships Listening to narratives from elders
Oral History - Sharing personal experiences - Make story come alive	The stories about landscape will hopefully be about passing on personal experiences of land change and how communities have historically responded to land change
Teachers are guides -Everything has meaning -Not forcing ideas	The lessons to be learned are about one's role in a landscape, and how a landscape can change. This is achieved via observation and exploration, rather than lecture Learning will be evaluated by the meaning students make of landscape change via participatory photos (art)
Experiential Learning -Never through books -Hands-on -Immersion	There will be no books involved here, and no writing/note taking either
Interpersonal Relationships -Be inclusive -Listening and engage the family -Know the families	Fosters intergenerational connectivity and community via historical narrative
Evaluating mastery -Ask for their input -Don't just lecture -Can do on their own, teach others	By sharing final photos, participants will be sharing how they learned about landscape change. They will show others the process of the curriculum, and communicate learning with others via art.

Project Timeline

- December 2016 - co-design of study with Josiah Pinkham
- September 2018 – Introduction to teacher through Johnna Boulafontes at Nez Perce natural resources
- Fall 2018- relationship building with participants, including principal & teacher at school
- Spring 2019 – data collection
- Field trips on Fridays During Standardized testing
- Implementation
- Pre-research, volunteering in classroom & with after school programs
- The Nez Perce Tribal Council approved the research permit on 3 March 2019
- "Landscape Lessons" project officially begins with students
- With approval, I began working with community members and teacher to find experts to join us in the field
    - Adaptable lesson planning to support emergent learning processes
    - Frontloading with questions (would you like to do a science project with me? What do you want to learn about the landscape where you live? What is a landscape?
    - Revisiting questions: what you want to learn about the landscape where you live
    - Then beginning the weekly fieldtrips outside of the classroom
    - A circular process, in classroom learning, field exploration and data collection, revising questions with each lesson, and asking what we will need for our next field excursion
    - Friday science lessons were 3-4 hours
    - Adjusting for weather when needed
    - Collaboration with Beau and local experts on process, content, concerns, etc.

Delivered Curriculum

	Friday, May 3	Friday, May 10	Friday, May 17	Friday, May 24	Tuesday, May 28	Friday, May 31
Activity	First day going on a local field trip, community garden	First day going to Lapwai Nature Park	In classroom due to weather	Cancelled due to weather (teacher's request)	First day of landscape lesson stations	Final data collection day
Information gathered	Exploratory, pilot lesson plan to see feasibility of participants would be able to make the longer trek to Lapwai Nature Park. Observation	Exploratory walk and introduction to Lapwai Nature Park, seeing how long it take to get there from classroom BioBlitz	In class lesson plan, impromptu collaboration between researcher (me), expert (Natasha), and teacher (Beau) on the butterfly life cycle.	n/a	Landscape observations (drawing), Focus groups about the meaning of butterflies in (Student inquiry) Lapwai Attempted to	Participant narratives, landscape observations/field journal (Student inquiry) butterfly egg count using hand lenses

	skills developed (see Field Notes)	activity with insects	Generated student questions about butterflies		do ecological transects to count butterfly eggs in LNP.	

Sample Lesson Plan

Landscape Lessons
Template 1: What do we want to learn?

April 27, 2019
Time 11:45 am – 1:30 pm
Classroom

Overview

This was the first day of the landscape lessons project after official permission from the Tribal Council and School.

Objectives

The goal of this lesson is to collaboratively identify the context and topic of the community oriented, land relational project. The goal was met through four objectives, led by classroom teacher and research-facilitator:

a. Describe the project and the process of co-design lesson plans
a. Assent from participants to participate on the project, go outside, ask questions
a. Co-define "science" and "landscape" as participants to set the context for the rest of the lesson plan
a. Identify the study topic as being related to place and land

Lead Facilitator
Hannah
Supporting Facilitators
Classroom teacher & helper
Learning Activities

- Drawing Landscape
- Participatory mapping
- Discussion

Suggested Materials

- Whiteboard
- Markers
- Paper
- Notecards

Evaluation
How did it go? (Questions to consider post-activity – how to improve, etc.)

Learning Activities

Introductions & Participant Assent

The lesson began by introducing my role as researcher-facilitator, as I had been volunteering in the classroom for months prior. I described my questions and desire to work with this class:

> *When I spoke up in front of the class, my goal was to introduce myself as a student that studies the relationships between people and land. "Relationship" was one of their vocab words for the week. I told them that I am curious about what people can learn from the "landscape", defined as culture and nature together. I told them that I was there to ask for their help, because they (as 4th graders) are expert learners.* (Field Notes, 2019)

Communication of the research purpose and my reasons opened room for participants to engage. I asked student participants if they would be willing to help me with this project, and assent was given by members of the class and teacher.

Facilitator Wrap-up Questions

What questions do you have for me about this process?
What do you want to learn about next time?

Appendix C - Field Notes

15 March 2019

First day of research permit, first visit to class on a Friday. Beau contacted me before via text and asked me if I had any "specific goals" that I wanted to accomplish. I responded with "it would be cool to introduce the idea of doing a research project together about the landscape and land change… see what they are curious about if possible.".

I asked if he thought project goals could aligned with current learning outcomes for his existing lesson plans. He responded by sharing the ELA unit they are currently in, which is about Treasure and Adventure (From Nat Geo Reach for Reading)

In an email, he noted that the lessons are often about explorers looking for treasure, which is a bit pro-colonist. He remarked on the challenge of integrating this unit previous years, and a desire to teach in a way aligned with Nimíipuu worldview, which agrees with Nimíipuu folks idea of treasure. I learned that the school uses the Nat Geo Reach for Reading common core, which I know little about. I plan on talking with Brant Miller about these standards

When I spoke up in front of the class, my goal was to introduce myself as a student that studies the relationships between people and land. "Relationship" was one of their vocab words for the week. I told them that I am curious about what people can learn from the "landscape", defined as culture and nature together. I told them that I was there to ask for their help, because they (as 4th graders) are expert learners. I asked if they would be willing to help design a research project with me to explore the landscapes in Lapwai, to learn about what they learn from it. Also, I asked them to help me learn about this place, because I am not from there. To gauge their willingness to participate in the project, I asked them to raise hands. Almost everyone did- and I said its okay if they didn't want to participate.

Then I drew a line on the board and asked them to think about all the elements of the landscape in Lapwai and drew pictures as they named human and natural aspects. We spent a lot of time naming animals, but also identified the creek, the road, the school, people, birds, and the butterfly. The students told me that Lapwai was named after the butterfly...

After the landscape activity, I looked at their identification of landscape aspects. I was impressed with the diversity and depth of aspects identified, social (including homeless people) and natural. It seems as if these students are aware of the social-ecological system they live in. I attempted to tie it

back to the idea of "treasure", after I defined treasure as a healthy ecosystem…. But felt weird and I think I may have misrepresented what I was trying to do, maybe sounding like a settler looking for gold. But the lesson was learned… I need to keep a critical eye on myself and how I try to tie in content from the common core curriculum.

I asked them if they had any ideas for potential activities we could do to learn more about the landscapes around them. Swimming was the first answer, someone suggested we go on a hike, etc. It seems as if they are interested in going outside for the project.

At the end of my 20-minute lesson, I wanted to assess spatial awareness with a brief activity. I tried to lead them through a quick participatory mapping activity of their homes, where they identified where in the house was the most important thing to them. Sharing was by choice, and answers ranged from gaming consoles to pets to family.

I look forward to continuing the conversation, and I hope we can go outside together soon and begin to explore the aspect of place in landscapes they explore daily.

"Assessed to death"

Mr. Woodford and I have been talking about how to balance the need for standardized testing in the spring with this lesson planning project. I am curious to learn more about how ISAT testing impacts students in Lapwai, and how place-based STEAM lesson plans can be designed to facilitate preparation for these tests.

Or are place-based STEM lesson plans the "antidote" to being "assessed to death"?

Mr. Woodford Teaching Tools

As I am new to facilitating learning with this class, I have been observing effective teaching tools used by Mr. Woodford. Here is the list I have so far:

- Small group work and discussions to remember concepts
- Think-pair-share
- Humor & stories
- Rewards (going outside or special treats)
- Visual representations of concepts, drawing
- Comparing behavior or concept the previous day
- Standing up, moving, instead of raising hands

- Competition and games
- Sharing personal anecdotes

I've also noticed Mr. Woodford engaging with critical pedagogy in the classroom. I can sense his respect for the Nimíipuu people, and dedication to the students. He refers to the classroom as "his universe" and knows how to keep the attention of the class. Mr. Woodford and his teaching style set the tone for how I enter the classroom, and his pedagogy and strategies are one of the most valuable things I think I will learn about in this project.

Next Steps:

Facilitate an activity with students about landscapes in Lapwai to create a conversation around place to inform research design. Some ideas:

- Facilitate a place-based ecosystem services lesson in the playground?
- Lesson plan idea: students write stories about landscapes in Lapwai? Acting out stories
- Butterflies in Lapwai? Seems to be a popular theme.
- After School Program Students present projects about renewable energy (For Mr. Woodford's partnership with Nimíipuu Protecting the Environment)

Meet with principal about field trips after spring break.

30 April 2019

To make sure I align field day planning with Mr. Woodford's classroom outcomes, I asked if he had a moment to chat this week. He said he had 15 minutes today, so I prepared some questions.

Can I have one hour on Friday with an outside activity? Logistics? Location? Interfere with testing prep?

> *-- yes, especially if it suits the purpose of the project. Mr. Woodford talked about how standardized testing starts this week, so Fridays can be more flexible to outside field trips. Still unsure of what this week will look like… we might just do an outdoor activity for an hour near to the school or have the time to walk from the elementary school to the nature park. I*

will prepare two different lesson plans, and remain adaptable to Mr. Woodfords teaching needs

I am most curious to learn about teaching about change and human-nature relationships. One of the best tools to do this is ecological footprints-- you taught about plastic and the garbage patch…. Was that just ASP or have you brought it into the classroom?

-- *I don't think so*

Looking for a local expert to join us, preferably someone who has lived in Lapwai their whole life. Any ideas? Other experts you want to bring in?

--*Name redacted,, language expert*

My greatest desire in this work is to respect the people I collaborate, and I prioritize their needs over desired research outcomes.

I also spoke with Josiah Pinkham over the phone today (30 April) about joining for Fridays as an expert, and also as a research partner. Josiah might be available for this Friday and may be available to join us for the rest of the month.

Josiah and I co-designed this project over the last 3 years, and I hope he will be able to attend each Friday field day. To be honest- I know how to facilitate outdoor exploration in a safe way, but I am not an expert in the culture or place. It is not my intent to pretend I have knowledge of this place or an understanding of the context. Having a skilled cultural ethnographer, like Josiah, join us for these field days is essential if we wish to facilitate place exploration in a way that honors the cultural history and people of Lapwai. I also trust Josiah to be aware of the student participants

3 May 2019

Wow today was really incredible. Marcie carter joined us. First field day. Set up some behavior expectations around Friday science days and walking as transportation. Morning lesson plan from beau: biology-- dissecting owl pellets and food web. Observation skills taught (I notice, I wonder, it reminds me of). Students observed at the community garden by drawing a picture of something they saw. Then, divided into teams… (team chicken, team nugget) to make a story that connects each picture.

Then debrief. Final reflection of activity was a solo journal about what question they wanted to ask about Lapwai. Place name and history were brought up, as well as pollinators and current population

size. May have potential to connect with a remote sensing project about butterfly habitat restoration (also consistent with BW's planned Nat geo science curriculum)

Lots of good feedback from the classroom helper today. I may ask her to do an interview with me. Need to acquire a field recorder.

Concluded with a silly game.

Next week, we plan on walking to the Lapwai nature park and spending some time there. Students want to play a game to see who can locate the most insects (BioBlitz?). I have invited Marcie, Josiah, Natasha, and a potential local expert to join as we explore. I'm wondering if we should do stations…. We divide up the hour into 15-minute segments, and the students into group of 4 or 5, rotating through the hour so everyone gets to spend dedicated time with each expert. Mr. Woodford could be one of the experts and so could I, if desired/needed. Also, could reach out to MOSSers for volunteer hours

It should take about 15 minutes to walk from school to the park, however, we have to cross the highway and walk on the railroad. ~30 walking ~1 hour place-exploration

NEEDS:

Sturdy shoes, long pants, Insect repellent, Water bottles, Snacks, Positive Mental Attitude (PMA), Any scientific tools required

Friday, May 3-- first day doing on local field trip… visited community garden

-(many of them have been there before as part of ASP, so it was a test)

Friday, May 10-- first day going to Lapwai nature park

Friday, May 17 -- In classroom due to rain/deluge

(In class lesson plan, impromptu collaboration between researcher (me), expert (Natasha), and teacher (beau). Beau brought a lot to the table-- including a potential citizen science project (maybe he could do it for his lesson plan next year/)

Friday, May 24 -- Cancelled due to weather (Teacher's request)

31 May 2019

After reading Ch 17 of Critical and Indigenous Methodologies (p 347), I brought a field recorder to our final field day. I taught each group how to use the field recorder, and then they took it to record sounds of whatever they wanted. In this way, I attempted to facilitate auto-ethnography of their experience as individuals and class in the nature park inquiry.

11 June 2019

Well, all the data for this part of the project has been collected. I attempted to gather data that triangulates the participants' experience via mental, emotional, and physical information (as suggested by Critical and Indigenous Methodologies (Ch 17?).

I attempted to facilitate student's place-based inquiry about butterfly eggs and butterfly habitat and collect data along the way. Rather than writing about my observations, I encouraged students to do landscape observations (drawing), facilitated focus groups about the meaning of butterflies in Lapwai and at in the nature park, and attempted to do ecological transects to count butterfly eggs in LNP. The transects were quickly abandoned for full on exploration of plants using hand lenses (provided by Mr. Woodford) on the final field days (May 28th and May 31st). On these days, we split the students into three group to rotate through stations, which were each run by an adult. Stations had similar themes each field day: 1) landscape observations through drawing, 2) conversations about place, gathered by phone (5.28) a field recorder (5.31), and ecological investigation… which I titled "butterfly egg detectives"

Appendix D - Interview Transcripts

Wingerter (Completed 01/21/20)

HLS: Gonna get wind feedback out here?

NW: Yeah, but it's not much.

HLS: Okay, this is still [inaudible]. So I do, Natasha and do I have your consent to record this interview?

NW: Yes, you do.

HLS: Okay, thank you. And so the first few questions that I want to ask her about your background professionally and also in Lapwai specifically as a place because my methods are play-space. So first of all, what is your formal academic training or even just professional training?

NW: Yes, so I have a Bachelor's in Organismal Biology from Kent State and then a Master's in Biology from Shippensburg University and now a PhD candidate here at UI in the water resources program. I had a weird way of getting to the whole education realm. So when I graduated, I graduated twice from Penn State. So the first time I graduated I went into consulting, like environmental consulting and did a lot of like environmental damage through that job and I felt like I needed to do good after that. And I just so happened to get laid off during the Great Recession and so the state of Ohio deemed my job like, not hirable again within the next five years so I got to go and get trained to do education stuff. To be like in after school and before school programs and I worked my way up to being a lead teacher for a program that was focused on STEM Ed with inner city kids.

HLS: Great, and like because I remember you saying that you had a background in environmental education so I was just wondering how this all came to be.

NW: So with those kids I learned pretty quickly that if you just like, I started off with like just EPA curriculum and it didn't work with them. And I recognize that those kids would never have their needs met and would never be interested in science based on this pre-made curriculum. So as a result, the students kind of ask questions and led their educational journey.

HLS: So what was it about the EPA curriculum that you think the students were struggling with.

NW: They just didn't like connect. Like they couldn't be how that science would go into their lives. So like a question that we went through was we were eating peaches one day and the kids didn't realize that peaches came from a peach. Like eating canned peaches, they didn't realize that it came from a peach fruit and that there were peach trees. And that led us on a whole journey of like understanding farms and how you grow food and the whole like plant cycle which you wouldn't have expected from a conversation about peaches, having breakfast with the kids.

HLS: And so that was in an urban setting?

NW: Mm-hmm (affirmative).

HLS: And how old were those students?

NW: So those students who I mainly focused with were K through fifth grade.

HLS: Okay, so same age which was what we were working with.

NW: Yeah.

HLS: And after that have you done any more environmental education?

NW: So then, because I was a teacher and I needed to keep my license. I continued to doing my masters, I worked a lot with the Audubon Society, doing their stream education programs, worked a lot with the Gettysburg School District and at Carlisle School District doing like, the come have a scientist come in. Stuff like that. And

then, in my PhD I haven't really been connected as much as I have been in the past just because couldn't find my place here, I guess.

HLS: It's very different.

NW: Different, yeah, I'm used in urban settings.

HLS: It's not urban.

NW: And yeah, this is very different.

HLS: Well, given your experience in STEM education, how do you, if you could sum up your approach to science pedagogy or the philosophy of teaching science and stem in a couple sentences, what would it be?

NW: So I think that everything should be, I think you get the most bang for your buck, okay? If it's something that the student can personally connect with which I guess is why I thought your curriculum was really good and kids actually doing. So that whole being a scientist and seeing themselves as that as their future. So anything that aligns in with that and I don't really think you're going to get that if it's led by a set. I mean, standards can fit in however you want but if it's like a set, this is how we do X, Y and Z, they're not going to connect.

HLS: Yeah, I just remember, do you remember [student]? The kid he had a helper.

NW: Yeah.

HLS: She was like, we were coming back from like our first field day and the helper is like, "[student] thinks he's a scientist now." I'm like "Well, that's because he is a scientist." And she's like, "It's amazing."

NW: And like with my college kids, I do the same thing like, the standard college lab for level I teaches them, look at the data set blah blah blah and like, this semester I'm even incorporating more of, you're a scientist already and having them like present at a conference.

HLS: Sweet.

NW: so like, I think it's really important for a kid or an emerging scientists to grab that science-ness early on.

HLS: Totally. What course do you teach?

NW: I teach a junior level fish ecology course and then in the fall or in the spring I have like two more but I haven't figured out my teaching strategy completely with those kids.

HLS: Sometimes they're like, "You're treating us like fourth graders." And I'm like, "Oh, am I" Yeah, because you're acting like fourth graders. And so can you talk about what you do in Lapwai.

NW: So what I do in Lapwai for the most part is on the hard sciences side so for the past four years or five years since 2014, like I said, five years. I go down and sample the steelhead community, the steelhead fish in the Lapwai drainage. I also take a whole bunch of insect samples and I'm trying to understand how shifts in when the fish need food and when that food is available, how that's kind of misaligning as we see the effects of climate change. So and it kind of fits into like the Nez Perce circular calendar with that they have a season for everything. So it's based on a lot of those principles that you have a season for your steelhead your season for your white fish so yeah.

HLS: Cool, and how long have you been working in Lapwai?

NW: So since 2014, so five years.

HLS: Five years.

NW: Yeah.

HLS: That's quite a while.

NW: Yes.

HLS: What have you learned from this specific place context and so Lapwai as a place? What have you learned there?

NW: So, okay, when I first started working in Lapwai I hated the place. I thought it was the most awful place and I was like, why did God put me here? Like serious, I cannot do this because it was so different from where I grew up. It's not nice at all but then working in it more, it started kind of have meaning for me. Like I did an internship with the Bureau of Reclamation so like I understood the whole lawsuit behind the place I was working in. And that gave a lot of validity to like what, like the importance of this place to other people and then I kind of was like, "Well, it's so important to all these other people, why is it not important to me?" And that's actually a turning point in my dissertation when I realized this is something worth fighting for even though I could give a shit less about fish. This matters so totally and then I started like the place which is the problem. Like not the problem but.

HLS: You grew to love it.

NW: Yeah.

HLS: And that case that you're talking about, is that that Orchard case?

NW: Yeah, the Lewiston Orchards case.

HLS: Well, that's, and what other big takeaways have you learned in Lapwai about either your work or about the culture or about the just like the place itself?

NW: Just, I think like being in that place knowing that it has like a rich history through my time of working in Lapwai I've heard a lot of the stories and I don't know, it just gives meaning and like a personhood to that area.

HLS: Yeah, like a relationship.

NW: Like a relationship with that area. Like, just like some of the stories like the all the big boulders that you see driving into work are all the animal people who were late to the creation and I'm like, "Man, I would totally be one of those rocks." Kind of like, I

don't know, like knowing a little bit more about the culture has really gotten me to the point of understanding that place and seen it as more so like a family member than just Lapwai where it's hot and terrible all the time.

HLS: Yeah. I understand that. Learning about the actual thing and like this last question we can explore it a little more because I know that your work there hasn't been mostly focused on education but how familiar, like I didn't know I went down to Spalding, the place is weird because they've got coyote cradleboard down there that was taken off the mountain by Daughters of the American Revolution. And sometimes I just go down and look at it like, what the heck, it's kinda creepy down there. But I saw a plaque that was like, this was the first place of the first school and church in Idaho and that blew my mind.

HLS: And so I didn't realize studying education in Lapwai I was also like studying education in the hub of the colonization of like, okay? Are you familiar with the historical context of education or even science?

NW: Yeah.

HLS: [inaudible] can you go in?

NW: So where I did my masters was actually 25 miles from Carlisle so it was kind of a weird thing like, I've seen the whole, like history of that boarding school and then I come here and I see the effects of that boarding school and when you look at the BIA grounds in Lapwai, like in the city how they haven't changed a lot of those buildings associated with the schools. So it's like, I don't know, you see kind of like the scarring of colonization. And if you think about when the gold rushes first happened and Lewiston was becoming a city, like the tribe was, didn't want those people near their reservation, not because they're trying to convert them and everything to Christianity but because they represented a culture that they didn't approve of. It was drinking and prostitutes and Wild West and yeah, it's been interesting seeing that context.

HLS: And in your perspective and just how you view things, how do you think that historical contexts may interact with like Lapwai School District or even the class that we were working with?

NW: So I think, with my role even and why I was so hesitant to work with the schools, like I knew that like Lapwai School District is something that I wanted to work with but being aware of like the history of education with the tribe, like, it was one of those I didn't want to be a White Savior. I didn't want to further that colonization and weighting until I felt that I could be culturally responsible. Especially as a white scientist like that's, being aware of that and I wasn't really aware of that for a couple of years. And then yeah, like just not wanting to hurt anyone was the first step and then understanding how I could be a partner rather than a savior.

HLS: Yeah, the one with the solutions.

NW: Yeah.

HLS: Totally and I appreciate that and so we're going to be, I'm going to.

HLS: On to the second part of the interview, which is more about your participation in the landscape lessons project we did. I can call it landscape lessons because that's my approach to what I'm trying to do. I'm curious about your motivations for participation. I think you mentioned it.

NW: Yeah.

HLS: From my recollection... We've met at the science communication workshop and after hearing about your work, ask if you'd be interested in this project. It seems like you were looking for some opportunities anyways. What opportunities were you looking for before I approached you?

NW: Before I started to dabble with my Lapwai kids... because I do feel I need to do something to give back. I've gotten a lot from my dissertation, and it's not right to not give back somehow.

HLS: Reciprocity.

NW: Yeah. Yeah.

HLS: Totally.

NW: The four hours that got incorporated into my research, which is not typical for a Western scientists, but any who. I had started working with Nez Perce Tribal Fisheries to do some of their outreach ed. I had done some of that just with them. What was the question, I'm sorry?

HLS: I'm just mostly curious, before I approached you, were you already involved? Were you looking? What were you already doing?

NW: Yeah, yeah. I was working with Nez Perce Fisheries, doing a couple of just outreach events, but those were actually not with Lapwai kids, those were more so with... Is it okay?

HLS: Yeah, it's good.

NW: Okay. It was more so with kids from Lewiston. I think in the end, yes, I was helping the Fisheries Department, it's another body to help them out managing 60 kids or 40 kids. But it still wasn't quite satisfying enough, I guess to me. When you had the opportunity to work with kids specific in Lapwai who have a connection with this place and have basically a vested interest in its future, recognizing that, Oh, going and playing with some kids for a couple of weeks, that could impact the future of this place.

HLS: Honestly, you were talking about how your approach to STEM is student-led inquiry.

NW: Mm-hmm (affirmative).

HLS: It was so beautiful and magical how their inquiry led them to be curious about butterflies and you have a collection. The whole thought I was like,... To really see that... that was great.

NW: Well, and what's funny is... I took an entomology class here. I have a really hard time with killing things needlessly. Anytime I kill my bugs for my research, I thank them for their lives. It's ridiculous. What do you think of it-

HLS: It's ridiculous.

NW: ... from how Western scientists view this? They think it's ridiculous, but it is a life that's sacrificing itself for a greater cause. The whole time I'm collecting those butterflies, I was having all these emotional issues. Like this is just for a class, this is just for a grade. [Siemi Metso], he and I were chatting the one day about it, just me saying, "I just do not feel comfortable doing this," and they needed a lot of bugs. He said, "Well, why don't you use that as a teaching collection?" I've just always had it in my closet as, "Okay, anytime I go teach this, I have this whole bug collection and give another purpose to these lives that have been sacrificed."

HLS: That's fantastic.

NW: Yeah. That's the only reason I have that. The only reason I didn't donate it or do anything else was [inaudible]

HLS: Yeah. That was so great. They were looking at that while they're coloring.

NW: The other thing with that collection is... in my head, "It's my education collection, they can touch it all they want." I think a lot of times kids don't get to touch. If you go the Smithsonian, there's all of these awesome bug collections and you can't touch them. You got to touch science to be a scientist.

HLS: Heck yeah. What was your initial impression of the project when I proposed it to you?

NW: I think I was like, "Okay, this is cool. I have no idea what we're doing, but you know what, whatever." It's cool. I think that's just my thing.

HLS: Why did you agree?

NW: Because of the potential to help those kids do their-

HLS: In Lapwai.

NW: ... their future in Lapwai, yeah.

HLS: Cool. I also wasn't really sure a lot of things when I proposed it. I'm really grateful for your support and your participation and how flexible you were to till I just feel that I'm like, "Oh, actually we're going to be in the classroom." You're like, "Okay," on the fly. I just really want to thank you for sharing your expertise in the park and in the classroom and supporting me in this process. I intentionally designed this process as part of the methodology, dependent on full participation from a teacher who would meet me as an equal partner, and that was Beau and also local experts who could come in and act as equal partners and be flexible with the students as a group of researchers together. I think that the success of this project is due to your skills and your dedication and your flexibility. I'm curious about how you felt the participatory planning process went.

NW: Knowing that it was going to be a student-led, they're going to do what they want to do kind of thing, I think that gave you a mindset automatically or gave me a mindset automatically of "Okay, this is going to be flexible," that kind of thing. The one day that I had to miss because I was sick, I felt so guilty and I was like, "I don't even have a relationship with these kids yet and I feel terrible about this." But I think it was because you really saw these kids care about this. They had... I don't know how to describe it... like a grasp, not a grasp but... I'm losing my words. It was like they're a little baby.

HLS: I was talking to Beau and he's like, "Yeah, normally I'm like, "Okay, get on the internet, research dogs." But because they were invested, when it was time for them to do research, they automatically knew exactly what they wanted to research.

NW: Yeah. During the time that we were in the classroom, the one day, the one kid who sat at the table that was closest to the door, two seats in, I guess not at the end-

HLS: Little dude?

NW: ... one, two. He looked... I can't remember what he looked like. I just remember where he sat. But just looking up stuff, knowing what to search, finding a book about what we were learning about. That's how you do research.

HLS: Exactly.

NW: When you think about it, a lot of how we do research is self-taught, and just self-taught himself. It was insane.

HLS: Yeah. That student in particular gave me so much joy. In his passion for discovery, I was like, "Yes." It was so good.

NW: Yeah.

HLS: How was the vision for the project shared? I'm asking for a feedback from you as a facilitator of a participatory research process. How was the vision shared with you?

NW: Like the overall vision of we're going to-

HLS: This is what we're going to do.

NW: This is what we're going to do?

HLS: You don't know.

NW: Yeah. I don't know if other people would be the best with that, because it's not a practice that people give validity to like, "Oh, how are kids going to learn everything that they need to learn in that format?" But I think, I don't know, being somebody who's seen how that process can work and work really well and be more effective than traditional methods, I think I was maybe a little bit more open to that type of vision of, "Yeah, they're going to collect bugs today." I don't know if everybody would be okay with that. But I think if you maybe shared like, "Okay, you want some science facts of why this has been shown to work," I think that would be a little bit helpful. The other thing for me is there was no risk in, if they failed, whatever, the kids got to play outside every day or every Friday.

HLS: Exactly. Especially doing standardized testing.

NW: Yeah. That was during their standardized testing at what time?

HLS: I was like, "Beau, what if we do this during standardized testing to give these kids a fricking break?" He was like, "Yeah, yeah, yeah, let's do that."

NW: That's brilliant. Those kids, healing powers of nature, being outside, that's got to be great. That's an awesome plan.

HLS: Yeah. Okay, good. Confidence in project, and please be honest or if you don't want to be honest, we can just move on. But can you think of any times you're unsure about the project or unsure about me?

NW: I wasn't unsure about you or the project. I think more so I was unsure about myself, and being able to be an expert because butterflies aren't what I do. I guess the day that we were inside, I spent like 45 minutes searching like, "Okay, I need to know all the different life cycles of a butterfly, because I don't remember them all. I know all these textbook answers." But I'm like, "Do I really remember the basics?" I'm like, "Yes, I do." But still I guess that was the only time I really felt unsure about anything in this whole time I guess. I think at the end of the day, even if the project didn't work out, those kids were outside. I guess that gave me confidence that it was a safe fail environment.

HLS: Yeah. They were asking some of those questions. I tried at the end of each session get like, "What do you still want to know about?" Then I would structure the next session to be addressing what they wanted to learn about. They were asking questions, I was like, "That's a dang good question, I have no clue."

NW: I was like, "Wow, what question was it?" I think one of the kids asked something about spots and butterflies, and I was like, "That's a really complex question. I wrote a graduate paper on that... it was evolutionary development level question." They just continue to shock me with the thoughtfulness of how they were thinking.

HLS: There's such preceptive as that class. I know each class is different all the time, but that group of students is super perceptive.

NW: Yeah.

HLS: This is on the same vein, from your perspective, how did the students engage with the content and the challenges we brought them?

NW: I think they were pretty much always engaged.

HLS: Yeah.

NW: I think the best day or the best time that I had was, and this is going to sound statistic, but the day that we went to catch bugs and they didn't really catch any bugs, in my head I'm thinking, "This is me almost every time I do research." I think I said that to them a couple times. I'm like, "Some days science doesn't work out." Just seeing the students be able to understand scientific failure even though... I think people put scientists on a pedestal and they don't ever think that scientists fail, and most of our job is failing. [inaudible], they're glorified. Oh, they're so smart." No, science is just about asking questions and having one or two successes in your lifetime.

HLS: Yeah. For sure.

NW: I don't know. I felt like that day was the most sciency.

HLS: Cool. That's awesome.

NW: Like a real science, not that textbook scientist stuff.

HLS: Yeah, totally. Because they were really interacting.

NW: Yeah. They were really upset. Like, "I only caught an ant."

HLS: Then the butterfly started coming back and they'd be like, "I saw a butterfly." I'm like, "That's great." It worked well.

NW: Yeah. You could tell like, "Oh, they're being perceptive to their environment."

HLS: Do you think there's anything particularly that was a struggle or that wasn't connecting and wasn't engaging with them?

NW: I'm trying to think. I think the only activity that was a struggle was when we did the plates of the butterfly life cycle. I think you could see some of the kids self-limiting in that activity. I guess that was a struggle to... because you wanted it to be like, "No,- ... it doesn't matter," and you're really good. Every kid had a different element, and it shows that everybody has a different skill set, and all of that can be brought to science. But I guess it was such a struggle, to watch them just feel like, "Oh, I don't feel like I'm- I'm not doing it right.

NW: Yeah. Yeah, exactly.

HLS: I just have a couple more questions.

NW: Mm-hmm (affirmative).

HLS: Based on your five years of experience, what are some potential outcomes this project may have for the students in the school and even the community?

NW: Start big at the community level.

HLS: Cool.

NW: What I see of the people who work at the Tribe in those higher level jobs, they're all white people in the natural resources for the most part. That bothers me. It's because those jobs require master's or PhD stuff and there's such a minority of native students who go on for the master's and PhD. At a community level, it's keeping that Tribal autonomy, being able to run their natural resources programs because of their culture and their connection to that land. Like I said, it took me four or five years to get a serious connection to this land. They have that already. Getting to the point of having Tribal people run their own programs I think is important at that big level.

NW: At the school level, I think a program like this really shows that different methods work for different kids, and giving validity to that, especially with how engaged those

students were through that whole process. I'm willing to bet that they could tell us a heck of a lot about butterflies still today, so that potential of that knowledge that they gained and also that feeling that they had. But I think that helps at that school level for validity of a process. Then at the student level, I really think those kids are scientists. You can't tell me that those kids aren't scientists. It might get knocked out of them by the time they hit college and masters and PhD level stuff or levels, but those kids in that setting were scientists.

HLS: Planted that seed.

NW: Yeah. Yeah. I think that seed just doesn't get watered. You don't take care of that curiosity, it goes away. I think one of the famous scientist basically said every kid's a scientist, it's just a matter of continuing to ask questions and not telling them that they're weird, that they're stupid or that they have to fit into a box.

HLS: Yeah, totally. Unfortunately, what's true in education is all about modernizing knowledge. That's another reason for this project, to be directly opposing that, and be like, "No."

NW: Yeah. Yeah.

HLS: Overall, if this project happens again in Lapwai, starting the fall, if we were able to do this curriculum all through the year, what would you like to see done differently? Think as an expert.

NW: Again, I'm not most aligned Western scientist.

HLS: [inaudible]

NW: I think it's important for these kids to see that tech is equal or better than Western science. I think I missed the day that cultural was with-

HLS: We did a really... there was a gap.

NW: Okay. I think that would be the one thing as having that cultural tech be taught or be incorporated along with black kid doing Western science because it's still valid.

HLS: And then intention was there, it just did not occur.

NW: Yeah. It's difficult too. It takes time, and it's more than time. It's a very sensitive issue too. I guess it's like, you got to try it so lightly.

HLS: The story about how butterflies came to be-

NW: It's not-

HLS: It's not appropriate.

NW: Yeah.

HLS: Yeah. I joke about that with Josiah a lot, he's in Cultural and he's like, "I don't know." I'm like "They're asking questions." But I think what we did this spring has opened up potential to do this again and have it be more interwoven. On a scale of 1 to 10, one being heck no, 10 being absolutely, how willing are you to participate in a similar project?

NW: Absolutely, 10. I think I also did some of the upward bound stuff with kids in Lapwai and some of the kids were on there. But I think this was more rewarding, some of the most rewarding stuff I've done outreach-wise. I didn't really do anything.

HLS: Just hung out.

NW: I just hung out with the kids. I don't know, and just said, "Oh, you're a scientist," because they are, and truly believing that, I guess.

HLS: Yeah. If you were to participate again, what ways would you like to participate invest in it? And you could think about this like how many hours a week or a month could you put to it or how many days for fall semester and spring semester would you be willing to participate.

NW: So long as it can work in my schedule. I would be willing to give a day. I love the Google method of productivity, where 20% of your time is spent not working on your

current project, which is why I have so many different projects. But I think it really helps you as a person for not hating your dissertation.

HLS: Yeah. Also, I talk about this with my friends who are doing PhD, it's like, "You don't know it, but you're always learning." It's not like you probably have big aha moments once every few months. The rest of the time it's just like... But I feel like being out there with those kids, it's a different way to look at stuff.

NW: I joked with my committee because I had taken my candidacy exams the week before we started. My advisor left the country and it was like, "Oh just get your stuff done." My advisor has very loose requirements of me anyways. But it was like, "Okay, I need to mentally recoup after doing this whole candidacy exam thing and oral defense and proposal defense kind of thing and seeing the value of your work, even if it's not your work directly." I don't know. I guess that was what I needed. I feel bad because I gained a lot out of this and I hope the kids gain stuff out of it.

HLS: I think they really did.

NW: Yeah.

HLS: I think that we're... Mercy and I are talking about, "Okay, well let's do this, let's do it," and trying to get some local knowledge, cultural knowledge embedded, she's trying to fly a drone to map out the habitat and maybe this could turn into habitat restoration, blah, blah, blah, blah. We're trying to really figure out how to integrate this in. It seems like Beau might be interested. Again, I'm not trying to force anything, but things are shifting into place. Do you know anybody else, any other grad students or people at Tribe that would be interested?

NW: Yeah. Grad students, everybody knows graduating, but I do think students in the Cadel might be perceptive just because it's closer than... I think I do they lot of work [inaudible] in Alaska, but it's a way for them to use their knowledge with salmon, lamb prey, the things that everybody cares about with an outreach situation. I could give you tons of names, but I'm protective of my Lapwai, which is ridiculous.

HLS: No, I really respect that. I think Beau mentioned something similar. Everybody wants a piece. We're talking being flippy-floppy on the Western science. It's a sacred thing and it ought to be completely respected. I wouldn't want to involve anybody who wasn't aware of that. I really again, appreciate you in your willingness and your intuition here.

NW: Yeah.

HLS: If it does happen, if you know people at the Tribe want to involved. If we're going to be working at that nature park, you already introduced me-

NW: Yeah, to Rue.

HLS: ... to Rue.

NW: There is a [Cierra High Eagle]

HLS: Yes. She's in the same department as me. But I'm having to talk to her because I'm shy.

NW: She's a bad ass. I think she would be a good role model because just like how I think Mercy is a really good role model. Mercy had a lot of influence on my science and she probably doesn't even know. But understanding how she even really struggles with the indigenous knowledge side versus the Western science side, having to wear those two different hats, and recognizing that both are very important, but how do you do it? I think that's important for kids to see if you're going to incorporate multiple knowledge systems, just understanding that just a scientist fails. I don't think she would show that. I don't know. But Cierra is also Western-trained. She's young and super cool.

HLS: Yeah. That's really good. I'll probably have to do like, "Hi." Is there anything else you want to add or any questions you have for me?

NW: Let's see. I guess you make me realize that Lapwai has really developed into a place that I care about. I care about it. I guess that question about asking who else, I could give you a ton of names, but I don't want to give them to you, which is terrible.

HLS: No, it's not. That's totally fine.

NW: I guess I've never really made that connection that I care about it more deeply than I thought I did.

HLS: That's a really awesome thing to hear. That's totally valid and awesome.

NW: Yeah, yeah. I want to do this again.

HLS: I hope we can. I think that Beau is like, "I'm surprised you got Tribal approval."

NW: I was too.

HLS: Honestly, I've been working on this project for three years and developing it with Josiah, things are crazy, cultural resources right now, they're so busy. But I feel like my intention is to take this information and to bring it back to the school and the cultural resources into water resources and say, "Do you guys want to do this? because it's cool.

NW: Yeah.

HLS: They're already doing the metamorphic. They're already learning morphosis. If they had little worms in their desk. I feel like if it's possible I might be able to get some milkweed donated and maybe we can plan more butterfly and... we'll see what's going to happen. Again, I don't want to force it, but it's good. I think Mercy's into it. It could just be so cool if we could actually get the students trained in the fall and then in the spring actually have them doing transects and egg counts for data collection. I don't really feel comfortable telling native people what to do, but also as just young people to be able to go out there and do that. I really hope that it works out. Again, I appreciate everything that you bring to the table. I wasn't aware that you do work with an indigenous methodologies framework. I've grappled with that too.

NW: Yeah. I really struggled for a good year with the whole... it's like all of a sudden you woke to all the issues and you were like, "Oh my gosh." Going through a guilt process of, "I'm just giving into this system, what can I do to give back? I am just taking, taking, taking." I guess we talked about it in the science communication thing. I still struggle with it. I'm giving the Tribe data that they want and finding ways to reconcile that. Now I'm to the point where I'm like, "Oh I have a class full of college kids that need to learn how to eat fish and the Tribe needs data on fish." Like, "Let's go do that for free." Understanding my place within Lapwai and when to step back and when to give and how to give I guess has been a real weird journey.

HLS: Yeah. That's really good to hear. I feel like your positionality within this and being like, "This is my position in all of this. This is exactly who I am. This is what I'm good at, this is what I'm not good at. I'm here. Love you guys." That's been really good to hear.

NW: Yeah. I think it should be a requirement that every person who does research on native lands or with native communities should have to take a course on indigenous methodologies or something like that to understand, or a history course even, what Western science has done to people. Even my approach, I have an opportunity to go back and work with some urban communities and researching more about what scientists have done, the black communities. I'm like, "Oh, okay." I'm going in, having to heal and mend kind of. I am a representative of that past and having to be a representative of what I would want the future to be like. And just being aware of that. Most scientists, they're like-

HLS: They don't even know about the [inaudible] people [inaudible] from the 15th century, which are like-

NW: It's just insane. We don't take any courses in ethics really. Or if we take an ethics class, it's how to treat an animal humanely, which I think is funny we treat animals more humanely than we treat people.

HLS: I think that things are changing. I'm really excited for the future of science given the emergence of indigenous methodologies. It's fascinating to me to have people who

are so trained in Western Academy. when you start bringing it up, they're like, "Whoa, what?"

NW: "My committee?"

HLS: Yeah. They're like, "How dare you?" It's like, "No, no, no, no, no. These exist because Western science exists." There has been a lot of conflict, but it doesn't need to be that way.

NW: As an example for that, for a good half an hour, 45 minutes of my candidacy exam, it was fighting me on... I think I answered a question of, how we respond to climate change from a data perspective? I said, incorporating tech I think, or other alternative worldviews. It doesn't have to be tech, it can be Buddhist perspective, stuff like that.

NW: My committee, one of the members hit me really hard and he's like, "I don't believe that if you get results from Western science that don't agree with your alternative knowledge system that you'll stand up for that Western result." My head was just shattering. "It's not how it works. You have cool validation. Western science isn't going to validate indigenous science at all." Trying to get them to understand that-

HLS: Phillip Stephens is on my committee. I was talking to him about quantum physics and mathematics and he's like, "We've known this for so long and you guys are just starting to figure it out and it's blowing your minds." We're like, "Whoa, everything's connected in the fabric of the universe's relationships." They're like, "Yeah, welcome to the party."

NW: Yeah.

HLS: I think it's fascinating. In my proposal, we ended up with Phillip Stephens being like, "Well, have you read Food Co?" I was like, "No, I have a business degree and a degree in economics. No, I haven't read Food Co." He's like, "I'm not approving you until you read Food Co, and then just leaves, I'm like, "Okay, here we go, Food Co." Have you read Food Co?

NW: I think I've read excerpt of Food Co. He came in and talked to our class.

HLS: It makes sense. Overall, I think is critiquing the very thing that he comes from, or they come from, but that they never fully acknowledged their positionality. Food Co directly benefited from being part of the bourgeoisie but critiqued it yet never acknowledged the positionality that they have.

NW: That's another thing, Western science, they teach you so hardly that you are separate from your research. That's not how life works.

HLS: No.

NW: You could say that your objective as much as you want, but your whole research question, the very last questions is all based on your worldview. I'm a community ecologist because I was raised that everything is connected, the values that were instilled in me. It's funny to me. I know it's a fallacy, but it hurts me as a scientist, but I really struggled to understand how my advisor thinks with the populations individuals, rather than as communities. I'm like, "I just don't get it. How can you not think about the community the whole time? They're all connected."

HLS: [inaudible]

NW: Yeah. But I see the value in a diversity of worldviews rather than-

HLS: Homogenizing knowledge systems. We know what happens when we homogenize other systems. I really appreciate that. I'm just going to... Thank you very much.

NW: Yeah.

Woodford (Completed 01/21/20)

HLS: ... Right now. Okay, cool. So have you reviewed the IRB consent form? I think you did, because you sent it to me.

BW: Yes.

HLS: Do you give consent to this interview being recorded?

BW: Yes.

HLS: Okay, awesome. So the first few questions, there's four, are about your background as an educator and your experiences teaching in Lapwai, so focused on Lapwai as a place. First, I'm wondering, why did you choose to pursue a career in education?

BW: It was always a natural thing for me and I grew up in a household of educators, so it was part of the conversation in the background of everything that we did and talked about. So it was a natural thing for me, and then even in other jobs and potential careers that I looked at and went into, I ended up gravitating towards or being assigned to do teaching of different things for those things anyways. So after a certain amount of time, it was just like, well, this is what I was designed to do. So that's why teaching.

HLS: Cool. How long have you been a professional educator? Because it sounds like you grew up with educators-

BW: Yeah. I've had my own classroom or been in charge of a classroom or whatever, that responsibility, for 11 years. I subbed before that, so I was a substitute teacher for three years before that.

HLS: Yeah. Was that at Lapwai Elementary or in the Lapwai school district?

BW: Yeah, I'd subbed in a lot of places but yeah, primarily in Lapwai. I kind of lived on the road in between Grangeville area with a job with the forest service in Lewiston, my wife lived in Lewiston and I did the forest service thing and lived in between. Then when I was laid off, I would sub in the Lewiston area and then quit subbing in Lewiston Clarkson area, just because at those schools I felt like I belonged out here better. Liked the small town feel. At least, it was familiar to me and so gravitated towards Lapwai and was able to basically sub every day if I wanted to.

HLS: Cool. Yeah. I was thinking about subbing next year. Since you've had your own classroom, what grades have you taught?

BW: Taught fourth and fifth, both.

HLS: Cool. The next one, it's kind of a challenge so you can take your time, but if you could sum up your approach to pedagogy or your personal philosophy on how to teach and facilitate learning, if you could just sum it up in a sentence or two, what would it be?

BW: That's a big one. I guess the things that, when I think about school and I think about kids learning, understanding that a kid is not a blank slate that rolls in the door and doesn't know anything is pretty foundational to the way I approach teaching. So kids come completely loaded with ways of thinking and knowing and doing, and if you think of kids and think of a classroom like that, that they come with social skills and content knowledge and address them accordingly, you can build strong relationships with them and you can teach them where they are and what they know. So that's what I try to do.

HLS: Yeah. Awesome. I also found that article that someone at U of I wrote about your classroom, your work with Vanessa.

BW: Oh yeah.

HLS: Yeah. That was cool. So you've been working at Lapwai Elementary in an official capacity for 11 years, as a classroom teacher. What have you learned about teaching from the specific contexts and place context of K through five education in Lapwai?

BW: Well, I've gotten a firsthand look at how thing in education aren't always as they seem and things aren't always fair and the education system is very political and it's very much power structure organized. Working here has really opened my eyes to the idea that it's really easy to create labels and lists and generate achievement and blanket statements across the state for what's a good school and what's a bad school based on what these numbers and things mean. But it doesn't reflect intelligence or the capacity of a community or a group to really do great things day in and day out. So it's been interesting to see that where working at other places and having friends that work in Lewiston area or different schools or even my parents in different context that they haven't seen that or don't understand that. But anyway, [inaudible].

HLS: You mentioned some power dynamics stuff. How does it relate to the power dynamics of working for the forest service as a wildland firefighter seasonally?

BW: I'm not sure I completely understand.

HLS: Yeah, we can move on.

BW: You sure?

HLS: Yeah, and if it comes up later, that's okay too. But I'm curious about that because I don't know. I'm not in education. I'm pretty new to education, and so I was just curious about that. But we can-

BW: Well, I guess my thought about power structures in schools and that is the way that initiatives roll out a lot of times is, predominantly education's controlled by the state. They, according to the constitution, have the ultimate say in how education ... It hasn't always been that way. There's been plenty of federal mandates that try to force the hand of states to do certain things. But Idaho being a really small state population-wise and that kind of thing, we're not that important nationally. So when you start thinking about curriculum, you start thinking about initiatives and things like that, Idaho a lot of times gets left in the dust, and working with a group of people like Nez Perce tribal people and that kind of thing, when they don't make up a very significant amount of a very small insignificant state, marginalized is barely even a fair thing to say. It's even worse than that.

BW: So you don't get curricular materials, you don't get assessment materials that are very significant, and you still have to abide by, since we're a public school, we still abide by any of the state policy that rolls our way, any of the federal policy. So as you get national standards and you get national curricular moves and all these different things, whenever you have assessments that ... Common core state standards and you have multiple states and consortiums that adopt all that, the bigger and the more standardized that something gets, the more it negates the individualisms that diversity brings.

BW: So people get left in the dust and then the question is often, well, why aren't these kids achieving? Or why is this school so bad? It continues the myth of, well, kids in poverty can't learn, or native kids can't succeed or that kind of thing. It's a self fulfilling prophecy because a lot of the system wasn't generated and built for them to be successful. So, it wasn't with them in mind. So anyway, that's kind of I guess where I was going with at least some of that.

HLS: Yeah, I think that's powerful insight too. I've been so inspired and impressed with how in tune and aware you are, so I really appreciate that.

BW: No. All right. Well, cool.

HLS: Yeah. Okay, we got one more on this section. I went down to Spalding Park a few months ago and read the plaque and it was, "This is the site of the first church and school in Idaho," and that blew my mind. So I'm wondering how familiar are you with the historical legacy of education in Lapwai and Spalding? Are you familiar with that history?

BW: To some degree, to some degree, and there's a lot of the knowledge that I have about any of this stuff has come from firsthand accounts. Just people that were there. I know you know Josiah and he's a pretty awesome historical expert on things and he's not the only person I've talked to. There used to be a lady from the community, lives here in the community and she taught third grade for years and years and years and some of the stuff came from her. My understanding of any of the legacy is just a lot of what is described as just trauma. Trauma from the educational system that was imposed here bears ... I've heard more than one story of boarding school roundups essentially locally in this area with kids where the government would show up and literally kidnap is the only way that I would be able to describe it.

BW: Grab kids, kid would try to escape, they would grab kids and then stories that I've heard from people in the community where generations back, they would be kids, right there on the spot, they would cut their hair, which was a big statement for assimilation. They'd cut hair, they'd load kids up, and the kids would be gone. A lot of times parents are left wondering if they would see their kid again. There wasn't

any kind of communication. Because of that, because of the trauma that was associated with that and how the language was considered taboo, and even in grandparents of kids that I've had were attending school, not necessarily boarding schools but attending any kind of school. If Nez Perce language was spoken, the kids were beaten or whatever.

BW: Certainly it was corporal punishment for sure, for any of that kind of thing. So, a lot of times the sense in the community can be distrust and generationally just a not comfortable feeling with anybody representing government, representing the school. That's a really tough road for a school to fight against because it's a perfect storm. Not only do we feel like we're not doing that, we have no way to tap into that sense of fear and anxiety that the school can create for people. So, while I don't understand it completely, I just know that it's a real thing and it's something that educators here have to be very mindful of because the implications are a lot of times people by default don't support what's going on at the school. So just keeping that in mind I guess.

HLS: Yeah, and now we're talking about trauma and also for us, I'm not saying for us, but someone who didn't grow up in Lapwai, I don't want to be triggering with this question, but have you personally encountered anything like that or do you have strategies for how you work with that in the classroom?

BW: So yeah, I guess it goes back to my approach to teaching here is that, first of all, you're not the expert. You roll in. I'm not the expert of this place for sure. Second of all, it does take more work. It is going to be more work to win kids over. But the kids are unbelievably perceptive and the kids are unbelievably intelligent when it comes to reading people. If you can win kids over, you can win over their families just by being good to their kids. That word gets out and not assuming that ... When I first started teaching, I really wanted to believe that all kids were the same and I thought that that was what college taught me. I'm like, okay, I'm a good student. Kids are the same, treat them the same, everything's good, colorblind, I'm that evolved.

BW: I realized that if you ignore that, then you negate the culture, you negate everything that they bring to the table that's different than you. Just because it's not your idea or

the way you would do it, doesn't mean that it's not valid. I don't remember when it was, but the realization hit me that, okay, learning didn't start 150 years ago or 200 years ago when that school was established. Certainly Nez Perce people have been learning for thousands of years and thriving. So how is it that now I'm in a position that I should know better or something like that?

BW: So just that honoring that or allowing for that or telling yourself to just hit the pause button when a parent does something differently than you would have done or a kid responds in a way that's a little bit different than you would in that. Just understanding that it'd be easy to classify it maybe as a negative thing. Like, Oh, I would've never, or I can't believe this kid did, taking a step back and said, all right, and really being reflective.

BW: It takes someone willing to actually say, and it's hard, it's an ego check, but I'm might not be right in this situation. So just trying to do that and allow that freedom I guess, or that reflective moment, I think it solves a lot of issues that other people have struggled with. Real struggles and teachers have left this building or were forced out because they just couldn't figure that out. But anyway.

HLS: Great. Thank you for sharing that.

BW: Yeah.

HLS: Now we're going to move on to the next part of the interview. These questions are about the landscape lessons project we collaborated on over the last year. I just wanted to just debrief and talk about it and see what your impression was.

HLS: First, I designed ... I've been working on this project with Josiah for a couple of years, three years. It was just, we were struggling because I couldn't ... wasn't finding the ... teacher. I was looking for a teacher who could meet me equally and be a partner on this and it just was falling through. I was considering doing this project in Donnelly or where I'm from. Then I met [Gianna Boulafontes], my friend's CSA. She told me about you and she said that, "Oh, I know this teacher who might be interested."

HLS: So I was wondering, before we got connected, can you tell me what you were looking for, what your idea was or how Gianna knew that you were interested in something like this?

BW: I don't know. I really don't know. It connects back to things that we were just talking about in that if you want to develop trust and you really want to honor a way of knowing or a way of doing or a community in general, and you really want to honor that, it has to be more than just in words.

BW: I don't think I'm the only one in the building, by a long shot, that embraces that idea that if you want to break down and create trust, you've got to open up the building to people from the community to come in. It is a district policy that we have that we invite at least a minimum of three community members per year to come to the classroom to share, to teach, or to be a part of. In fourth grade we've tried to take it to the next level and really tried and not ... and to seize any opportunity that we have. It's been something that I've been trying to do.

BW: It's weird to me because I grew up in a small town. I was not an outsider but I wasn't born there. I was born in Missoula and then we moved to Grangeville. Small towns in Idaho, everybody's related. Everybody is just ... it's one big family. It's absolutely no different here. Everybody's related and maybe even a tighter family circle.

BW: Getting out into the community and allowing the community to become part of the classroom and getting the kids out is really critical. What differs from Grangeville small town community where I'm from and here, is that there is literally a community center. People go there if it's a check in, check out thing. Where I don't know if it's a component of tribal life that is just really, really well established or if ... what it is, but it's a very different feel from the small town I grew up in where people go to basketball games, but there's not that sense of lives that just completely overlap in so many different areas. Everybody where I'm from, they had their thing and then ... but then you had your own. You pull back at some point and it's probably more consistent with European culture.

BW: I honestly don't even know. I just know that here, everything overlaps. There's community center and there's community garden. There's all these different spaces. So trying to get kids not just to be learning and doing and being here at the school, but literally taking stuff there that we were doing, and even instead of inviting people in, trying to go one step further.

BW: We were learning about drones last year at this time and we were flying. Most of these grants and things that schools qualify for that you have to have parent involvement or whatever. What that usually means is send home a bunch of flyers and for parents make it to the school to watch you do something and then leave. What we did was just, knowing how the community is, we went to the community center. We set up literally right out front of all the offices so everybody that went on lunch had to walk right through the middle of us, "Hey, everybody," that was rolling by. Kids were running up and teaching people how to fly drones because they had become experts on it. So trying to take things on the road.

BW: No different than the work that you were doing and the kids were doing at the canoe project where it's not about ... The learning can happen wherever. Going out and literally trying to be in these spaces and places so that people look at you and they go, "Oh my gosh, the school is not what I thought it was. They're not trying to pull my kid away from me. It's still not the same old school that tells me that they're getting out. They're doing the things that matter and they're in places and spaces that matter."

BW: I think I probably had conversations like that or Gianna seen evidence of that that just, if community's a big deal to the kids, then learning in the context of community should maximize my mission here academically. It should only help do that.

HLS: Great. That's a smart idea.

HLS: What was your initial impression of the project when I proposed it, just like, "Hi, I'm Hannah. This is what we ... I want to do." What was your initial response or impression of that?

BW: Well, I thought it was ambitious and I thought it would probably ... it would be cool to get ... Honestly I thought we would have more interactions with elders from the

community, I guess, is my initial impression. So I thought, "All this will be great." I don't have tons of community contacts and I thought, "Oh my gosh, she's going to put us in touch."

BW: It turned out that it wasn't so much an elder connection as other experts in other fields in the community, so that turned out to be a surprise. It was, I thought, like I said, it went right in line with the idea of opening things up, going here, going there, having people come in. I thought that that would be a good fit for the way we do business.

HLS: I thought that we would too, we would be working with more elders and people who lived in Lapwai but it wasn't getting traction. In some ways I feel like perhaps this opened up an avenue to involve more in the future. We can talk about that in just a little bit. I do want to respect your time so if we got to get off of this call, too, we can.

BW: No, yeah, I'm good. I'm good for a while here.

HLS: I just, I wasn't really sure of a lot of things when I proposed it besides that I might ... I prefer to work with kids outside, working together to explore and investigate. That's what I knew and I was grateful that you were willing just to let me come in and observe and that I got to just be a fly on the wall for awhile while I was learning about your classroom and then the culture there. I quickly realized at the beginning that I wanted to keep the project separate from afterschool program and [inaudible] protecting. I'm grateful that you were willing to be flexible with me and moving into Fridays and also the great weather that we had.

HLS: I guess this next part's about the process we went through. Acknowledging that it was ambitious and also not knowing what was going on. It was intentionally designed to depend on full participation from a teacher and from experts. I think that the success of the project is due to your skills and dedication to your classroom.

HLS: How did you feel about the process of collaboration or co-design or trying to work together on this thing that we both weren't really sure what was going on?

BW: My initial apprehension was because I have ... I've gone down that road. I have a certain timeframe agenda kind of thing and I can remember trying to get tribal

approval. Just because it's an issue ... I thought that things, from that standpoint, I wasn't sure that everything was even going to get off the ground, I mean, even from that. Just knowing that it's important to you but there's a lot. Everybody wants a piece of an indigenous culture.

BW: We are bombarded, as an elementary school, we are bombarded and have had many chapters and many books written about places. People want to be here and they want to study it. That doesn't mean that the tribe is always big on getting that so I wasn't surprised as long as even approval took, I was worried that things wouldn't happen and you wouldn't even be able to get off the ground. So when I say, "Ambitious," just knowing, having gone down that road myself before and trying to do action research and I was just frustrated to no end because I couldn't get things the way I wanted them and when I want it and that kind of thing.

BW: So I thought that we had a slow start but then again, I thought that the collaborative planning, I thought one of the cool things about it was that ... your willingness to have a direction in mind and do a lot of the legwork on your own and come up with time-honoring ways to get things done and to do things. That was good. I've been involved with people that I have literally, in other schools and places, where I just get to a point where I just say, "Okay, we're done. We have to be done because this is becoming more about ... It's taking away from things and goals and directions that we really have to do."

BW: It's not just because I know I am a rule follower to some degree, and within the school there are just so many goals and directions and expectations that we have. I'm sure you sense that in conversations but I appreciated the fact that you kept that in mind. I have no complaints about any of that. It's clear that you had a certain plan in mind and wanted to do and then when things weren't exactly as they were, the demands that you had, you still sought my input but you didn't increase the demands on me to fix or make something happen. I really appreciated that.

HLS: Well, thank you. That's something that's really important to me as a collaborator and someone as part of a true co-design process is sharing that responsibility and being complementary. I appreciate that feedback.

BW: It's not always like that. In fact, I was part of a thing last year and it wasn't. It wasn't. It was going to be like this, it was going to be like that, this is what it was told to me. And then I was ... I had to be in Moscow on such and such. Finally I just said, "I'm out. It sounds great. Good luck, but this is ... I'm not your huckleberry." It was cool to be a part of something that was different.

HLS: I've never heard that phrase, "I'm not your huckleberry." That's funny.

HLS: From your perspective, how did the students engage with the content and the challenges or the inquiry that I brought in? What did they react well to? What did they struggle with?

BW: Well, it made it real. That's the tendency of, I guess, the efficiency that a school system with students that are significantly behind academically by the measures that we use, the natural flow is to get ultra-efficient which cuts out a lot of the real world living, breathing application pieces that learning ... that's a part of learning. It's stuff that makes school boring.

BW: There's plenty of research that shows that kids in systems like ours will learn and they will benefit, but it takes a lot of the life out of what we're doing. What the first thing I noticed is that kids were honestly excited. They were honestly excited about the things that we were talking about and learning about. And it was foreign to them to begin with, the idea of observations outside of the school. In our classroom there was an opportunity for them to express their individual thoughts but when you put somebody out in the real world, there's a lot to observe. So you have to find places that you turn on and turn off in your brain like, "I'm going to ignore the fact that ... I'm going to grab a parking lot and I'm going to focus 400 yards off in the distance," or, "I'm going to ..."

BW: So just those, some of those real world skills, so I saw life, I saw excitement. And it carried over. The other thing I noticed with that was once we started getting out and going and doing that, providing that as a backdrop to what we were learning, it made a lot of the stuff that we were doing in the classroom not a classroom activity but a

way to enhance what we were trying to have the kids discover and things that they were leading ... going towards from out in the field.

BW: A lot of times there's a lot of different reading sources and things like that that we use in the classroom and they can become key as well. I would put things on the board. I tried, even in other lessons and units that we'd done throughout the year, I'd try to house like, "We're going to get on this online program and I really only want you to be reading about whatever it is we're studying." We're studying, whatever, dogs, and, "I only want you to read about dogs." Well, a lot of times I got a lot of guff and feedback from the kids, negative feedback like, "Oh man. Can I just read whatever I want?" "No, I want you to read about dogs." "Well, we're studying butterflies and milkweed and moths." When I would suggest reading that it was suddenly it was purposed, it was purposeful and there was going to be an application piece.

BW: That was one of the big things that I noticed about it. That's ultimate. That's ultimate engagement.

HLS: I wonder if it's because we spent every ... almost every session like, "What else do you want to know? What else do you want to know?" And then I would take that and come up with an idea for the next so that they were driving their own inquiry.

BW: Nope, it's very powerful.

HLS: Cool. I'm going a little bit over time. Just got a couple more questions.

HLS: It seemed like it just happened that we got to do field science Fridays during standardized testing. How was that juxtaposition? How do you think the students felt or how was it managing that during standardized testing and then trying to also make space every week to go outside and explore?

BW: Well, it was unfamiliar territory for me. Usually when we get into that mode it's like, teachers put signs outside their door and there's a sign on the drinking fountain that says to push the button gently so that you don't disturb during testing. It becomes a freakish event of tiptoeing around, like when a baby that doesn't sleep, then you got everybody in the house is quiet, nobody breathes and everybody does things

[inaudible]. That's what happens around here during testing time so I wasn't sure, first, how it'd be received by the principal, and second of all, how the kids would respond, just not having done it before and being a little loose with that.

BW: We usually have activities of some sort or another. Which is why we had the mealworms and we did owl pellets and a few other of these science activities that were learning activities but also a cognitive break from the direction we would go in with standardizing ... standardized tests. I think it went well. Think the students managed well. I liked the idea of it being on a Friday to give the kids something to look forward to during the week. And the energy and some of the other things, the loose behavioral expectation, things had got a little loose on Fridays, it was nothing that would derail any need for serious academic environment with the weekend and the Monday to get re-calibrated before we were back to business, I guess, on a Tuesday for our assessments.

BW: I thought it worked well. I thought it was a smooth transition. There was nothing that I didn't like about doing that.

HLS: Great. I'm curious to see, to learn about what potential outcomes or impact or deliverables this project might have for a, the students or the elementary school itself, or Lapwai as a community. Partly what I'm trying to do this summer is not only do the analysis but also create some deliverables to present back to you and to the school and to the students and to be reciprocal. What are some potential outcomes that you could see from this?

BW: I don't know. Often the first place people go even with a lot of other action research projects is, and I don't exactly know what you have in mind with deliverables, but the curriculum aspect and developing a curriculum and building a curriculum, I see a lot of people go that route and I see a lot of time and energy put into it. The people that benefit from it are you and the people that benefit from it are me, and because it was an experiential thing and the power in that, to get somebody excited to try is one thing, and ... but to recreate it is a totally different thing.

BW: So I don't know. I guess I could leave it at that but I just, I don't know. I know that a lot of the benefits and a lot of the things, the excitement and then the knowledge that gets created in that planning, that idea and planting that seed in the mind of the kid that likely will grow up and work for and work in the same community and work for, probably, in a tribal job that will want to still continue the work and huge natural resource department for the tribe.

BW: That, to me, is where I like to hang my hat. It's like, "Oh yeah, I planted the seed," or, "I helped plant the seed in some kid's mind that they are going to use and apply this some place down the road." Other than that, I don't really know. I honestly don't.

HLS: Great. Thank you.

HLS: Last hard question. On a scale of one to ten, one being heck no, 10 being totally, how willing are you to participate in something similar next year with butterflies and all that?

BW: Probably an eight or nine.

HLS: I'm just trying to quantify that. How many hours a week would you be willing to spend on it in the classroom or how many hours a month, or how many days per semester would you be willing to dedicate to a butterfly habitat project?

BW: Thinking about some of the other goals and things that we have going on in the school, what ... I guess what to me, it lends itself to a lot of different content areas and curricular things that we're trying to address.

BW: What's cool is, I'm willing to bend and fit. If what I'm teaching in the classroom matters then it should be able to be connected to things of local significance or cultural significance.

HLS: Absolutely.

BW: I'm willing to meet you in however that is. I've got a lot of things that I'm trying to cover but of the eight or so units that I try and cover in the year, if there isn't a

connection somehow then what ... how responsive, culturally responsive, is our curriculum? How responsive am I as a teacher?

BW: I don't have any problem meeting with you and figuring out connections and times and that kind of thing, but it's hard to quantify an amount of time for sure. Probably, I guess my overall sense would be an every Friday thing would be too much but if we were spreading things out over time, Fridays once a month or something like that-

HLS: Cool.

BW: ... across a year's worth of time. That's, just, even just spit balling. Now, it could be more. I don't know.

HLS: Well, after that last day, Marcy and I went and talked and had lunch. She invited me to help her with some stuff with her project. We were talking about this summer gathering a lot more information and working together with Marcy to design a program where we're teaching ... the kids are being trained on how to gather data, and then that data is used to help map out butterfly habitat restoration potentially. That's why I asked that question.

HLS: Do you know any other teachers that would be interested in that project, maybe? Or a project similar to this?

BW: I don't, off the top of my head. It would be something that I would definitely be willing to mention or email or communicate to the staff and then be willing to answer any questions and certainly defer anything that I couldn't speak on knowledgeably to you. I'd give you my vote of confidence and that kind of thing but off the top of my head, I can't think of anybody.

BW: I think my partner in fourth would probably not but ... and I don't know, I don't honestly know what fifth grade would be thinking so if you're thinking similar grade level ... like I said, I'd definitely communicate it for sure, the offer and the opportunity.

HLS: Cool. Well that's all I have.

HLS: Is there anything else from your end? Do you have any questions for me?

BW: No, I don't. I don't, I don't.

HLS: Great. We've covered a lot of ground. Thanks again for your time even though you're sick. I was hoping maybe I can follow up with you again around August, mid-August, before school starts and things get crazy again?

BW: Yeah.

HLS: Sweet.

BW: Great. And you're headed to Flathead country, huh?

HLS: Oh yeah. There was some talk because I'm going to meet with the climate change director for the Salish Kootenai tribe. He's got a project where it's education as climate change adaptation. We're going to sit down and talk and so I just wanted to check in with you. I'm not going to share any details like names and everything but I just wanted to see if it was okay if I mentioned this project.

BW: Oh yeah. The only reason I have a [inaudible] connection up there. We spend every summer, a week or more, in that area. I was originally born in a town, I [inaudible] I spent part of my childhood in the Mission Valley, so south of Flathead Lake. My mom worked in Arlee and I'm born in Saint Ignatius.

BW: Anyway, so just a personal connection to the area. Beautiful place.

HLS: I am so pumped to go.

BW: Where are you going to be? Do you know where you're traveling to? A town?

HLS: We're going to be in Polson, the biological station on the lake.

BW: Cool.

HLS: There's a host tribe and then we have tribes from all over coming to sit down and workshop on climate change planning. I got promoted from driver of car to actual

coach and I'll be working with three teams from Alaskan communities on climate adaptation planning.

BW: Right on.

HLS: I'm excited and I'm ... it looks like gorgeous country.

BW: It's breathtaking. It's amazing. It's amazing. And the lake's awesome. Really cool place to be.

HLS: Awesome. Thank you so much.

BW: I will be there also. I can't remember when. I think the 5th of July I go there for two weeks.

HLS: Awesome. Cool.

BW: Well, cool. I'm going to get back to my homework.

HLS: Well, thank you so very much. I hope you have a wonderful break and we'll talk again in a couple months.

BW: All right, Hannah. Have a good summer then.

HLS: Thank you, [Beau].

BW: Later, bye.

HLS: Bye.

Appendix E - Conversational Transcripts

Group 1

Jesse:	00:00	Recording, alright.
Tandy :	00:02	[unintelligible]
Kendall:	00:03	Hey.
Tandy :	00:03	Just ignore all these sounds.
Kendall:	00:05	We're looking for sounds.
Hannah:	00:06	You can interview each other [crosstalk 00:00:08]
Jesse:	00:07	Yeah. Looking... Looking for sounds of animals. yea-
Kendall:	00:13	Like the beautiful water.
Hannah :	00:14	and then... So what I'll do... [crosstalk 00:00:15].
Tandy :	00:15	Can you guys hear this water?
Kendall:	00:20	Let's go over to the water, guys. Guys, let's go over to the water and listen to the beautiful water.
Tandy :	00:22	Okay.
Tandy :	00:22	I remember... I remember it smells nasty, does it?
Jesse:	00:22	Be careful.
Tandy :	00:22	Yep.
Jesse:	00:22	Don't fall in the water.

break:	00:22	--coded audio break---
landscape:	00:22	(highway sounds, rock thrown on rock)
Tandy :	00:22	Do you smell something? Oh.
Jesse:	00:22	It's amphibian. (@0:48)
Tandy :	00:22	Amphibian?
Jesse:	00:22	Amphibian lives down there.
coded break:	00:22	-- coded audio break --
Kendall:	00:22	Okay.
multiple speaker...:	00:24	Ew. [crosstalk 00:00:55].
Kendall:	00:24	Woah, That's a lot of ants.
Kendall:	00:58	We're going over here to the water.
Tandy :	01:01	To the water?
Kendall:	01:02	Listening.
landscape:	01:02	(highway sounds).
landscape:	01:02	(splash @ 1:08)
Kendall:	01:09	That was someone throwing a rock. [inaudible 00:01:12].
coded break:	01:11	--coded audio break--
Kendall:	01:13	There's a calm, shallow wave.
Tristan:	01:15	Wait, hold on, everyone be quiet. Everyone be quiet. We have to enjoy the sounds of ASMR.

Tristan:	01:18	One...
landscape:	01:18	(single splash sound)
Tristan:	01:27	Wait, hold on, put it close to here.
landscape:	01:27	(splash sound).
Jesse:	01:28	Right here.
Tandy :	01:28	Wait.
landscape:	01:28	(sounds of rocks being clicked together, background noise of highway)
Jesse:	01:28	Look at this stuff on my leg.
Kendall:	01:35	Whoa [Loud exclaim], that's a huge spider!
Tristan:	01:39	Where?
Kendall:	01:40	Right there.
Jesse:	01:40	Whoa, what the...
Kendall:	01:41	Go get my cup. I want to catch it.
Jesse:	01:43	Oh, it's a water spider. That one's venomous, watch out, watch out, that's venomous.
Tristan:	01:47	Where is it?
Kendall:	01:47	It's right there.
Tandy :	01:49	Oh my goodness, that's a big one.
Kendall:	01:51	Kill it?

Tandy :	01:51	Guys. Guys, and it-
Jesse:	01:53	It's a water spider.
Tandy :	01:53	Guys, guys, don't mess with it, it might bite you.
Jesse:	01:55	Yeah, venomous.
Kendall:	01:55	Where is it? Where...where'd it go
Jesse:	01:57	It's poisons.
Tristan:	01:58	Okay, one, two, three, (rock thrown on rock) okay let's move on.
Kendall:	02:01	Ugh.
Kendall:	02:01	It's [spider] under here.
Jesse:	02:02	There it [spider] is.
Tandy :	02:05	... you know what... Ugh!
Kendall:	02:05	Ugh,
landscape:	02:05	(rock on rock)
Speaker 1 or 4:	02:05	you know lets move on
Jesse:	02:07	Move on!
Tandy :	02:07	Move on, guys.
Tristan:	02:08	That's a very fast river. Wonder how far it goes. ... ah!
Kendall:	02:13	It goes far.
Jesse:	02:14	Water.

Jesse:	02:15	It goes to the mountains.
Jesse:	02:21	(Belch @ 2:20)
Tandy :	02:21	(laugher)
Kendall:	02:21	itsa Beautiful sound.
Jesse:	02:21	(laugher)
Tristan:	02:22	That doesn't look deep.
Kendall:	02:23	[yell] Make more sound!.
Tristan:	02:25	It doesn't look deep, but I have to test it out. [Rock splash in water]....
Tristan:	02:25	Hold on-
Kendall:	02:25	Dude- it wa- [sounds of highway].
coded break:	02:25	-- coded audio break --
Kendall:	02:25	@ 2:30 [whispering directly into field recorder] Where's the butterflies? The beautiful butterflies?
Kendall:	02:25	I'm gonna talk the whole time.... i'm being gentle with sound.[crosstalk 00:02:38, sounds from other participants moving, talking to eachother]...
Tandy :	02:26	ooh ooh (catching breath) oh ...
speaker 3:	02:26	the beautiful butter-
Tandy :	02:26	that was close!

Kendall:	02:26	[breathing sounds, narrator] I love these flowers.... [giggling].
Tristan:	02:26	I'm not gonna fall in.
Tandy :	02:26	Did you just put your hand right in it?
Jesse:	02:26	Yeah, I did that.
Kendall:	02:41	Guys, look, it's a beautiful-
Tandy :	02:52	Guys, look at it.
Kendall:	02:54	Red flower.
Jesse:	02:55	What?
Tandy :	02:55	Leaves down.
Tandy :	02:55	Yeah, that's why it's [river] deep.
Kendall:	02:57	[simultaneously] I found you.. I found you something.
Jesse:	02:58	See, look.
Kendall:	02:59	It's a pink petal.
Speaker 1 :	03:00	Legit, it won't come back.
landscape :	03:01	(splash)
Tristan:	03:04	It's gone forever.
Kendall:	03:05	How deep is that?
Jesse:	03:10	It's like that.
Kendall:	03:11	How deep is this?

Jesse:	03:11	It's like that.
Tandy :	03:12	Can I put my hand in it and see.
Tristan:	03:15	yeah
Speaker 3 :	03:15	no i see it.
Tristan:	03:17	Hold on, hold on, Let me hold ya' [crosstalk].
Speaker 4 (clar...:	03:17	Holy donkies
Tandy :	03:18	Oh my goodness.
Jesse:	03:18	Raaaaa! (sound of throwing rock)
landscape:	03:18	(highway sounds, splash, bird sounds)
Speaker 1 :	03:27	See, look it's deep.
Tristan:	03:30	I'm getting my socks wet.
Jesse:	03:40	Tandy, watch out.
Hannah :	03:40	You guys have like seven more minutes.
Tandy :	03:40	[big splash, screams]
Tandy :	03:40	Are you okay?
Tristan:	03:40	Oh wait.
Kendall:	03:40	Surprise blast-splash...
Jesse:	03:41	Don't worry, I got water on my face (simultaneous conversation)
Kendall:	03:42	Uuuuuuugh... Dude!

Tandy :	03:46	[inaudible 00:03:46].
Tristan:	03:46	i know, Okay, let's go.
Hannah:	03:47	Let's mosey on.
Kendall:	03:47	[annoyed] I was making beautiful water sounds.
Tristan:	03:49	Come on.
Hannah :	03:50	Look, you can go-
speaker 2:	03:51	.... < watch out for those-
Hannah :	03:51	you can go talk to Mr. Woodford If you want.
Jesse:	03:55	Nah, mister Woodford's too boring [crosstalk] (water sounds, splashing)
Tandy :	03:55	(playing sounds)
Mr. Woodford:	03:55	Woah... [Unintelligible crosstalk]
Tandy :	03:55	(laughter)
Jesse:	03:55	How did you find us?
Tandy :	03:55	<(yelling to Mr. Woodford) How did you... How did you find us?
Tristan:	04:05	Be carefullllll....
Kendall:	04:07	l throw..just want- i just wanna yeet this [field recorder] into the water.
Hannah:	04:10	No, please don't do that.
Kendall:	04:11	Why would I do that? It's been four minutes.

Tandy :	04:13	(yelling from a distance) Guys.... Hey guys... [unintellegable, crosstalk]
Hannah:	04:13	Okay.
Jesse:	04:14	theres just one more minute left- [file recording stopped, change narrators].
coded break:	04:14	-- coded audio break --
Tristan:	04:16	Coming back to you on G-ghost A-adventures. .... (highway sounds) Just kidding, we're just walkin'.
landscape:	04:22	(sounds of walking, multiple participants talking in background...).
landscape :	04:22	(sounds of gravel being moved by footsteps)
Tandy :	04:32	I don't like, I don't like cow poop... or jan-jo->...[crosstalk 00:04:34]
Kendall:	04:34	Are actually just doing elements?
Tristan:	04:35	No, we're just, like, um, you know... just Doing stuff.
Tandy :	04:38	...[simultaneous] <cow poop?
Kendall:	04:38	[inaudible 00:04:38] look at this rock, it's beautiful.
Tristan:	04:40	Wait, I wanna make some ASMR.
Kendall:	04:41	Here, put some rocks in here and then we can shake it around.
Tristan:	04:46	Oh thanks, okay. Good idea, good idea. Okay.
Kendall:	04:51	Wait, record the sound when you're putting them in.

Tandy :	04:52	(sounds of rocks being put in cup , footsteps in gravel)
Tandy :	04:52	Look! Look!
Tandy :	04:52	(sounds of rocks in cup, participants recording shaking of rocks in cup).
Kendall:	04:52	What is that?
Tandy :	04:52	(rocks clashing together in cup) [crosstalk]
Jesse:	05:04	> (whispers) Welcome back to ghost adventures (laughs...giggles).
Tristan:	05:06	Hey, its still my turn...
break:	05:06	Coded audio break
Tristan:	05:10	Now interviewing, Mr. Old Man. Here you go.
Mr Woodford:	05:14	Here I am.
coded break:	05:15	-- coded audio break -- ????
Tristan:	05:15	Wait, oh wait, no, no. [crosstalk 00:05:16] oh wait., no no
Tandy :	05:19	Did you know i like dinosaurs?
Hannah:	05:19	I like dinosaurs too
Multiple:	05:19	[inaudible 00:05:19].
Jesse:	05:19	Hey wait, hey wait... how do you make it so we can hear each... like hear eacho-
Hannah :	05:22	We'll have to go, ... like, you wanna listen to it [field recording] ?

Tristan:	05:25	baaaa-aaa (sheep sound) [crosstalk 00:05:25] (animal sounds) we heard the sheep.
Hannah:	05:26	we have to have headphones for it.
Tandy :	05:27	You know what's my ba-tn, what my favorite dinosaur is? [to Hannah]
Tristan:	05:39	baaaa-aaa (animal sounds) we heard the sheep
Hannah:	05:39	What? [to speaker 2]
Tandy :	05:39	T-Rex.
Hannah:	05:39	T-Rex? Why do you like the T-Rex?
speaker 1:	05:39	baaaaaa-aaa.
Tandy :	05:39	-- track break--
landscape:	05:39	[cross talk] (sounds of walking, talking through grass)
Tandy :	05:39	[unintelligible, something about snakes]
Tandy :	05:46	Guys, make sure you don't see any snakes.
Jesse:	05:49	[unintelligible]
Tandy :	05:49	If you see any snakes, let mi- let her [Hannah] know.
Hannah:	05:51	yeah, obviously, i wanna make sure we don't step on any snakes, okay?
Kendall:	05:51	i wanna hold a snake, I've hold-held a snake before
Tristan:	05:51	you did.
Kendall:	05:51	who's held a snake before?

Group 2

Miss Smith:	00:01	Names?
Kaylor:	00:01	My ... My name is [Kaylor 00:00:05] and-
Tanner:	00:08	My name is [Tanner 00:00:09].
Aiden:	00:11	My name is [Aiden 00:00:11].
Asra:	00:11	My name is [Asra 00:00:11]
Rory:	00:11	My name is [Rory 00:00:12].
Miss Smith:	00:11	Okay, so now [crosstalk 00:00:15] I'm going to show you how to stop it [field recorder], so you just ...
New Speaker:	00:17	coded audio break
Miss Smith:	00:21	You can go do whatever you want and you don't have to hold it [field recorder] close to your mouth.
uncertain:	00:24	Okay. Um-
Miss Smith:	00:25	You can go record any sound that you want-
uncertain:	00:27	[crosstalk 00:00:27] Ah! (laughs)
Rory:	00:27	Ow!
Kaylor:	00:30	All right, so I'm with my homies. Well, basically some of my homies and [Miss Smith 00:00:34]. Um, can we go look at the creek? The creek?
uncertain:	00:38	The creek?
uncertain:	00:39	Yep-

uncertain:	00:40	[inaudible 00:00:40] <well lets go....
Kaylor:	00:41	We're going to go look at the creek and we're going to see what sound it makes.
Rory:	00:47	[inaudible 00:00:47], I'm going to laugh at you.
Kaylor:	00:49	You already have sticks.
Miss Smith:	00:51	And just remember [inaudible 00:00:51] creek is that only hands go in the creek. And if you have more than hands in the creek then we will leave.
Kaylor:	00:58	Yes, ma'am. Okay. So, the creek, we usually come here and meet ... Well, basically my friends, we go here during the summer at the creek and we, um, we ...
uncertain:	01:09	[crosstalk 00:01:11].
Kaylor:	01:09	.. I know (response to other participant)...
Kaylor:	01:11	We go to the creek and jump in. Well here's Asra .
Rory:	01:17	Hey guys-
Asra:	01:18	Um, hi, my name is Asra and right now I'm just talking because I'm bored.
uncertain:	01:22	And that's a creek. And we-
Asra:	01:25	We found a trail. We should go down that trail.
uncertain (...:	01:27	Let's go down it [the trail] then
Asra:	01:30	Okay. Can we go to the trail? Through the trail real quick?
Rory:	01:33	You guys, (exacerbated), ehhhh...

Miss Smith:	01:34	[crosstalk 00:01:34] you guys ... Yeah, we all go. We all go together.
Rory:	01:40	This is freaking cow poop
Asra :	01:40	Okay.
Kaylor:	01:40	Okay, let's go.
Asra:	01:40	So we are going through a trail.
multiple partic...:	01:41	[unintelligible discussion]
Asra:	01:43	That trail, yes.
Asra :	01:46	Does that have thorns on it?
Kaylor:	01:47	Uh, no.
Asra:	01:47	Okay, because I ain't trying to get cut up.
New Speaker:	01:50	(sound of rocks crashing, being thrown)
Asra:	01:52	Okay, come on, let's go.
uncertain:	01:56	Ow. [crosstalk 00:01:57]. Okay, so you might've seen the-
New Speaker:	02:00	(rocks crashing in background)
Asra:	02:00	You might hear those.....
Rory:	02:07	Go, go, go.
Asra:	02:07	... Rugged kids in the back.
uncertain:	02:12	[inaudible 00:02:12]... (crying out, exacerbated)
Asra:	02:12	Ah, this one has thorns, this one has thorns.

Tanner:	02:14	You good?
Asra:	02:16	Yes.
Rory:	02:16	Ah, fuck.
Asra :	02:19	Ow, my hair. My hair.
Asra :	02:28	We're still going to the trail. Ah, well, it comes all the way back here. We're, what if we got lost in this, bro? [Crosstalk 00:02:38].
New Speaker:	02:36	(background sounds of rocks, participants talking)
Kaylor:	02:44	Anyways, we're at the creek-
Asra :	02:47	It's just gonna be me and Kaylor talking, I think.
Kaylor:	02:49	Yeah, hold up. Let's see if-
Miss Smith:	02:50	(from a distance) everybody needs to have a turn....
Kaylor :	02:52	Okay, um, so pretty much I'll see if Aiden wants to talk, but we don't know if Aiden wants to talk because he's a quiet boy. But here you go Aiden.
Aiden :	02:59	What?
Kaylor:	03:00	Aiden , get, come here. Come here, come here.
Aiden :	03:11	What? Where?
uncertain:	03:11	What is that?
Aiden :	03:11	All right.
uncertain:	03:11	What is that?

New Speaker:	03:11	(background sounds of other participants talking, playing)
Aiden :	03:11	We're going to go towards the water. And Jesus, there's a lot, all right, of rocks.
Tanner :	03:19	[inaudible 00:03:19] going back.
New Speaker:	03:19	(background sounds of participants, water, rock sounds)
Aiden :	03:31	All right.
Kaylor:	03:32	Aiden, are you talking?
Aiden :	03:36	Yeah.
Kaylor:	03:36	Okay.
Aiden :	03:36	Here, want it back?
Kaylor:	03:36	If you want me to hold it or-
Aiden :	03:36	Sure.
Kaylor :	03:42	Okay, so right now I gotta hold this pretty because - (rock sound, surprised inhalation)... Rory ! . Well, I'm with my friend and he's trying to get me wet. But anyways, I want to push ...
Kaylor:	03:54	But there's like a deep spot and it looks so cool. But I think me and my friend should go floating down this riv-, um, this creek.
New Speaker:	03:59	(rock sounds, splash, being thrown?)
uncertain:	04:02	Okay, I'm going to bring you guys back to Mrs ... Never mind, here's Miss .

Rory :	04:07	Hey, what the-
uncertain:	04:07	(laughs)
Asra :	04:07	Hi, I'm ... I guess I'm Miss . Um,
New Speaker:	04:13	(participant grunting noise, splash)
Asra :	04:13	okay. We are at the creek currently. We heard that from Kaylor [uncertain] or [Tannera 00:00:07].
Asra :	04:22	So it's kind of strange. [crosstalk 00:04:29].
Miss Smith:	04:26	(sounds of playing, rock thrown, splash, laughter,)> Duuuuuude.....
Rory:	04:26	... i'm splashing, i-
Asra :	04:26	It's kind of stra-... [gasps].. I almost fell in. Yeah.....
Asra :	04:26	And so I'm going to throw in a little tiny stick and see how fast it goes in because, um, I just want to experiment I guess? So [crosstalk 00:04:54] (background sounds of rocks, creek, and splashes) I have a stick with me right now and it kind of goes down slowly. Kind of fast, kind of slow. Uh-
uncertain:	05:02	(yelling, crying, screaming noises)
Miss Smith:	05:03	hey, Rory, that's what I'm talking about, with-
Asra :	05:05	Um-
Miss Smith:	05:05	... anything but hands in the water....
uncertain (Rory...:	05:09	[inaudible 00:05:09, yelling/shouting].
Asra :	05:09	Anyways-

Rory:	05:09	Ah! [inaudible 00:05:10]...
Miss Smith:	05:09	All right, you guys want to go back up?
uncertain, mult...:	05:09	Yep-
Asra :	05:13	So- [crosstalk 00:05:14]
Miss Smith:	05:15	so has everybody had chance to-
Asra :	05:16	We're going back up.
Rory:	05:17	Hey I didnt get to record!
Asra :	05:18	And so [crosstalk 00:05:20] here's Rory .
Miss Smith:	05:21	Well, [crosstalk 00:05:21] switch it up, stop it, and start a new recording.
uncertain:	05:23	This one?
Miss Smith:	05:24	Yeah, stop it [the field recorder].
New Speaker:	05:25	Coded audio break
Miss Smith:	05:30	All right, you guys can tell a story, you guys can make sounds and-
Rory :	05:34	come on!
Rory:	05:34	So [crosstalk 00:05:35] we're over by the creek.
Miss Smith:	05:38	... but don't swing, [inaudible 00:05:38].
Rory :	05:38	Uh so, [inaudible 00:05:41] so up by the creek. My dad used to swim. It was back in the, uh, 90s. My dad wasn't back in the 90s but-

Miss Smith:	05:47	[crosstalk 00:05:47] check this out.
Rory :	05:47	... like up above like ... more like pa-ash-a[inaudible 00:05:49]- right here. Like right here. Like right in this spot where I'm standing at, was right here where my dad was [inaudible 00:06:02].
Tanner:	05:58	(background speaker)....my dad can skip rocks...
Rory :	06:04	last time a-[inaudible 00:06:04]. um, how my, how my grandpa died here. This how my grandpa died here.
Tanner:	06:11	(background speaker)... my dad can do that ...
Rory :	06:11	He (Rory grandfather) died, he died long time ago.
Kaylor:	06:13	[inaudible 00:06:13].
Miss Smith:	06:14	Hey guys, let's move back up. Okay, we're going to go back [crosstalk 00:06:15], come on guys.
Kaylor:	06:14	We better go back up..
Rory :	06:14	Uh, we're going back up to the top. Anything you'd like to say [inaudible 00:06:23],Asra ? Here's Asra .
Asra :	06:26	Okay, so currently we're going back up and I'm going to see if Tanner wants to talk, okay?
uncertain:	06:33	... thats [inaudible]..underwater... (many talking, walking sounds)
Asra :	06:34	Okay. Um, I know. Okay, so here's Tanner. (background sounds of rocks, playing)... It's still recording.

Tanner :	06:45	Okay. Well we're walking back up [crosstalk 00:06:52]. Go Aiden (directional), I'm here with Aiden and um, we're [inaudible 00:07:02]. [crosstalk 00:07:02].
Kaylor:	06:47	(background) Oh just spashed ya....
Miss Smith:	06:47	Okay we're going this way
Tanner:	06:47	(participants moving through landscape, from creek to other area) We're going under. Yeah, I always go that way.
Miss Smith:	07:07	All right, just, uh, [inaudible 00:07:08]. (negotiating the way through the brush).
uncertain:	07:07	(background) [scream]
Tanner :	07:07	We need to go this way..
Miss Smith:	07:07	Hey, watch out for this plant (hemlock) okay?
Tanner :	07:12	Okay.
Multiple:	07:12	Okay
Miss Smith:	07:12	All right, let me go first.
Kaylor:	07:14	All right.
New Speaker:	07:14	(background noises of singing)
Tanner :	07:19	I'm going under the sticks.
uncertain:	07:28	Oh! [crosstalk 00:07:28]. (singing, sounds of walking, sticks)
Tanner :	07:28	We're going ... so long way.

Rory :	07:28	(background speaker) Ow! Ow, it hurts!
Tanner :	07:28	Let's go, Aiden.
Aiden :	07:28	All right. I had to do that.
Tanner :	07:28	Okay, let's go.
Aiden :	07:28	All right.
Tanner :	07:28	Who wants to record now?
Aiden :	07:51	Talking to the recorder.
Miss Smith:	07:52	Is it working?
Tanner :	07:53	Yeah.
Miss Smith:	07:55	Oh, you got some stuff on you (debris from moving through brush)
Miss Smith:	07:57	All right, let's just do a real quick check on each other, make sure that-
Tanner :	08:00	[Kaylor 00:08:00], you want to record now?
Kaylor:	08:03	Hello guys, it's Kaylor and-
Miss Smith:	08:06	Just check and make sure that everybody's okay.
Kaylor:	08:08	And just ... I'm going to be doing an obstacle course and it's involved with those [crosstalk 00:08:15]. And Rory, he likes butt- I'm just kidding. [crosstalk 00:08:21].
Miss Smith:	08:14	(background speaker) okay, lets start heading towards [inaudible]

uncertain:	08:19	Okay.
Kaylor:	08:22	Okay, we have to go to the [Butterfly Detective 00:09:41] after, so ...
Asra :	08:29	(background speaker) She's like, "Let's do it together." [crosstalk 00:08:29]
Kaylor:	08:29	Okay, so now I have to go back down, but here's Asra .
Asra :	08:33	Okay so as you see, as ... as Kaylor said, we are going to be going to flower detective, flower, um, Butterfly Detectives next. And we're just going to be finding butterfly eggs. Or at least trying to. Um, [crosstalk 00:08:55].
Rory :	08:55	Watch out guys, [inaudible 00:08:55], don't step right there.
Asra :	08:57	Anyways, so I'm just talking. [crosstalk 00:09:05]. (playing through obstacle course)
Asra :	09:00	Hey, watch this! (moving through obstacle course) Skills. ..... So right now you guys are on my left hand. [moving field recorder] Now my right.
Miss Smith:	09:29	Hey Asra, Aiden, you have to go to Butterfly Detectives next, right?
Aiden :	09:39	Yep.
Asra :	09:39	Yeah, we're going to Butterfly Detectives next. And so-
Miss Smith:	09:44	[inaudible 00:09:44], come on this way.
Asra :	09:45	Okay so my and Tannera [crosstalk 00:09:49]. Okay, me and Kaylor are going to say goodbye to you guys.
Kaylor:	09:53	Watch.... [Inaudible 00:09:54], I'm just kidding.

New Speaker:	09:53	(singing into microphone,)
Miss Smith:	09:56	[crosstalk 00:09:56] you can interview them about their butterfly eggs.
Kaylor:	09:59	A-S-
Asra :	10:03	Okay, we're going to be interviewing ... So we're interviewing them about the butterfly eggs, right?
Aiden :	10:07	Yeah, that's what we're doing.
Asra :	10:11	Okay, we'll just get this.(walking sounds)
Kaylor:	10:14	[inaudible 00:10:14]
Asra :	10:15	Let's ask the teachers then the students.
Tandy:	10:16	(background speaker) What are you guys ... are doing? [crosstalk 00:10:23]
Asra :	10:23	Okay so we're here kind of in her video, guys....
Natasha:	10:28	Okay.
uncertain:	10:29	.(background speaker).. do you know what an egg...[inaudible]...
Asra:	10:29	So how is you guys' butterfly egg hunting?
Natasha:	10:34	Well, you know, it goes pretty good, it's going pretty all right.
Asra :	10:37	Mm-hmm (affirmative).
Kaylor:	10:37	Have you guys found any eggs?

Asra :	10:37	Have you-
Natasha:	10:40	So one group found about 80 eggs. And the other group, they found about one so far.
Asra :	10:47	Where would they ... Where did they find the eggs?
Natasha:	10:49	I don't know, where do you think they'll ... they find the eggs?
Multiple:	10:51	(background speaking about milkweed)
Asra :	10:52	Probably on milkweed.
Natasha:	10:53	You're right, (laughs).
Kaylor:	10:54	Oh.
Tanner :	10:57	Yeah.
Kaylor:	10:58	Okay. So where ... I have a question. Where is the milkweed at?
Natasha:	11:05	Where is the milkweed? There's some over there and it's kind of like a fuzzy plant. If you see that weird stick thing-
uncertain:	11:15	Yep. Mm-hmm (affirmative).
Natasha:	11:15	... it's right next to that.
uncertain:	11:17	Okay.
Miss Smith:	11:17	So-
Kaylor:	11:18	So thank you for interviewing and have a nice day.
Natasha:	11:21	Thank you!

Asra :	11:22	[crosstalk 00:11:22] We're going to go interview [Marcy 00:11:25] now.
Miss Smith:	11:24	Guys, we're going to switch around now so you can do Butterfly Detectives.
Asra :	11:28	Can we interview Marcy?
Miss Smith:	11:29	Okay, go interview Marcy.
uncertain:	11:32	Good [inaudible 00:11:34]. (walking sounds)
Asra :	11:35	Hi, Marcy, we are, um-
Marcy:	11:36	Hi, how are you?
Asra :	11:38	... We are kind of interviewing people- (background sounds playing, wind)
Marcy:	11:40	Oh, okay.
Asra :	11:41	... I guess. Um, and so have you found any bugs yet? Um, bugs, um, egg- butterfly eggs?
Marcy:	11:48	We have found butterfly eggs. Um, one group has found 80.
Kaylor:	11:53	Oi! Sorry.
Marcy:	11:55	One group has found one.
uncertain:	11:57	Yep, who needs one? You need one. You need one.
Asra :	11:57	Um-
Marcy:	11:58	Right here. This little man does.
Aiden :	12:00	Aiden...

Asra :	12:01	Okay, so want to ask her a question?
Kaylor:	12:04	Okay. Um, uh ... I don't really have a question, but like, how come, like, magnifying glasses, like, they burn your skin?
Marcy:	12:16	I- I don't know, that's a- that's kind of a physics question [crosstalk 00:12:20]
Kaylor:	12:20	[crosstalk 00:12:20], because they burn my skin with this on it.
Marcy:	12:22	It's glass, but if- if you have a question-
uncertain:	12:27	What?
Asra :	12:29	Yeah. Well ... Thanks for interviewing-
Marcy:	12:30	Watch out for that.
Asra :	12:32	Thanks for interviewing and thank you, have a nice day.
Miss Smith:	12:35	Thank you very much for being such a good interviewer and have a good day. Okay.
Kaylor :	12:37	yay, we're interviewers.
Asra :	12:37	Have a good day, bye.
Miss Smith:	12:37	Goodbye.

Group 3

Multiple:	00:00	Ohh (in wonder)
Hannah:	00:00	Mm-hmm (affirmative). And so then you can create multiple tracks.

Farren:	00:04	[inaudible 00:00:04] hey excuse me, theres a [uncertain] shaped like a butterfly, you see.
Hannah:	00:05	That's great. So, first let's get everybody's names.
Max:	00:11	Max
Candace:	00:13	Candace.
Blake:	00:14	Blake
Chase:	00:15	Chase
Hannah:	00:16	Farren, right?
Farren:	00:17	Yes.
Hannah:	00:17	Okay. So, that is how I use it. And then when you're done recording the track and you wanna pass it (field recorder) on...
New Speaker:	00:22	--coded audio break--
Hannah:	00:22	Now, I'll follow you and you guys can go play. Everybody needs to have a chance in the next 10 minutes.
Note:	00:23	Missing Transcription between 0:23-2:12
Max:	02:12	Okay. Let's go. [crosstalk 00:00:53]. .....
Multiple:	02:12	i don't know what i'm doing, (answer) here let me see it
New Speaker:	02:12	(background walking noises, running noises)
Farren:	02:12	To front pass...
Candace:	02:12	[inaudible 00:01:10].

unknown:	02:12	[inaudible 00:02:12].
Blake:	02:12	[inaudible 00:02:12] (laughs).
unknown:	02:12	This is probably an active score. [inaudible 00:02:12].
Candace:	03:45	Wait are you all going to the [inaudible 00:02:03].
unknown:	03:45	[inaudible 00:02:09].
Candace:	03:45	(laughter) [inaudible 00:02:28].
Unknown:	03:45	Cross over there. [inaudible 00:03:46].
Candace:	03:45	Those two would make a good chess.
unknown:	03:46	I think I'm saying that.
Candace:	03:46	[inaudible 00:03:46].
Unknown:	03:46	[inaudible 00:03:46]. (laughter)
Blake:	03:46	[inaudible 00:03:46].
Unknown:	03:46	Hi.
Blake:	03:46	Hi (laughs.
unknown:	03:46	[inaudible 00:03:46].
Blake:	03:46	Come on. Introduce yourself. Okay. What?
Candace:	03:47	Okay. My name is Candace... [inaudible 00:03:47].
Blake:	03:47	We're just messing around (laughter).
Candace:	03:49	And I am [inaudible 00:03:50] that is the Qinta powwow. Okay. And we are going to like a picnic spot type thing.

Blake:		03:50	spot... (said in unison with candace).
Candace:		03:50	and we're on our way there....
Max:	04:06	How far is it?	
Candace:		04:08	this one. (background walking sounds, bird song)
Max:		04:12	(complaining) how much farther [inaudible 00:04:12]
Candace:		04:12	Do you wanna run and get there faster?
Max:	04:17		Yeah, yeah. (running)
Candace:		04:18	three hours... woah, i was like three hours...[Inaudible 00:04:18].
unknown:		04:18	What back there? Wanna go see whats back there?
Candance:		04:18	Aw, I guess we can't see it.
Max:		04:29	Did you [inaudible] for him? You should there for your birthday...
Candace:		04:36	Why?
unknown:		04:36	I don't know.
Hannah:		04:36	You both used it [field recorder]
Max:		04:37	Yeah
unknown:		04:38	No.
Hannah:		04:39	Oh, now it's recording again.
Chase:		04:41	(laughs) yeah. Can we sit in the grass? [Inaudible 00:04:42].

Hannah:	04:41	Okay. Now it's recording it.
multiple:	04:44	yay [Crosstalk 00:04:45].
Unknown:	04:44	Do you wanna pass it off or?
Candace:	04:55	[inaudible 00:04:55].... i don't know who, i don't know it goes
Blake:	04:55	It (field recorder) goes chase
Chase:	04:58	It was me.
Max:	05:01	Are you recording?
Hannah:	05:02	Is it? Check it out..
Candace:	05:05	Yeah, it's recording.
Hannah:	05:07	You can tell a story. You can record sounds.
Chase:	05:10	Alright
Max:	05:10	we'll just get a story
Hannah:	05:13	wait... is that elderberry over there
Blake:	05:13	Where?
Hannah:	05:14	See that, those yellow flowers, I think that’s elder tree out there.
Max:	05:16	I can't see.
Candace or Blake:	05:16	I can see 'em
Chase:	05:19	I can.

Hannah:	05:22	... i think thats elderflower, you guys wanna go check it out?
multiple:	05:22	Yeah!
Hannah:	05:22	You can record it however long you want,
Chase:	05:22	alright
Max:	05:27	what do i do with my cup (plastic cup crunching)
Chase:	05:27	Okay. Let's go back.
Candace:	05:30	Let's go.
Unknown:	05:30	Lets go!
Farren:	05:30	Lets go back (background sounds, walking).
New Speaker:	05:30	(long period of sounds: walking, breathing, talking, wind-sounds like participants moving field recorder around)
Chase:	05:32	They're right behind.
Blake:	05:33	Alright
Chase:	05:33	Try to find the trail. Where's the trail at. Oh, no. Trying to find a trail- that's all i know
unknown:	06:04	(laughs) I go. (breathing sounds, walking sounds, bird)
Chase:	06:12	Trying to find a trail... tired
Max:	06:13	Did you guys stop the recording when you got into running?
Candace:	06:40	No.
Max:	06:42	All right. Um, we can go, um, where are we going?

Candace:	06:52	I don't know.
Chase:	06:54	Um, we're going to the way down to the Creek. Yay, Yeah. Still recording?[inaudible 00:07:25]. we're going on a secret trip
Max:	07:24	That's cool.
Chase:	07:50	Where does this go, where does this lead to ....
Chase:	07:50	(asking/yelling) Wait, do I have to tell a story?
unknown:	07:58	(from distance) If you want to.
Chase:	07:58	(using storytelling voice) Once upon... (walking sounds, bird calls)
Chase:	08:15	Okay. This is the homeless camp.
Blake:	08:19	The homeless camp?
Chase:	08:19	its a homeless camp
Max:	08:21	Where are you going?
Candace:	08:32	to see the flowers.
Blake:	08:32	Yeah, the flowers.
Chase:	08:41	Okay. I'm going to check back here.
Max:	08:42	Why you going that way?
Chase:	08:42	Cuz. (because)

Chase:	08:49	Ohhh! (loud, moving fast) People, people, people. There's people back there. (running) There's people back there. There's people back there.
Hannah:	08:58	There are? What are they doing?
Blake:	08:58	They’re sitting down.
multiple:	08:58	crosstalk, movement
Farren:	08:58	they're sitting doOOwn (exclamation)? Why they're sitting down? who?
Farren:	09:05	[inaudible 00:09:05]...alk on it?
Candace:	09:08	Do you want me to hold it back for you? Okay. Go ahead. Talk to it [field recorder], its recording.
New Speaker:	09:12	--coded audio break--
Hannah:	09:40	(background) Let's go back to the shelter. Get some shade and some water.
Chase:	09:42	AYYYE Lets go!
Farren:	09:46	(Narrating) This is, This a story about when they're butterfly detectives.
Natasha:	09:50	What was that? I'm sorry.
Farren:	09:54	of butterfly eggs... [Inaudible 00:09:54].
Natasha:	09:54	Theyve found 34 on 9 plants
Farren:	09:54	See look! I interviewed it.
Natasha:	09:58	You interviewed us?

Farren:	09:59	You interviewed up.
Farren:	10:01	You interview... Tell the story. just...
Natasha:	10:03	(walking sounds) [inaudible 00:10:03]. What about? What will my story be about.
Farren:	10:08	of butterfly eggs, of butterfly detectives.
Natasha:	10:11	It was pretty fun and we found all different amounts of it. So, we're gonna average our amount of eggs we found
Farren:	10:24	Average... average the amount of eggs we found [inaudible 00:10:26].
Hannah:	10:25	Let's if it's still recording?
Farren:	10:31	I think so.
Hannah:	10:32	Yeah, nice work. It's still recording.
Farren:	10:33	See! I interviewed the story.
Hannah:	10:35	Yeah you did.
unknown:	10:36	See. (laughs).
Hannah:	10:36	What do you like about butterflies, Farren [inaudible 00:10:43]?
Farren:	10:44	Butterflies are cute. (walking sounds) I interviewed. I'll interview it.
New Speaker:	10:59	(walking through gravel) [inaudible 00:10:59]
Farren:	11:00	Mm-hmm (affirmative).

multiple:	11:08	[inaudible 00:11:08] (participants talking in the background)
Farren:	11:15	Both butterfly eggs. Of butterfly detectives.... Are super cute for what? Butterflies eggs, why go to the trail. Butterflies eggs. We just found one. We just found the one.
Candace:	11:37	(background) you should go here for your birthday.
Blake:	11:37	(background) Well your birthday is closer than mine
Farren:	11:39	I was born on June 3, 2008.
Blake:	11:51	(crosstalk, to Blake) if i come here for my birthday, its gonna be too hot [inaudible 00:11:51].
Farren:	11:51	Okay. Wait right here we're interviewing the story. [inaudible 00:12:00].
Chase:	11:55	(to other participants, outside of group 3) dude, i went on this one trail and i saw people.[inaudible]
Farren:	11:55	Okay Bye.
Rory:	12:19	(narrating) Um, uh, it's, uh, we're now gonna leave the nature park thing.
Kaylor:	12:26	The nature park?
Rory:	12:26	Yeah, the nature park.
Kaylor:	12:30	Hello, guys. I hate some... (chuckles) i'm just kidding
Rory:	12:32	(into field microphone) He said- she said, she hates you and she said the f-word.... bye.
Kaylor:	12:33	(to Rory) No i didnt