DEFYING GRAVITY: AN AFFECTIVE PHOTOVOICE LENS ON TRANSFORMATIVE SUSTAINABILITY LEARNING

by

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Abstract

The purpose of this study was to understand the learning experiences and the role of affect for students in a transformative sustainability education doctoral program. My research questions reflected the purpose of this study: How do adults experience learning in a transformative sustainability education doctoral program? How does affective learning play a role in adult learner experiences in a transformative sustainability education doctoral program? How do affect and emotions play a role in transformative learning? Through participatory action research utilizing a photovoice method and built upon a transformative sustainability theoretical framework, I explored affect and learning experiences in a cohort doctoral program. The results of this study indicated that students experienced ongoing learning with positive affect when they felt a sense of belonging and connectedness to self, others, and/or nature. When students experienced a lack of belonging/connectedness, they worked to re-establish connections. Network connections, dynamic balance, and feedback loops were key in establishing a sense of belonging to support ongoing and meaningful learning in a transformative sustainability education program.

Keywords: transformative sustainability education, transformative sustainability learning, transformative learning, affective learning, emotions, feelings, behavior, learning sanctuary, experiential education, ecological thought, belonging, cohort, systems thinking, living systems theory, dynamic balance, feedback loops, participatory action research, photovoice
Dedication

To my mom. Based on my deep love of life-long learning, I was intrinsically motivated to begin this doctoral journey. This doctoral journey has been one of love, heartbreak, and inspiration. It has transformed my way of being in the world and has been a process of self-discovery and, at times, has given me great strength and resiliency when I needed to keep going. For my strength, resiliency, and love for learning, I am forever in gratitude to my mom. This work is dedicated to you, mom. I love you. Thank you for teaching me unconditional love and the strength to keep going, to find new adventures, to always grow and learn, and to accept and love myself. You are in my heart always.
Acknowledgments

To my brother and dad. I owe much appreciation to you both. You have always been completely supportive of me. To my brother, Brian. You are a kind and caring soul who has taught me to be more selfless and forgiving. You have accepted and supported me through love and humor. Thank you. I love you. To my dad. You have taught me to take risks, to love big, to laugh in spite of myself, and to stretch and break boundaries—to defy gravity. Thank you. I love you.

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To both of my kids, Lily and Ben. The best thing in my world is being your mom. You are two exceptional people, and I am so very lucky. Thank you both for teaching me so much about pure joy and love. I love you both very much. To my son, Ben. Your smiles, dances, energy, and love shines through in all you do. Your creativity and wonder and super mad building skills are incredible. I admire the way you go about life and am so proud of you. You are fun, loving, and so kind. To my daughter, Lily. You know me so well and have always been a wise soul. You look after yourself independently with a strong motivation to succeed, and I often feel that you are the grown up in the family. I am so proud of you. Thank you for caring for your old mom—just knowing who I am and loving me for just that.

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To my entire Cohort I. You are rock stars and game changers. You have braved a wild frontier and a new way of learning. You are my heroes and you carried me through this. You also reminded me that it’s okay to feel like kids when we enjoy the learning. Love of learning goes beyond looking or acting professional. It is about being your authentic self as you learn and to feel accepted by your peers. I feel that all my cohort friends are exceptional in so many ways. I thank and appreciate all of you.

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Epigraph

Defying Gravity

Something has changed within me.
Something is not the same.
I'm through with playing by the rules of someone else's game.
Too late for second-guessing.
Too late to go back to sleep.
It's time to trust my instincts, close my eyes and leap!

(Schwartz, 2007)
Chapter 1. Introduction

Defying Gravity

When I entered the University of Wisconsin-Stevens Point Educational Sustainability Doctoral (EDSU) Program in 2017, I had over 20 years of experience as a high school science teacher and as an environmental educator and administrator in the non-profit sector; it has always been true that my love for the outdoors shaped my teachings and how I have lived my life. In my teachings, I have been inspired by Aldo Leopold and his land ethic (1949), who believed in connecting to nature, being a part of the land community, and being a steward of our natural systems—all reflective of an ecological worldview. This worldview supports the ideology that humans are inextricably linked to the natural world. Having an educational background in biology, I also had the foundational knowledge and an understanding of our natural systems and how humans have impacted those systems. This way of knowing supported my ecological worldview.

While I had this worldview, I had also subscribed to the traditional educational pedagogy, where I adhered to privileged cognitive, transmissive learning systems and hierarchical power structures. During the first two years of this EDSU program, I noticed that I allowed myself to be more creative as a vehicle to process my learning, including returning to art after a long absence of approximately 20 years. I started to take a deep dive into drawing and painting as an expression of learning. I wondered what was happening and if I was the only student experiencing this deep learning. As a result of being a member of Cohort I in the EDSU program, this intrigued me, given my own reflections on my learning process as largely connected to my emotions and transformative sustainability learning experiences. Thus, I chose
to inquire about how adults learn and the role that affect and emotions play for other learners in a doctoral program in Educational Sustainability.

The art that I created and included in Figures 1-4 are expressions of my learning experiences and of defying gravity which defines my learning process in my doctoral program, especially as it relates to affective and creative ways of learning and knowing. In this initial drawing, my materials included pen and ink (Figure 1). At the time, I had the positionality of a pragmatist with an ecological worldview—one who adheres to the rules of traditional institutional systems while also caring for the environment.

Figure 1. Purple Coneflower Sketch

I drew this coneflower while sitting with my mother in the hospital. She was sleeping after a surgery while I drew flowers. It connected to my own learning of prairie plants for my job, something I had been learning along with my daughter. Art had also connected us. We hiked in prairies, took photographs, and later drew them. I began to draw more as way to relax, learn, create, and sometimes as a way to relate to others.

During this time, I was working as an outdoor educator and administrator at a nonprofit organization, and my teaching methods were evolving to more closely reflect experiential and sustainability education. Along with my teaching practices, my art and use of materials also started to evolve, moving away from ink, pencil, and acrylics to using paint with natural minerals and walnut oil. After weeks of frustration in learning how to use these materials effectively by hand-mixing and self-teaching, I started painting more successfully (Figure 2).
I painted an abstract that I envisioned in my mind. Although an imperfect painting, to me it was beautiful. It was a representation of growth, overlaying a foundation that represented myself or identity. I was learning to accept myself through reflections and journaling while also learning other ways of being in the world.

By learning within an Educational Sustainability program, I was becoming more authentic in my teaching and learning and more empowered as an individual. I started to view things, such as my own work culture and life, differently. Yet, as I learned more about sustainability education, communication with those in my environmental education field became increasingly difficult, especially within my work culture. I realized and felt that my organization subscribed to a traditional, hierarchical power system that I could no longer function within. During this time, I worked on many phases of the layered “Disorienting Onions” painting (Figure 3).

All of the paintings were on the same canvas, just painted over at least 5 different times. I painted these onion versions while I attempted to make a bridge between my environmental and sustainability education worlds. Each onion version did not seem quite what I wanted, but I eventually accepted a final version. It was not an exact fit of what I wanted or envisioned, but I accepted where it ended up. The numerous attempts and the frustration which led to satisfaction and acceptance paralleled my transformative experience. I did not make the connection of this to my art until later in my journey.

My job became more challenging with time. I no longer had any autonomy, and I felt stressed, pressured, and unhappy on a daily basis in a work environment in which those in power
lacked care or concern for those who thought differently. As a result, I eventually quit my job.

During that time, I felt disoriented and alienated from this organization and also temporarily from the environmental education community (Figure 4). These learning experiences in both my work and doctoral program shaped my positionality as I approached this study, learning, and life.

Figure 4. Transformation

I painted this while going through the process of quitting my job. I remember being very intentional in making it fit my moods. Darkness underneath represents pain while light in the middle of the cloud represents my support, strength, and empowerment as I transformed to the warmer orange above. This reflects feeling stronger as a result of the transformative learning process.

Through my own transformative sustainability learning and lived experiences, I have been able to achieve healthier connections and relationships, both personally and professionally, while I continue to grow, learn, and be more open to different perspectives and people who are at different places in their lives and in their learning. I have reintegrated into the environmental education community again with a different perspective and more determined to support sustainable systems, including organizations. I am currently with a different nonprofit organization that has been incredibly supportive of myself and different ways of being in the world. I am an experiential and sustainability educator and am now one that defies gravity from traditional cognitive processes of learning to include affective learning as a means for transformative sustainability education.

**Positionality**

My methods reflect constructivism rather than a Western, scientific study steeped in linearity and an imbalance of cognitive thinking that does not reflect holistic learning and
teaching. Constructivism, according to Creswell and Creswell (2018) is a philosophical perspective in which,

Individuals seek understanding of the world in which they live and work. They develop subjective meanings of their experiences…These meanings are varied and multiple, leading the researcher to look for the complexity of views…Often these subjective meanings are negotiated socially and historically. In other words, they are not simply imprinted on individuals but are formed through interaction with others (hence social constructivism) and through historical and cultural norms that operate in individuals’ lives (p. 8).

In addition to constructivism and how I view learning, my current views on life now reflect a sustainability worldview (Figure 5). Nolet (2016) stated that “a sustainability worldview prompts us to seek out ways to become personally engaged with individual and collective actions that help create a safe and just space for humans and other species now and in the future” (p. 63). This worldview reflects strong sustainability practices in education.

Figure 5. My Sustainability Worldview

To support strong sustainability, sustainability educators allow for a democratic learning process and support students in guiding curriculum (Sterling, 2001). In this democratic learning process, students are involved in all aspects of their learning, including curriculum, evaluation or
assessment, and holistic grading and assignments. This democratic process provides a shared power structure and helps to empower learners by taking more ownership of their own learning. This process has paralleled my own learning in the first two years of my doctoral program as I have been a part of this program as a student participant in the first cohort, Cohort I.

As a result of my own affective and transformative sustainability learning experiences while in this program, I wished to understand if other students experienced this as vital to their learning within the program and how affect has played a role in their learning experiences. I designed this study to reflect a strong sustainability and holistic learning-teaching practices. This study included a collaborative analysis of narratives (i.e., visual, verbal, written) to interpret multiple perspectives relative to learning theories and was designed to empower student participants. My positionality, rooted in constructivism and strong sustainability education, has guided this work. I have incorporated my own experiences and learning in this study, along with others in this program in a learning community of cohorts: Cohorts I, II, and III. I have been a sustainability education student and researcher in that I looked at learning holistically with an emphasis on affect.

**Problem Statement**

Based on the degradation of our global social and natural systems, many educators have been looking at how we educate future decision-makers to build a sustainable future. The hope is that a paradigm shift will change how we respond, our reflexivity, to changes in our global systems to think more critically about sustainable practices. Raskin (2008) has stated that our global future “will rest with the reflexivity of human consciousness: our capacity to think critically about why we think what we do—and then to think and act differently” (p. 469). Transformative sustainability learning and education is a paradigm shift in the way we are in the
world. To address this way of being, I have looked at how transformative sustainability education and learning can support this paradigm shift. Specifically, I looked at transformative sustainability learning experiences and the role of affect and emotions. Affective learning phenomena in scholarly work has included feelings and emotions as well as attitudes, values, and behaviors (Birbeck & Andre, 2009). I focused on emotions, feelings, and behaviors connected to this study.

Although emotions and feelings connected to learning has been extensively studied (Goleman, 1995; Hascher, 2009; Immordino-Yang & Damasio, 2011; Evans et al., 2013), there is still a lack of research that considers affective learning and emotions as vital for learning in higher education doctoral programs. A lack of research on affect connected to transformative sustainability education leads to an incomplete understanding of the holistic learning process in education. In addition to the role of affect, there is also a lack of research and understanding on transformative sustainability learning. This gap of knowledge prevents us from fully supporting students in this new way of learning for we need to consider their affect and emotions throughout their transformative sustainability learning process.

**Focus & Context**

The focus of this study was on adult learning experiences and the role of affect in the context of the Doctor of Education in Educational Sustainability (EDSU) program at the University of Wisconsin-Stevens Point—a doctoral program rooted in strong sustainability or learning as sustainability. O’Neil (2017) situated sustainability education learning paradigms in higher education and wrote (emphasis added),

Sterling (2011) conceptualizes these paradigms by adapting Bateson’s (1972) ecological systems theory of mind and Bohm’s systems view of thought into a “nested” system of
learning. In the center of the nest lies learning (cognitive), followed by meta-learning (meta-cognitive), and epistemic (transformative) learning. Sterling’s application of the nested system model to sustainability education can be explained as the first (education about sustainability), second (education for sustainability), and third order (education as sustainability) of change (p. 320).

Learning as sustainability, considered a strong sustainability, has the goal of transforming perceptions and people to be more sustainable (O’Neil, 2017, p. 321). It has been referred to as transformative sustainability education in this study. Established in the summer of 2017 and designed by the inaugural director and a core faculty member, Dr. Joy Kcenia O’Neil, the program was designed to build an ecological community of learners within a collaborative online atmosphere. This program design was also built upon O’Neil’s Living Learning System (O’Neil, 2015) which was based on living system principles (Capra, 1996). The EDSU program has six core principles scaffolded within the curriculum, which include:

- Ecological thought
- Systems thinking
- Transformative learning
- Pluralistic democracy
- Social justice and diversity
- Ethical action (Ed.D. in Educational Sustainability, 2019, p. 16)

A glossary of these and other key terms used in this study can be found in Appendix A.

These principles that promote transformative sustainability learning in this higher education doctoral program have shown great promise in helping learners support more sustainable systems, including themselves. The adult learner and a cohort of learners have been
situated in a nested learning system meant to support one another. In this study, the focus has been on affect and emotions as it relates to transformative sustainability learning experiences. Students in this learner system have traveled within a cohort; participants intentionally grouped together to share experiences in a learning program with a commitment to a common goal (Pemberton & Akkary, 2010, p. 180). Within a cohort learning model, relationships are critical to sustain people and programs, including empowerment to develop their own voice, critically think, and move beyond passive learning to more holistic practices.

Looking holistically at this study and the learning that has happened within this program revealed the complexities of academic language and use of terms. Holistic education (i.e., educators, teaching, learning) has been defined in a myriad of ways by diverse members of the academia. Hare (2010) stated,

Holistic education does not exist in a single, consistent form. It is best described as a group of beliefs, feelings, principles and general ideas that share a family resemblance (Forbes, 2003, p. 2). It is more than the education of the whole student and addresses the very broadest development of the whole person at the cognitive and affective levels (p. 3).

In other definitions, holistic education has been defined as “a multi-leveled experiential journey of discovery, expression and mastery in which students and teachers learn and grow together” (Jaison, 2017, p. 5). Miller (2007) referred to connections that can be used as a framework for teaching holistically: thinking connections (i.e., intuitive and analytical), body mind connections, soul connections (i.e., inner life), subject connections (i.e., context), and Earth connections. Through inner and outer connections and relationships, the whole learner and their perspectives and feelings are considered in their learning.
In this study, holistic education centered on learning and the learner, especially as it related to affect. I also considered different ways of knowing and learning to include the whole learning process. This included Miller’s (2007) concepts of body, mind, and inner and outer (i.e., intra- and inter-personal) relationships that influence learning as well as the context of the learning. The contextual framework in this study included the overall intentional design of this transformative sustainability education program. This program, rooted in transformative sustainability education, has been at the forefront of changing how we live in the world. Lange (2018) wrote about transformative sustainability education in inspiring prose,

We stand in a historical moment every bit as momentous as the shift from the Ptolemaic flat Earth view to the Copernican view of a heliocentric solar system. As Einstein famously asserted, no problem can be solved from the same level of consciousness that created it. The challenge then, say both theorists, is whether our societies will persist with the status quo and break down into chaos (entropy), or whether it will evolve and break through into a new civilizational form that is regenerative and fundamentally sustainable (p. 283).

The EDSU program pushes boundaries and breaks glass ceilings to help our societies become more sustainable while also supporting the whole student during this transformational process.

Purpose & Research Questions

The way we have been educating others has left us with a gap of knowledge on the role of affect in learning, especially as it relates to transformative sustainability education. More insight into affective learning is needed to support learning as sustainability. Therefore, the purpose of this study has been to understand adult learning experiences and the role of affect for doctoral students in a transformative sustainability education program.
Through a photovoice research study, I examined learner experiences (connections and responses to learning) in the EDSU program. Student learners in Cohorts I, II, and III were participant researchers in the study. Affective learning, especially as it relates to emotions, were studied relative to the learner and their learning experiences. Because traditional studies have mainly focused on cognitive learning (Evans et al., 2013, Birbeck & André, 2009; Bolin et al., 2005), this study focused on connecting other ways of knowing and being to provide a more holistic view of learning and the learner. My research questions were as follows:

- How do adults experience learning in a transformative sustainability education doctoral program?
- How does affective learning play a role in adult learner experiences in a transformative sustainability education doctoral program?
- How do affect and emotions play a role in transformative learning?

I was considerate of the overall holistic learning experience for students in the EDSU program but focused in on affect. Learning more about the role of affect in a transformative sustainability education program provided more insight into how affect plays a role in the learning process. These questions emerged from arts-based learning that focused on affect and that supported transformative sustainability education and learning. They were used to examine visual, written, and verbal narratives from student participants.

**Theoretical Framework**

My theoretical framework was built on the foundation of transformative sustainability learning (TSL) and how affective learning plays a role (Figure 6). Transformative sustainability education (TSE) is a “fascinating edge where transformative learning and sustainability
education meet” and has “emerged partly in response to the extreme and challenging context of the anthropogenic era in which we currently live and educate” (Burns, 2018, p. 277).

Figure 6. Contextual and Theoretical Framework

TSL moves away from a gross imbalance of traditional, transmissive education to a more holistic, transformational paradigm. Although TSL has “not yet been explicitly theorized” (Lange, 2018, p. 280), it is considered a strong sustainability—learning as sustainability (O’Neil, 2018). Transformative learning and systems thinking are critical components of transformative sustainability learning and will be addressed here to lay a foundation for this study. An additional lens on affective and holistic learning will help in building upon this framework. Further exploration into transformative sustainability learning will be addressed in Chapter 2.

**Transformative Learning**

Transformative learning involves a shift of perspective or frame of reference for the learner. “Frames of reference are structures of assumptions and expectations that frame an individual’s tacit points of view and influence their thinking, beliefs, and actions” (Taylor, 2007, p. 5). Mezirow (1991), credited with transformative learning theory, considered the following phases in transformative learning (TL):

- Experiencing a disorienting dilemma
- Self-examination
- Critical assessment of self and assumptions
- Understanding commonalities with shared experiences in TL
- Building self-confidence in reinventing new roles
- Planning and acquiring knowledge and skills in a plan of action
- Trying out new roles and action plans, building confidence, and reintegrating into society (pp. 168-169)

A disorienting dilemma is a profound trigger that causes one to examine one’s place in the world and how one views this world—leading to a potential change in identity. This may result in a feeling of alienation and lack of connections to one’s previously held belief system and their role in systems. Through self-examination and an assessment of societal systems, the learner begins to reconstruct their role in life. Mezirow (1991) mentioned that the shared experiences of TL builds self-confidence in reintegrating into society. Meant to promote sustainability education at its highest level, TL is an important component of this doctoral learning program.

Transformative learning is “understood as the process of using a prior interpretation to construe a new or revised interpretation of the meaning of one’s experience to guide future action” (Mezirow, 1996, p. 162). Mezirow’s work has been instrumental in theorizing transformative learning theory. This study further explored Mezirow’s theory but also included other theorists who more closely connected to affective learning, especially emotions, to the overall learning process. Weiss (2000) stated that “one of the most important things we have to do is to ensure that learners become emotionally involved in whatever we’re teaching them” (p. 47). Other studies that support emotions as important aspects of the learning process have included Johnson and Frederickson (2000) who wrote, “enlisting experience and emotion as allies in the process of understanding . . . extends to the students’ lives and actions” (p. 45).
Sterling (2001) wrote, “cultural and educational systems need to engage in deep change in order to facilitate deep change—that is, need to transform in order to be transformative” (p. 15). Deep change breaks glass ceilings and defies gravity in a sense. It moves beyond traditional ways of knowing and being into new ways that transform how we live and learn in the world. The importance of affect and emotions to learning is critical in adult learning programs in higher education. By studying affect through the lens of photography and arts-based learning in this study, we can begin to discover the importance of affect as a driver for learning and how educators can foster more meaningful learning experiences.

**Systems Thinking**

Transformative sustainability education and learning is also largely built on principles of systems thinking and the theory of living systems. Living systems theory is based on a metaphor, “to represent an animate arrangement of parts and processes that continually affect one another over time. There are living systems on all scales, from the smallest plankton to the human body to the planet as a whole” and, in this metaphor, “we can see that a family, a business, and even a country also are living systems” (Booth-Sweeney, 2009, p. 3). Viewing life from a living systems perspective requires one to look at an organism in its entirety, including: all of its parts, how those parts work together, and how the organism responds to its environment (Capra & Luisi, 2014). Principles of living systems theory or properties of systems are “awesomely elegant in their simplicity and constancy throughout the observable universe, from sub organic to biological and ecological systems, and mental and social systems, as well” (Macy & Brown, 1998, p. 41) and can be applied to learning in this doctoral program. Transformative sustainability education helps us understand complex systems through experiential and holistic teaching-learning practices.
**Affective Learning**

The foundation of holistic learning and teaching is built upon sustainability education and systems thinking (Capra, 2002; Orr, 2004). Orr (2004) approaches sustainability education by inclusively connecting the whole person—body (somatic), as well as cognitive learning and affective learning, including emotions and feelings. The role of emotions has long been debated and defined by individuals that offer diverse models and theories as part of the human system. Emotions historically have been thought of as magic back in the 19th century, akin to religious feelings and in opposition to rationality. Du Toit (2014) traced the linking of emotions to evolutionary adaptations for survival, along with connections to religion and the arts:

> Human emotion is a powerful common denominator that transcends temporal, cultural and ethnic boundaries. Our earliest ancestors’ fears supposedly helped them to survive, and the domestication of temporal forces is said to have taken place by embodying them anthropomorphically in art and religion (p. 2).

Through our evolutionary past, Darwin (1965), referenced in Du Toit (2014) and in O’Regan (2003), has also described emotions as the result of adaptations due to survival instincts, such as fight or flight. This physicality of emotions has been linked to our bodily processes and memory—an inner working that is meant to continue the survival of self and species. Although emotions have been considered a matter of survival, most of the focus in education has been on cognitive skills and abilities which have largely influenced educational methods. For example, Bolin et al. (2005) stated that traditional education has spent much time on “recognizing, knowing, comprehending, remembering, applying, and synthesizing outcomes” (p. 154), and they addressed that affective outcomes are lacking in education. Yet, there has been
an increasing amount of research that demonstrates the importance of affect and emotions on learning.

Goleman (1995) stated that “the extent to which emotional upsets can interfere with mental life is no news to teachers. Students who are anxious, angry, or depressed don’t learn; people who are caught in these states do not take in information efficiently or deal with it well” (p. 78). But emotions not only interfere with learning—they can also help connect students to their learning. Emotions are not separate from cognitive learning, but they work together in one learning process (O’Regan, 2003, p. 80). In my own learning and teaching experiences, I have observed that being emotionally connected to learning makes it more meaningful. Learners are more connected and invested in their learning.

**Significance of Study**

My study contributes to the field of adult learning within higher education and doctoral programming in educational sustainability. The use of arts-based research helps to understand the role of affect in driving learning processes. To further explore Mezirow’s transformative learning theory (1991), this study also draws from other theorists who more closely align affect and emotions to learning (Illeris, 2004; Dirkx, 2006; Lawrence, 2008, 2012). By including different dimensions of learning, such as affective learning, we can begin to understand more about the learning process. Illeris’ (2004) stated that “the whole range of conditions involved when learning processes that are not only cognitive significantly change the personal capacities, understandings, and orientations of the learner” (p. 84). By focusing in on affect and emotions, we can further understand its role in the transformative sustainability learning process, which will inform transformative sustainability doctoral programs that aim to reflect strong sustainability.
Using photography helps create a direct personal encounter with a person, place, or thing while promoting affect. Photography, within the context of this photovoice study, connects affect and emotions to that particular intersection with a learning experience. As students represent meaningful learning experiences connected to their doctoral program, they potentially show how the role of affect drives meaning-making. This study shows how emotions and affect must be considered to cultivate meaningful, deep learning experiences that reflect strong sustainability.

**Summary**

The doctoral program in Educational Sustainability at the University of Wisconsin-Stevens Point was designed by O’Neil with the intention of being a program rooted in transformative sustainability education. As such, I have referred to this doctoral program as a transformative sustainability education program in this study. Students in this program, including myself, have been attempting to learn differently, to learn *as* sustainability—a strong sustainability. I have gained my own transformative sustainability learning experiences within the framework of this doctoral program and have learned that affect is largely connected to fostering meaningful learning experiences. Through my lived experiences in this program, I have questioned how others learn in this program. Through a camera lens, I have focused on how affect, particularly emotions and feelings, drive meaningful learning experiences in a transformative sustainability education program. This study challenges the traditional educational philosophy of reductionism and transmissive ways of knowing and moves into a growing movement in shifting education to be more sustainable. This movement is metaphorically defying gravity. It is a movement that is helping me, along with others, slowly take off into education that reflects a strong sustainability in a higher education doctoral program.
Chapter 2. Literature Review

In the initial section of this literature review, I considered traditional education. Then I dove into sustainability connected to higher education and then transformative sustainability learning (TSL). An exploration of educational systems, such as traditional, sustainability, and TSL systems, helped to build an understanding when data and information was interpreted in this study. I also researched affective and transformative learning to help understand their roles in TSL. The structure of this chapter is shown in Figure 7.

Figure 7. Literature Organizational Structure

There are many perspectives and variables within a study which can influence the outcome. It might be easier to focus in on one aspect of a study in particular, but then it would become another example of reductionism. In this case, theories would be reduced to just raindrops on a windshield (Figure 8) without ever getting a clear picture of the whole outer world that lies outside this metaphorical windshield.
Therefore, I focused in on affect but also focused out from time to time to connect to larger systems of learning. The hope was that I would continue to figure out how these raindrops may distort our view and, in other ways, bring it into a more focused understanding of how we can transform our learning to be more just and holistic. This helped in providing a clearer picture of what lies outside the windshield (Figure 9).

As I go through this literature-review, I made connections to micro- and macrosystems. These connections in learning were reflective of experiential education, often treated as a philosophy in my own teaching and learning experiences.

**Traditional Education**

Looking at our current educational system has helped in laying the foundation of where we have been to better understand where we need to go from traditional to transformative sustainability education—in hopes that we may reach for an understanding (Figure 10) of how we can transform our educational systems to support sustainability.
Our past and current educational system has been steeped in transmissive methods (transmitting information directly to the student) and has promoted reductionism and linear thinking. Dualistic by nature, this educational system has often focused too heavily on cognitive thought processes. This type of teaching-learning system has been referred to as a traditional or Western educational system or sometimes as the modern education movement.

The traditional or modern education movement may have originated during the fifth century (Marrou, 1956). In traditional education, lectures, repetition, rote memorization, and focusing on single subjects has been the main way of transferring information and approaches have focused on one-way, didactic methods of communication (Bietenbeck, 2014; Ducharme et al., 2012; Blumstein & Saylan, 2011). This one-way method of communication in education was described by Freire (1971) as “banking education” in which “the teacher issues communiqués and makes deposits which the students patiently receive, memorize, and repeat” (p. 58). Traditional education in this way has been prevalent throughout our schools, including higher education.

Prior to this program, I often had classes in which I had to memorize information, sit in lectures, and had little to no voice in my learning. In my past professional work environment, people have often relied on lectures and presentations in providing information. Although teaching and learning in work and schools have been starting to move towards more exciting and
meaningful learning experiences, there is still much emphasis on the teacher being the expert in providing information to the learner. This supports a power structure in which the teacher has the majority of the power in how the learning happens and is reflected in less voice and choice for students. Although this teaching methodology is not inherently bad in itself, too much emphasis on this way of teaching negates diverse learning styles and disempowers learners.

This traditional educational structure not only places the teacher in the position as expert, but it also separates knowledge content into different subjects. According to DuPuis and Ball (2013), traditional education has been an “entrenched history of presenting knowledge as ‘what’: as immutable information held by experts and segregated into siloed disciplinary tracts” (p. 74). Mechanistic education methods also separate thinking into discreet subjects while promoting passive learning. Hyder and Bhamani (2016) explained how some scholars have criticized the “segmentation of knowledge application into a hierarchical model, that may restrict learners, specifically in higher education settings” and that may “limit their acquisition of a concept” (p. 288). Teaching separate subjects, such as math, science, and reading, has failed to make connections to systems.

In addition to compartmentalizing subjects as a form of reductionism, scholars have also chosen to compartmentalize education and learning objectives. Reflective of traditional education, Benjamin Bloom, with a team, published *Taxonomy of Educational Objectives: The Classification of Educational Goals* (Bloom et al., 1956). This work included a model that categorized levels of learning. The original taxonomic levels, known as Bloom’s Taxonomy, included: knowledge, comprehension, application, analysis, synthesis, and evaluation (Bloom et al., 1956).
Taxonomy, a method of organization, has also been used in education to form objectives in a two-dimensional style that included “(a) some subject matter content and (b) a description of what is to be done with or to that content” (Krathwohl, 2002, p. 213). Bloom’s taxonomy has not often been used in connection to educational sustainability due to its linear nature. Hoping to use language that would help build a stronger connection to learning objectives, Bloom’s taxonomy has been revised to use more commonly used verbs, such as remember, understand, apply, analyze, evaluate, and create (Krathwohl, 2002, p. 215). The taxonomic structure, while still hierarchical, is more applicable to standards of learning.

Bloom’s taxonomy has provided further evidence that traditional education has been “a reductionism of the system and a fixation on the parts while losing sight of the total system” (Gould, 2013, p. 95). Reductionism as well as transmissive forms of education have dominated Western, traditional education. Yet, we continue to face the degradation of our social and natural systems; in response, many individuals have been attempting to change the paradigm of education to be “education that prepares people for lives and livelihoods suited to a planet with a biosphere that operates by the laws of ecology and thermodynamics” (Orr, 2004, p. 27). Moving away from transmissive to transformative sustainability education will help support sustainability in learning and being. Helping learners live and be sustainable will help us in learning to live within more sustainable and just social and natural systems globally.

**Sustainability & Higher Education**

**Global Sustainability**

For decades, people have realized that industrialization and economic growth has impacted our social and ecological systems. The *Report of the World Commission on Environment and Development: Our Common Future* (WCED; also known as the *Brundtland Commission*)


Report) viewed sustainable development as a necessity and defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, p. 41). Furthermore, it stated that, “we have in the past been concerned about the impacts of economic growth upon the environment. We are now forced to concern ourselves with the impacts of ecological stress . . . upon our economic prospects” (WCED, 1987, p. 14). As a result, university leaders responded by creating an action plan called the Talloires Declaration (Talloires Declaration, 1990). The goal of the Talloires Declaration was to have a higher education structure that supports a more sustainable future for all (Talloires Declaration, 1990, para. 3). The complex structure of higher education institutions (HEIs) has been critical to this transformational process. As stated in the Talloires Declaration, “Universities educate most of the people who develop and manage society’s institutions. For this reason, universities bear profound responsibilities to increase the awareness, knowledge, technologies, and tools to create an environmentally sustainable future” (Report and Declaration of The Presidents Conference, 1990, para. 8).

In 2000, at the United Nations (UN) Millennium Summit, the Millennium Development Goals (MDGs) were adopted as a framework for global strategy. These 8 goals included: eradicate extreme poverty and hunger; achieve universal primary education; empower women and promote gender equality; lower child mortality; improve maternal health; combat diseases; promote environmental sustainability; and develop a global partnership to support development (Wysokińska, 2017, p. 102). At the UN Conference in Rio de Janeiro (Rio+20), additional targets were addressed and, more recently, the United Nations Economic and Social Council (UNESCO) adopted 17 sustainable development goals (SDGs) in hopes of global system sustainability transformation for current and future generations (UN, 2015). These goals have
been grounded in the “basic premise of sustainable development” in which “human and natural systems are dynamically interdependent and cannot be considered in isolation to resolve critical issues” (Dale & Newman, 2005, p. 352). The SDGs were an adaptation of the Millennium Development Goals to promote and integrate sustainable development globally. Education has been key to this global sustainable development (Mochizuki & Fadeeva, 2010; Wals & Jickling, 2002). In the SDGs, Goal #4 on Quality Education was geared to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all” (UN, n.d., para. 2). Owens (2017) wrote,

> Agenda 2030 for sustainable development focuses attention on life-long learning opportunities for all. The new targets expand on their predecessors, the Millennial Development Goals, by both widening and deepening the scope of system-wide quality education systems. Whilst the Millennial Development Goals focused attention on universal primary attainment, the Sustainable Development Goals introduce tertiary education into the global development agenda (p. 1).

A study by Ruiz-Mallén and Heras (2020) sampled seven higher education institutions (HEIs) networks globally and regionally that addressed the 2030 agenda and the SDGs. Ruiz-Mallén and Heras (2020) “studied HEIs networks instead of other HEIs such as single universities or research centers because networks accelerate the dissemination of discourses and practices” (p. 5). Their sampling originated with the Global University Network for Innovation (GUNi). Their results found ‘greening, resilience, and alternative’ discourses as significant trends in higher education institution (HEI) networks (Ruiz-Mallén & Heras, 2020, p. 6). These trends were defined as follows: greening as sustainable practices to support a ‘green’ economy; resilience increasing control of nature and linking to socio-economic development; and
alternatives to dominating economic growth models (Ruiz-Mallén & Heras, 2020). Their findings suggested that “through this diversity of proposed actions (teaching, research, assessment, dissemination, advocacy, etc.), all the reviewed networks go beyond SDG #4, Quality Education, perceiving the Agenda 2030 as a strategic and holistic framework for broad transversal action” (Ruiz-Mallén & Heras, 2020, p. 11). Greening or ‘less environmentally damaging forms of economic growth’ (Ruiz-Mallén & Heras, 2020, p. 13) was significant in their findings while resiliency and alternatives less so. Authors recognized limitations of generalizing efforts in broad HEI networks that only refer to online documentation. I was left with questions on the role of networks connected to direct institutional implementation of greening practices. Also, greening does not account for how we teach and learn within HEIs.

More connections with networks and greening HEI single universities and the impact on these connections to teaching-learning would further our understanding on the practical application of this work. One step towards this connection would be system-level change in HEI policies. Cheeseman et al. (2019) reviewed HEI policy and suggested the following additional research to further the field: more comparative research on existing sustainability policies in higher education to understand the link between policy work and Sustainable Development Goals (SDGs); more relationship building within the research process; and a commitment to challenges in past literature, such as the gap in teacher education (p. 1707). Connections between context and people would help move sustainable development initiatives forward in higher education while also considering more holistic approaches.

Caerio and Azeiteiro (2020) stated that HEIs are moving forward with sustainability connected to SDGs through: holistic initiatives and strategies, collaborative and integrative learning, engaging responsibility of personal and institutional partners, and long-term
assessments (p. 3). Although they surveyed articles from diverse places, such as U.S., China, Taiwan, and places in Europe, their study was limited in scope. Their study suggested a common objective assessment tool and could use further exploration as HEI sustainability initiatives have been diverse in methods and application. In addition to holistic strategies and partnership engagement, the connection of sustainable development (SD) has been increasing in courses and programs, especially related to science, technology, and engineering.

One study (Iyer-Raniga & Andamon, 2016) looked at systemic engineering learning and international initiatives which included the Promotion of Sustainability in Postgraduate Education and Research Network (ProSPER.Net). ProSPER.Net was developed by the United Nations University’s Institute of Advanced Studies. This program integrated sustainability education into the built (human-made) environment and engineering curriculum. Collaborative inquiry and sustainability goals were key to this curriculum. The strength in this research was within its participatory action research methodology and in considering professional development for educators. This was reflective of systems thinking and in needing a more complete educational system change. Educators trained in transformative and sustainability practices will more authentically support sustainability for learners.

Sustainability development linked to engineering stems from the interests of industry and the economy (Hjelseth, 2017). A study by Hjelseth (2017) used the Integrated Design and Delivery Solution framework. Hjelseth (2017) stated that the “implementation of sustainability in higher education, both in number of studies and in use of professional method is far behind the need in the industry and the society” (p. 1) and findings indicated needing more factual information and quantitative data on sustainability assessment. This begs the question of needing diverse methods of assessment. There is great value in quantitative, mixed methods, and
qualitative data to give a more complete picture of the overall arching HEI system. In addition to a large focus on industry, and courses in engineering and architecture, this study did reveal that they needed more information on putting sustainability into practice. The economy drives much interest in human behavior. As such, I see this pillar of sustainability as a draw for economists and industrialists in showing them the monetary profit connected to more sustainable practices. The economy and power structures continue to be an incentive for sustainability change in HEIs.

Bien and Sassen (2020) did a study that looked at sensemaking (and sensegiving) theory, meaning creation, and discourses in understanding sustainability in HEIs while also considering power structures. Sensemaking and meaning creations define what sustainability and sustainability universities mean to people in the organization. Although Bien and Sassen (2020) only looked at one university, their study gave great insight into how we can implement a sustainability transition (ST) in higher education. This is an important step as the concept of sustainability or “sustainababble” (Engelman, 2013) can confuse communication and lead to muddled discourse and plans on how to proceed with ST implementation. Sustainability can mean different things to different people, and its overuse in language may impede its true intentionality and meaning in organizations.

In addition, related to power, communication and action becomes more challenging when people feel threatened in some way. Bien and Sassen (2020) stated,

Sustainability proponents try to attain discourse sovereignty and discourse power over the idea of a sustainable HEI, but if anyone feels threatened, they will try to break through the constructed nature of the arguments and undermine an opponents’ sovereignty, discrediting terms and concepts, e.g., by playing traditional academic values (scientific
freedom, self-governance and objectivity) against the sustainability concept (social responsibility and normativity) (p. 4).

In their study (Bien & Sassen, 2020), there was a lack of involvement of administration and students as the study only looked at higher personnel leaders. It also needed more research on how power impacts ST discourse for there was still an element of power hoarding in their structure that seemed suspect. In other words, managers and leaders were given authority over people and sustainability objectives versus a shared power structure to include other voices. Relative to how change can be threatening, the study concentrated on those in power who are comfortable in their role and the roles of hierarchy. In addition, one other interesting thing to note, “Resistance to transition is triggered if the created meaning formations of sustainability are perceived to reduce autonomy, quality, resources, visibility or influence” (Bien & Sassen, 2020, p. 11). Part of the challenge is with changing traditional power hierarchy structures to one that supports a shared power structure that is more open to change.

Power is a focal point in how social systems are structured and power determines whether or not there is successful communication or conflict. In order to resolve any conflict in a community, there needs to be the right mix of power between members of the society. A hierarchical structure leads to a domination of power, but, for a sustainable social system, power needs to result in the empowerment of its members (Capra & Luisi, 2014). In order to transition to more sustainable systems and structures, an understanding should be accomplished on the meaning behind sustainability while also proactively and collaboratively dealing with organizational tensions and resistance to change. Dealing with the tension between leaders and the culture of the organization has been critical in moving forward with sustainability transitions. Lattu and Cai (2020) described some tensions while looking at relations between the
organizational and systemic levels. A sampling of these tensions include: academic leadership and management legitimacy; political power over the university and role of the state; academic work and profession; and the future of the university institution (p. 1).

Relative to organizational culture and sustainable development, Bauer et al. (2020) looked at 11 German HEIs and stated that,

It is certainly a central finding that the cases not only demonstrate an interplay between cultures and functions, but also that the individual cultural orientations interlock during the implementation of structures, etc., and usually produce a common result. It is unlikely to be possible to cite single cultural orientations, be they holistic or learning, that have clearly and directly affected and shaped individual governance dimensions (p. 17).

The strength of their study lies in the consideration of culture and the functions that occur in cultural systems. Culture impacted the functions of sustainability governance, including holistic and organizational learning orientations (Bauer et al., 2020). Relative to culture, they also considered attitudes, assumptions, and practices in sustainable development implementation (Bauer et al., 2020, p. 2).

**Sustainability Programs & Competencies**

Since the 1990s, the number of HEIs that have embraced sustainable development and the sustainability movement has increased. Over 1,000 academic institutions around the world have signed declarations of the intention to implement sustainability through: curriculum development; environmental literacy and sustainable community initiatives; and the development of more sustainable building operations (Wright, 2007; Barlett & Chase, 2004). By 2010, the Association for the Advancement of Sustainability in Higher Education (AASHE) stated that sustainability-focused programs grew to 1,447 in 467 campuses, including 66 states and
provinces (AASHE, 2010). Gosselin et al. (2013) referred to interdisciplinary environmental education (IEE) programs and sustainability science and studies education (SSSE) and stated that,

> The 2012 census of U.S. 4-year colleges and universities by the National Council for Science and the Environment revealed a sharp increase since fall of 2008 in IEE and SSSE programs—the number of schools offering IEE and SSSE programs increased 27%, the number of degree-granting programs/units increased 37%, and the number of degrees offered increased 57% (Vincent, 2010; Vincent et al., 2012) (p. 317).

Sustainability stand-alone programs have also increased (Vincent et al., 2013). A study by O’Bryne, Dripps, and Nicholas (2015) found that sustainability programs at a Master’s level have been very research-based with an additional emphasis on applied sustainability and social sciences, whereas Bachelor’s programs have focused more on courses in general sustainability, such as natural and social sciences, with less research. It may be easier for educators to build on existing curriculum and more practical as far as college funding. Although this may be easier and less expensive, we are missing the major paradigm shift in education in order to make great advances in how we teach and not necessarily what we teach. To further emphasize this shift in teaching, thinking, and learning, concepts rooted in sustainability could be throughout all curriculum and not just in stand-alone programs.

The movement to teach for sustainability has been gaining momentum and there have been key competencies set forth by the academia on what this looks like in education, especially in higher education. “Most descriptions of competence is that it consists of connected pieces of knowledge, skills and attitudes that can be used to adequately solve a problem” (Baartman et al., 2007, p. 115). An increasing number of programs in higher education across a wide range of
disciplines have been responsive to completing sustainability competency frameworks (Frisk & Larson, 2011; Wiek et al., 2011). Wiek et al. (2011) referred to this definition in their work and reviewed competencies in sustainability. They (Wiek et al., 2011) offered the following five overarching competencies below:

- Systems thinking: Analyze complex systems, considering feedback loops and other systemic features;
- Anticipatory: Collectively analyze, evaluate, and envision images of the future (problem-solving connected to sustainability);
- Normative: Collectively specify, map, apply, reconcile, and negotiate sustainability values, goals, targets, and principles;
- Strategic: Collectively design and implement transformative strategies; and
- Interpersonal: Motivate and facilitate collaborative and participatory sustainability research (pp. 207-211).

Systems thinking and interpersonal competencies have been considered in the methods and methodology in this study and will be further explored throughout this study.

More recently, Albareda-Tiana et al. (2018) reviewed the Conference of Rectors of Spanish Universities (CRUE in Spanish) core competencies documents in sustainability and used them in their experimental educational model. The core competencies for sustainability in higher education they used have been simplified here: critical contextualization of knowledge linking social, economic and environmental issues; sustainable use of resources and prevention of negative impacts; participate in community processes that promote sustainability; and apply ethical principles related to sustainability values (p. 2). These competencies focused on curriculum ideologies tied to social efficiency and social reconstruction without considering
learner-centered instruction which supports a healthy life for individuals. Social efficiency and social reconstruction focuses on the needs of society, whereas learner-centered practices concerns itself with the individual (Schiro, 2013). In order to consider healthy systems, one must look at themselves as a living system and what helps to support their own overall health and well-being. I would think that healthy individuals who are empowered are much more able to be effective when dealing with sustainability issues in larger systems that include society and planet.

Connection of sustainability competencies to chosen individual roles in community, including work roles and context, could use further attention and research. “The reality, however, is that sustainability challenges and tasks often become meaningful in one’s specific work environment. Therefore, the work context is also an important factor to take into account in the field of sustainable development” (Ploum et al., 2018, p. 114). In addition, society currently addresses learning through assessment of teaching effectiveness. These competencies will need to have authentic assessment measures which support learning for sustainability while considering diverse learners and individualized instruction versus standardization measures.

**Sustainability Education**

Although sustainability programs in Higher Education Institutions (HEIs) have increased, there have been increasing concerns over how we teach and learn. Sustainability programs in higher education seem more about sustainability and lack higher levels of learning in sustainability education. Moving to programs nested in “sustainability education utilizes applied learning models that connect real-world circumstances with the broader human concerns of environmental, economic, and social systems” (Hislop, 2017, para. 2). In this way, we hope to prepare people to live more sustainably through practicing sustainable development and
exemplifying sustainability itself. Although much has been done to advance sustainability education, there is more that needs to be done for higher education to become leaders in sustainability and to have sustainability become implemented in higher education (Waas et al., 2010).

In a brief search for similar doctoral programs to the one in this study, I found two Doctorate of Philosophy (PhD) programs rooted in Educational Sustainability: Nipissing University in Canada (Nipissing University, 2019) and Prescott College in Arizona (Prescott College, n.d.). I found 3 additional universities that offered doctoral degrees in environmental studies, ecological sustainability, or leadership: Antioch University in New England (Antioch University, 2020), Fielding Graduate University in California (Fielding Graduate University, 2020), and the Rochester Institute of Technology in New York (Rochester Institute of Technology, n.d.). I did not find any Doctorate of Education (EdD) sustainability education programs, except for the program in this study—the UWSP EDSU doctorate program—still in its early stages of development. I did, however, find two programs that were in the realm of sustainability education: the London South Bank University and their EdD program with a special focus on sustainability, equality, and diversity (London South Bank University, 2020); and the University of Missouri-St. Louis EdD in Heritage Leadership for sustainability, social justice, and participatory culture (University of Missouri-St. Louis, n.d.). This indicates that the EDSU program and this study will help future programs and organizations learn and grow to support whole system sustainability education transformation.

For sustainability education to be fully implemented, there needs to be a whole system HEI reform which involves change within nested systems. This is very challenging as sustainability programs call for a new paradigm of teaching-learning that is transformative,
especially for educators who require an understanding of how to put transformative sustainability theory into practice. Part of these challenges are due to limitations and often inadequate support from the overall HEI administration (Hoover & Harder, 2014, as cited in Filho et al., 2018).

“Moreover, capacity building and empowerment are crucial and support participatory approaches for transformation” (Disterheft et al., 2015, as cited in Filho et al., 2018, p. 287). This applies to students, staff, faculty, and administration. A full system change will help programs and people move away from traditional education – to defy gravity – and move into reflecting a strong sustainability.

**Transformative Sustainability Learning**

In this study, I focused on transformative sustainability learning (TSL) and education and the foundational concepts that support this learning. This included experiential education, ecological thought, systems thinking, and ways of learning which are relational, holistic, embodied, and transformative. I have also included affective learning and arts-based learning to further connect to this study. Through an exploration of foundational concepts and case studies, I learned more about TSL theory and practice.

**Experiential Education**

Experiential education supports transformative sustainability teaching and learning and is reflected throughout this study. Experiential education is ‘learning by doing’ (Dewey, 1938). John Dewey and David Kolb are two scholars who have been instrumental in shaping the field of experiential education. In Dewey’s work, *Experience & Education* (1938), he explained why an educational institution that transfers knowledge from teacher to students, through books, forgets about the personal connections between students and the present. The deeper the exploration behind those connections, the deeper the learning experiences for students. To create meaningful
learning experiences, educators should facilitate an “organic connection between education and personal experience” (Dewey, 1938, p. 12) while also keeping in mind that learners build upon learning experiences.

Steeped in connecting and reflecting on experiences, experiential education has the power to develop authentic, deep learning experiences, but there is a lack of information on the role of affective learning as it relates to experiential education. Kolb (1984) stated that “learning is the process whereby knowledge is created through the transformation of experience” (p. 38) and referenced four adaptive and cyclic learning modes: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Although Kolb (1984) mentioned the cyclic nature of learning and the importance of connection and reflection, he referred to knowledge as a process of interpretation without acknowledging other ways of knowing. “This theory implies that the learning takes place through reflection, a cognitive and rational process of making sense of an experience that has already occurred” (Lawrence, 2008, pp. 69-70). This study and results will show that the role of affect is integrated throughout learning and is an important component in transformative sustainability education. Key in higher level sustainability education is ecological thought and systems thinking.

*Ecological Thought & Systems Thinking*

Laferrière and Stoett (1999) stated that, “Ecology is literally the ‘study of the house’, and so ecological thought seems to include sundry reflections concerning the house, i.e. natural habitat” (p. 24). Ecological thought connects us to our natural habitat or systems. Those steeped in ecological thought and who think deeply about relationships in natural systems display ecosophy. Ecosophy is the philosophy that reflects harmony in natural systems and studies “the intellectual output of a subject that creates ecological relationships” (Matsuoka, 2014, p. 43).
Arne Naess, often cited as the father of ecosophy, stated that it is a “philosophy of ecological harmony or equilibrium” (Naess, 1995, p. 8).

Ecological thought in this study has included an emphasis on the importance of ecological literacy. Capra and Luisi (2014) believed that as we work to build sustainable communities, we need to learn and understand the principles of organizations that have evolved in ecosystems (p. 353). This understanding is referred to as “ecological literacy” (Capra & Luisi, 2014, p. 353) and is also referred to as ecological thought in this study as the two are deeply connected conceptually. Systems thinking is key to ecological thought and in understanding natural and social communities.

Systems thinking stems from diverse fields of biology, psychology, ecology, and physics. These transected disciplines lead to a deeper understanding of systems thinking which is beyond interdisciplinary and multidisciplinary—it is transdisciplinary. “Transdisciplinary is a term that is intended to flag a research attitude in which it is understood that the members of a research team arrive with different disciplinary backgrounds” (Davis & Sumara, 2008, p. 3). Complexity transverses disciplines to add to and build upon systems thinking relative to complex systems. A complex system is not a complicated system. Davis and Sumara (2006) explained the contrast between the two:

Although a complicated system might have many components, the relationship among those parts is fixed and clearly defined. If it were carefully dismantled and reassembled, the system would work in exactly the same, predictable way. However, there exist some forms that cannot be dismantled and reassembled, whose characters are destroyed when the relationships among components are broken (p. 11).
Complex systems cannot be dismantled and reassembled as opposed to complicated systems (Davis & Sumara, 2006). Living systems are complex systems. Miller (1978) developed a living systems theory which included 8 levels of living systems: cell, organ, organism, group, organization, community, society, and supranational system (p. 158). His theory was built upon concepts of space, energy, time, matter, and information. Living systems are essentially open systems that exchange matter and/or energy from their network or surroundings. This flow of energy supports living systems that are nested within a network of connectedness. Principles of living systems can be found in Table 1 (Capra, 2007). Throughout this study, I will be revisiting living system principles as the foundation for ways of learning in the EDSU doctoral program.

Table 1. Living System Principles

<table>
<thead>
<tr>
<th>Principles</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nested Systems</td>
<td>Being part of a larger whole.</td>
</tr>
<tr>
<td>Network</td>
<td>Members are connected and have relationships with these interconnections.</td>
</tr>
<tr>
<td>Interdependence</td>
<td>Organisms are supported by other living/nonliving things and do not survive in isolation.</td>
</tr>
<tr>
<td>Diversity</td>
<td>Systems are more resilient with more diversity.</td>
</tr>
<tr>
<td>Dynamic Balance</td>
<td>Cycles behave as feedback loops; involves community regulation and maintaining a dynamic balance.</td>
</tr>
<tr>
<td>Cycles</td>
<td>Exchanging energy among members of a system in ongoing cycles.</td>
</tr>
<tr>
<td>Flows</td>
<td>Organisms are considered open systems. There is a flow of energy in systems.</td>
</tr>
<tr>
<td>Development</td>
<td>Development as it relates to an unfolding of learning at the individual-species level; includes creativity and adaptations of organisms with environment and co-evolution.</td>
</tr>
</tbody>
</table>

(Capra, 2007, pp. 13-16)

Metabolism and self-organization are key to survival in living systems. When living things encounter disruptions or triggers, they naturally respond and are self-organizing or autopoietic (Maturana & Varela, 1978, as cited in Capra & Luisi, 2014, p. 22). Humans are considered autopoietic systems (Luisi et al., 1996, as cited in Capra & Luisi, 2014, p. 22). They
interpret their surroundings based on their structure and behave accordingly. When an organism responds to its environment, structural coupling is taking place as well as self-organization or autopoiesis. Autopoiesis (Maturana & Varela, 1991) refers to how a system sustains itself through a network of a reactions. It is self-organizing and responds to its environment. This behavior is the result of the dynamic balance of the system.

Dynamic balance or dynamic equilibrium is achieved when a living system is in balance and is sometimes referred to as homeostasis. This balance refers to the stability of the system. Learning, however, happens away from equilibrium based on a series of feedback loops. Feedback loops are cycles of events that impact a system, and these loops can reinforce or inhibit changes in a system. Positive feedback loops reinforce a behavior, whereas negative feedback loops inhibit the behavior and return a system to its equilibrium. Positive or negative, in this sense, is not a reference to being good or bad. It signifies the direction and behavior of the feedback loop and cycle in a particular system. The structure of a system, its physical and behavioral structure, is determined by its interactions and connectedness with matter in its surroundings. This interaction is referred to as structural coupling. When systems operate away from equilibrium in the form of dissipative structures, the system experiences change and development.

Capra (2002) refers to Prigogine’s dissipative structures and how they operate far from equilibrium but are still self-organizing (p. 13). Prigogine (1967, as cited in Prigogine & Lefever, 1973) references biological systems and their structures and stated that,

One has structures which are created by the continuous flow of energy and matter from the outside world. Their maintenance requires a critical distance from equilibrium, i.e., a
minimum level of dissipation. For all these reasons we have called them “dissipative structures” (p. 125).

These dissipative structures can lead to “emergence of new forms of order” (Capra, 2002, p. 1). Bifurcation happens at this juncture in forming this new order formation. Capra and Luisi (2014) stated that “according to the theory of autopoiesis, a living system relates to its environment structurally—that is, through recurrent interactions, each of which triggers structural changes in a system” (p. 135). An autopoietic network (Capra, 1996) shows the following behaviors:

- Self-bounded: Although a system is open to energy and matter, it is organizationally closed;
- Self-generating, self-renewing, and self-perpetuating: Parts of the system are being produced/replaced within the system; and
- Structural coupling: Interactions with others and/or the environment leads to adapting, learning, and developing within the system (p. 208).

Understanding living systems helps us understand the complexity of learning and life. As Capra (2002) wrote, “Understanding human organizations in terms of living systems, i.e. in terms of complex nonlinear networks, is likely to lead to new insights into the nature of complexity” (p. 100).

Structural changes are the result of process and experiences. Therefore, experiential education that is holistic and embodied while considering systems thinking supports transformative sustainability education. Critical to experiential learning is building upon prior experiences and reflecting on these experiences to help learners create meaning and shape their frame of reference. “The principle of continuity of experience means that every experience both takes up something from those which have gone before and modifies it in some way the quality
of those which come after” (Dewey, 1938, p. 27). Continuity and reflection is key in experiential education—a result of embodied and holistic learning.

**Embodied Learning**

Addressing more holistic ways of learning, such as embodied and transformative learning, is critical to understanding TSL and learner experiences in this study. Although there is a strong emphasis on affect and emotions in this study, I have also been open to emergence with the overall learning process. Lawrence and Cranton (2009) referenced transformative learning, a key component in TSL, when they stated that,

> No one theoretical perspective needs to mean others are excluded. That is, transformative learning can be both cognitive and imaginative; it can be collaborative and individually based; it can include depth psychology alongside a more practical reflective approach.

Dreams and reflections need not compete with each other (p. 316).

In this study, the whole body and internal and external conditions have been considered as related to TSL experiences. I will go over these experiences relative to embodied learning, connect to holistic learning, and review learning models that support TSL. A few models of holistic learning that have supported TSL, include: Sipos et al. (2008), Singleton (2015), Burns (2015), Lambert (2017), Förster et al. (2019), and O’Neil (2017). In addition, Lange (2018) connected to TSL with theoretical underpinnings that support some of these models. All models considered connections and learning dimensions that helped to inform this study, including holistic and embodied learning.

Embodied learning is considering the whole body in learning. Munro (2018) referred to embodiment as:
‘The deliberate and mindful simultaneous bodyminded engagement of the self with both the inner and outer environments’. Embodied learning is argued to be ‘the deliberate use and recognition of multimodal bodymind activities and strategies to facilitate shifts in perspectives, perceptions, paradigms, behaviour and actions’ (p. 5).

I have been drawn to embodied learning in that it considers our whole selves—involved in the intricate way of learning and being in the world. Embodied learning processes drive our understanding and perceptions. Experiences are unique to each person or human learning system. Munro (2018) referenced interrelationships in stating that “the complexity of mind, due to the interactive and multi-levelled interrelationship of body and environment, fosters insight, reflection and choice, determining the adherence to, or protection from, change” (p. 7). I considered these multi-level nested systems to reflect transformative sustainability learning. In this sense, the model shown in Figure 10 builds upon this to include embodied learning and the environment. This connected to Illeris’ (2018) work, as I have chosen to include external and internal conditions, and also to others who have focused on holistic and embodied learning (Figure 11).

Figure 11. Embodied Learning
The following dimensions included in Figure 11 are defined in this study as follows:

- **Affective**: Includes affect, emotions, feelings, and moods (Bloom et al., 1956; Birbeck & Andre, 2009; Bolin et al., 2005; Holt & Hannon, 2006); some studies include values, attitudes, and behaviors (behaviours) associated with learning. In this study, I focused on affect mainly related to emotions and feelings while behaviors have been considered as results or outcomes of embodied learning.

- **Cognitive**: The intellectual skills and knowledge of individuals (Bloom et al., 1956); and

- **Somatic**: Includes psychomotor learning or meaningful hands-on experiences or ‘learning by doing’ (Dewey, 1938) or physical movement, motor skills and development (Bloom et al., 1956) as well as other bodily or biological processes (senses and nervous system; endocrine system).

Riis and Woodhead (2010) stated that, “We are always already within complex patterns of social and symbolic relationships, and ‘emotion’ is a name we give to the multidimensional processes by which subjects navigate and negotiate within them. We ‘feel’ our way through life in an embodied engagement ...” (p. 53). In this way, I situate affect, along with cognitive and somatic, nested within the embodiment of learning. Lawrence (2012) explained that,

> Many of our strong emotions include a physical component. When we are sad or depressed, we feel a heaviness that is palpable. Fear may be experienced by a quickening of the heart rate or hyperventilation...Even cognitive knowledge that appears to be wholly rational on the surface often has affective and somatic components (p. 8).

This helps one to understand how affect connects to other learning dimensions through embodiment. Learners navigate through embodied learning with the different dimensions—cognitive, somatic, and affective. This embodied learning, especially as it relates to affect, is
within the context of transformative sustainability learning—a pedagogy in this study. Since I am considering the learner and the internal and external factors, I have looked to holistic education in this study and models that support transformative sustainability learning.

**Holistic Learning**

Sipos et al. (2008) have given a framework that supports holistic learning through their example of a head-hand-heart model. Considering the head (i.e., cognitive), hands (i.e., psychomotor), and heart (i.e., affect) helped inform this study, especially in methods and analysis. Connecting different dimensions of learning also connects to imaginative and emotional ways of knowing in transformative sustainability learning. Singleton (2015) built on this work and connected transformative learning to the head-hands-heart model in the following ways: cognitive (head) to critical reflection; affective (heart) to relational knowing; and psychomotor (hands) to engagement (p.1).

These models have taken into consideration holistic learning and teaching and move towards change that supports actions in sustainability, yet the models also needed further explanation on the meaning of the psychomotor learning dimension and implementation and practice in the field. All models cannot be inclusive of all factors that influence learning but further study into transformative sustainability learning and systems thinking would build upon this head-hands-heart model, especially as it pertains to embodied learning.

The Burns model (2015) has included five dimensions related to learning: content, perspectives, process, context, and design (p. 263). Burns’ ecological design supported learners in constructing meaning-making on sustainability concepts and issues and opened up spaces to critically think about social systems from different perspectives. The model also supported the role of affect in exploring issues. In this model, the role of psychomotor learning was explored
through hands-on participatory experiences and a connection to place and spirituality. Although there was a lack of information on somatic learning, this model and study rounded out teaching-learning experiences holistically. Strengths of this work included its holistic lens on education, especially diverse perspectives, including indigenous ways of knowing. Many scholars who theorize about TL have included indigenous ways of wisdom due to the connectedness of ecological systems to self while also supporting a greater sense of place.

Burns’ model has been extremely helpful in laying the groundwork for more TSL studies, however, it needs more input from learners. More student input into the process and especially in dealing with perspective shifts was needed to inform this model and the field of TSL. How can we incorporate the whole learner within the program? Programs and those that design programs can involve learners in the process to improve theoretical application for there is much research on preparing for TL but not enough on during and application of learning outside of the program. Also, by designing the model itself, the power is in the hands of designer. More student input into these models is needed to better inform a model that reflects TSL.

Another model in the TSL field has been Lambert’s (2017) developmental model on intercultural sensitivity. This model measured cognitive development and included six stages of development along a continuum (in order of advancement): denial, defense, minimization, acceptance, adaptation, and integration (Lambert, 2017, p. 12). Lambert’s (2017) model recognized the role of community and that individual transformation was relative to social norms and also referenced the role of affect. According to Lambert (2017),

The participants’ interviews revealed the power of affect for those who did experience transformation. In addition to the experiences that opened them up, such as vulnerability, insecurity, humility, and empathy, participants also experienced negative emotions that
originally turned them away from learning about diversity and inclusion before and during the program (pp. 170-171).

The study provided greater insight into emotional resilience, critical reflection, and modeled developmental stages in intercultural sensitivity. Process over outcomes was emphasized along with the importance of affect and social systems. In addition, the power of “antecedent primer experiences” (Lambert, 2017, p. 177) or experiences that prime learning for students who have had prior experiences in diversity and inclusion were explored in the model. Cognitive, affective, and behavior considerations were also interwoven in this study. Themes that emerged in the study included: number of Mezirow’s phases experienced (the more phases, the more likely transformative learning experienced), emotional openness/sensitivity, emotional intelligence/resilience, importance of critical reflection, professional orientation, local primer experiences, and the power of antecedent primer experiences (Lambert, 2017, p. 195).

Disorienting dilemmas were an important part of Lambert’s (2017) study, however, I would have been interested in a deeper exploration of primer experiences and how that impacted disorienting dilemmas. Primer experiences could potentially improve how perspective shifts could incrementally occur while also helping students feel more supported in their learning and overall well-being.

Affective Learning

Many scholars have contributed widely to the field of affective learning, especially related to emotions, and have helped me decipher some of its complexity. A few that have laid the groundwork in bringing attention to affect and emotions have included Bloom et al. (1956), Krathwohl et al. (1973), and Goleman (1995). Scholars who have given us a greater understanding about the neuroscience of emotions have included Immordino-Yang and Damasio
(2011). In addition, other scholars have been mentioned throughout this portion of the research relative to transformative learning and emotions (Lawrence, 2008, 2012; Dirkx, 2006, 2008). Foundational knowledge based on our history as well as current research has helped to provide a clearer picture of not only where we are at in our understanding of the role of affect in embodied learning, but where it has been and where we continue to go in transformative sustainability education as we support the whole learner.

The well-being of learners has included affective phenomenon, such as emotions, feelings, and mood and has been a critical part of the embodied learning process. Riis and Woodhead (2010) explained differences in passions that reflect emotions and that feelings express the embodied aspect and affect suggests “their passive and reactive dimensions” (p. 20). I have been especially drawn to feelings as embodied, such as feeling an emotion connected to other learning dimensions (i.e., cognitive and somatic dimensions). Although emotions and affect research has gained ground in academia, I have found that affective learning and terms have been difficult to define because the research encompasses so many theoretical and disciplinary perspectives. It depends on the person viewing, researching, and feeling—it depends on the lens of the learning (Figure 12 shows how different lenses in seeing can lead to diverse experiences).

Figure 12. Lens of Learning
Wading through these diverse perspectives, definitions, and scholarly work about emotions and feelings has been quite challenging in this study when studying the affective learning dimension. Ekkekakis (2012) stated that,

Although the distinct-states approach highlights the unique features of different states, it has been proposed that such states are not entirely independent of one another but are interrelated systematically. These systematic relationships can be modeled by a small number of underlying dimensions. Hence, this conceptual approach has been labeled *dimensional* (p. 323).

My working definitions derive from scholars who have defined the affective dimension as the “significant dimension of the educational process which is concerned with the feelings, beliefs, attitude and emotions of students” (Lang, 1998, p. 4). Emotions were a large focus of this study related to affect and learning. Scarantino and de Sousa (2018) wrote,

Throughout much of the twentieth-century, scientists and philosophers of mind tended to neglect the emotions—in part because of behaviorism’s allergy to inner mental states and in part because the variety of phenomena covered by the word “emotion” discourages tidy theorizing. In recent decades, however, emotions have once again become the focus of vigorous interest in philosophy and affective science (para. 1).

Although there has been much diversity in defining emotions and other affective phenomena, I defined the following terms here for the purpose of this study as:

- Emotion: Short-lived; Russell and Feldman Barrett (1999) defined a “prototypical emotional episode” (what is commonly called an occurrence of an *emotion*) as a “complex set of interrelated subevents concerned with a specific object” (p. 806).
- Feeling: A physical or emotional experience or awareness (Cambridge Dictionary, 2019).
• Mood: Lasts longer than emotion, not necessarily about specific person-place-thing (Ekkekakis, 2012, p. 322).

• Behavior (also spelled as behaviour): “Actions, words spoken, <or> decisions” (Brown, 2003, p. 122); referred to as general actions or responses to embodied learning in this study without an emphasis on transformative learning behavior for change after learning experiences.

I considered emotion, mood, feelings, and behavior along with the meaning of core affect connected to the affective dimension. Russell and Feldman Barrett (1999) stated,

We use the term core affect to refer to the most elementary consciously accessible affective feelings (and their neurophysiological counterparts) that need not be directed at anything. Examples include a sense of pleasure or displeasure, tension or relaxation, and depression or elation. Core affect ebbs and flows over the course of time. Although core affect is not necessarily consciously directed at anything—it can be free-floating as in moods—it can become directed, as when it is part of a prototypical emotional episode (p. 806).

For this study, core affect has been enveloped into the meaning of emotions and feelings. Emotion and/or feelings and behaviors were central to affective phenomena in this study. Feeling our emotions happens before we behave and formulate our thoughts resulting in our behaviors.

Schutz et al. (2006) explained that “emotions are portrayed as ‘ways of being’, and as ‘holistic episodes’ that include physiological, psychological, and behavioural aspects” (as cited in Hascher, 2009, p. 14). This way of being reflective of holistic episodes has been key in this study as I looked at various learning dimensions within embodiment. Hascher (2009) explained multi-modality or multiple components in approaching emotions. According to Hascher (2009),
who referred to Scherer (1987) and Izard (1994), there are five components which include: the affective component (i.e., emotions and feelings in this study), cognitive component (i.e., thinking about emotions), expressive component (i.e., facial and other ways of showing emotion), motivational component (i.e., actions as result of emotions), and physiological components (i.e., sweating and faster heart rates). The motivational component, action, has connected to behaviors in this study. Behaviors and actions result from embodied learning, including affect and emotions.

Diving further into defining emotions, Hascher (2009) referred to the following characteristics:

- Emotions are affective reactions (examples include joy, anger, sadness) and result from an incident;
- Experiences of emotions result from situations that are important to the person having the emotion; and
- When a person experiences an emotion, the person becomes mainly focused on the emotion (p. 14).

The characteristics listed above have lent themselves well to this study. Looking mainly at emotions and feelings, emotions are considered reactions to situations, such as meaningful learning experiences in this doctoral program. Therefore, photographs taken by students in this study were expected to represent emotions and help us learn how these emotions connect to learning. Key here is that emotions result from situations that are important to the learner—an another reason why we continue to explore emotions in learning. For example, Csikszentmihalyi (1990) argued that students who feel engaged in their learning, a term he has referred to as ‘in flow’ or flow, are situated for prime learning experiences. In this study, flow referred to an
intense focus on learning. Focus is important as we navigate our way of being through emotions and holistic ways of creating meaning or meaning-making.

Hascher (2009) further explained eight indicators of the “quality of an emotion” (p. 14), which included the following: valence of an emotion (i.e., happy = positive); arousal level (i.e., deactivating–activating); intensity (i.e., low to high); duration (short to long); frequency of its occurrence (seldom to often); time dimension (retrospective, in the moment); point of reference (self-related or towards others); and context of the emotion (p. 14). These five components and eight indicators have proven useful when looking at emotions and in having a more holistic lens on affect connected to cognitive-somatic-affective dimensions within embodied learning experiences. In this study, I mainly looked at frequency, point of reference, context, and the valence of emotions. Frequency and any measurements have been a part of the coding process but were not necessarily included in the findings as narratives, such as visuals and written, which have been the main focus of this qualitative study.

In addition to emotions, feelings, moods, and behaviors, other definitions of affect have included the values and attitudes associated with learning (Bloom et al., 1956; Birbeck & Andre, 2009; Bolin et al., 2005; Holt & Hannon, 2006). I focused mainly on emotions, feelings, and behaviors while keeping in mind that other affective phenomena (i.e., attitudes, values) have been blended events intermingled within complex systems in this study. For instance, whatever you have felt involved your emotions; you felt these emotions in response to a particular place-thing-object. A person maintains an attitude about an event or object connected to how they feel about it and how they feel their emotions. Their emotions and attitude, in this sense, may determine an action or behavior as a result (Deonna & Teroni, 2015, as cited in Scarantino & de Sousa, 2018, p. 303). Learners construct an understanding of meaning that includes their attitudes and beliefs,
among other embodied phenomena. From my constructivist viewpoint, I have considered emotions as a compilation or a construction of events, things, and feelings that result in behaviors. Scarantino and de Sousa (2018) referred to Dewey’s (1895) work and expressed the following:

Dewey’s main suggestion was that there is a difference between the feeling of anger and anger itself: an emotion “in its entirety” is “a mode of behavior which is purposive” and “which also reflects itself into feeling” (Dewey, 1895, p. 15, as cited in Scarantino & de Sousa, 2018, para. 22).

Here, Dewey’s understanding on affect reflected its complexity in that distinct parts make up the whole of an experience through a connected network of affective phenomena. Although he distinguished emotion from feeling (ie., feeling anger and anger alone), emotions entangle into behavior reflective of feeling.

Affective learning includes what happens biologically in ourselves as well as our interactions with our surroundings. Emotions are the result of embodied experiences often triggered by a person-place-thing. In some cases, as in mood, there may not be a specific entity or trigger but an overall feeling that lasts for an undetermined amount of time, such as depression. Mood, although not specifically referenced in this study and findings, involves a longer ‘felt’ time period than emotions. I have focused more on how emotions and feelings impacted learning in this study versus how long someone felt something (reflective of mood).

Going into this study, I hypothesized that, as students search for meaningful learning experiences, they would initially feel an emotion. This would happen at that particular moment that they searched, through their lens of learning, for an experience that they wanted to share with others. Their mood, something that may be longer lasting, impacted their emotions and how
they felt about their learning. I looked at emotions and feelings initially, knowing that this is a multi-faceted systemic process in which internal and external considerations, such as mood, may impact learning through embodiment.

Emotions have usually been referred to in studies as being positive or negative or as neutral/focused. I am open to thinking that emotions are not always simplistic in nature and that they can be intimately linked and impacted by internal and external factors. For the purposes of this study, however, I have looked to past research on neutral/focused (flow) and positive versus negative affect which has reflected dualism as a starting point of understanding parts to make up the whole of affective learning experiences. Research has shown that positive affect (such as curiosity, joy, or satisfaction) enhances learning, whereas negative affect (such as disillusionment or frustration) diminishes learning (D’Mello et al., 2014; Kort et al., 2001). Woolf et al. (2009) found that students who felt overwhelmed became confused or frustrated in their learning. In addition, Baker et al. (2007) found that certain types of affective states, such as boredom, have been associated with poor learning.

Affect has also been studied in higher education as it relates to affect learning gains and outcomes. Rogaten et al. (2019) looked into measuring affect gains, and they defined this as “a change in affect related states during a course, such as confidence, motivation and attitudes” (p. 322). Rogaten et al. (2019) wrote,

Recently researchers have extended the focus within the learning gains field to also include behavioural learning gains, which focus more strongly on skills than knowledge, and include, for example, engagement, leadership skills, study skills and team working skills (e.g., Strijbos, Engels & Struyven, 2015; de Hei et al., 2016). For example, Varsavsky et al. (2014) looked at learning gains in team working amongst 400 science
students developing skills to work with others to accomplish a shared task, whereby students reported improvements in teamwork skills, but they rated the importance of the skill significantly higher than their improvement (p. 323).

Relative to graduate or learning outcomes in higher education, “affective learning outcomes are those that relate to values, attitudes, dispositions and behaviours. They are often described as graduate attributes” (Buissink-Smith et al., 2011, p. 103). This has related to outcomes of emotions (and feelings) as behaviors in this study. Stephens et al. (2012) referred to individual and structural considerations in impacting behavior, such as individual personal traits, skills, and abilities and structural environmental and material resources (for example, financial support). Connected to this study, I looked at internal and external conditions that may have impacted learning.

External conditions that impact learning include affect as it connects social learning and making decisions. Studying emotion as the initial driver of meaning-making, behaviors, and actions for students has helped to understand its role in the overall learning process. Emotions as drivers motivate individuals to learn. They behave accordingly and this sometimes involves taking action. In this sense, taking action is doing something. Extensive work in neuroscience has helped in making these connections, including providing evidence that emotions act as a driver for decision-making and behaviors. Immordino-Yang and Damasio (2011) have done a great deal of work that supports the hypothesis that emotions are drivers to behaviors, and they have stated that “the evidence from brain-damaged patients suggests the hypothesis that emotion-related processes are required for skills and knowledge to be transferred from the structured school environment to real-world decision making because they provide an emotional rudder to
guide judgment and action” (p. 115). Immordino-Yang and Damasio (2011) summarized some of their work here:

To recap, the prefrontal patients we have described have social deficits. We have argued that these are fundamentally problems of emotion and therefore manifest as well in the realm of decision making. The relationship between these symptoms is very informative, in that it suggests that hidden emotional processes underlie our apparently rational real-world decision making and learning. Furthermore, this relationship underscores the importance of the ability to perceive and incorporate social feedback in learning (p. 120).

By addressing emotions in learning, we are reinforcing how to perceive situations, address problems, and make sound decisions in our behaviors and how we take action. In this way, emotions help guide us in how we socialize and make decisions within our social systems.

Culture or social systems have also influenced our emotions, in addition to physical body responses (i.e., heart racing, sweating) to an object of affect. Social systems have influenced our behaviors and impact emotions. Du Toit (2014) referred to Rorty (2004) who stated that,

Social institutions provide the models for the feelings of responsibility and accountability; they set norms for the tenor of social interactions, newly attuned for status and power, formality or intimacy, empathically tactful or aggressively confrontational. They form the patterns and the habits of aggression and cooperation that are exercised in generating and resolving ordinary conflicts (p. 3).

In my culture, it has seemed that the majority of academic scholars or professionals (or even those in my personal life) have viewed emotions as a sign of weakness, not to be shown, and often stereotyped as a feminine trait. For me, emotions result in behaviors that are either vilified or approved by a greater culture. When one does not adhere to cultural norms, one may feel an
emotion such as shame or embarrassment for not fitting in. They may feel alienated from the larger culture, misunderstood, and/or that emotions are not valued which could lead to a person feeling not valued overall. This connects to transformative learning and Mezirow’s (1991) phases, including disorienting dilemma (and alienation) and self-examination to reintegrate into society. Emotions are key to transformative learning experiences in how learners navigate these phases and their ways of being in the world.

The role of affect in this qualitative study provided more insight into this navigation, and current studies have shown that the research is gaining ground. Much of this research has been grounded in psychology and the social sciences and has laid the foundation for our understanding on affective learning. Willis and Cromby (2020) have given a more current view on the role of affect in qualitative studies and argue, especially as it relates to psychological studies, that the role of affect has “come of age” and they refer to this as a ‘turn to affect’ in the social sciences and humanities (p. 1). Their research on diverse studies from different disciplines included four themes: bodies, situations (time-space), representations (especially language), and affective practices (Willis & Cromby, 2020, p. 1). This has helped provide context in this study on the role of affect in learning.

In their work, Willis and Cromby (2020) used the concept of “bodies” to refer to embodied learning and how emotions are experienced in lived experiences. These lived experiences entangle affect-cognitive-somatic (including senses) together and are felt uniquely to the individual learners. Although the body should be included in embodied experiences, researchers have not often addressed biological systems and have treated the body as a mere vessel where learning takes place. The learning is the rain that falls into the puddle that is us.
Yet, we have found that the body has determined the kind of learning that takes place and in how the role of affect has determined our behaviors.

Behavior is complex and considered a result of embodied learning in this study. Naylor et al. (1980) declared that, “Behavior is defined here as an ‘ongoing act’ or process. It is the ‘doing’ of something by an individual...the basic unit of behavior in the theory is called the act” (p. 5). Naylor et al. (1980) believed that behavior is better thought of as the verb behaving (p. 5).

In addition, Brown (2003) stated that,

Emotions and feelings often arise within us in response to various stimuli—events that surround us and actions and behaviors of others with whom we interact. Within the context of our personality, temperament, and moods, emotions rise and fall in short-term cycles. Together with the cognitive component of our thought processes (the “rational mind”), they shape the decisions we make and the behaviors we display (p. 123).

Tello et al. (2013) referred to Fishbein and Ajzen (2009) when they stated, “an individual's behaviors are an interrelated combination of how one thinks and feels about a concept or idea, which then promotes the intention to act that results in actual behavior” (p. 107). Behavior and action have been dealt with differently in diverse learning theories, especially in reference to transformative sustainability learning or specifically to transformative learning. While I have looked at behavior as an outcome of learning through actions, transformative learning (TL) scholars have often looked at behavior change. In other words, how students behave differently as a result of transformative experiences—often looking at more sustainable behaviors that impact self and others after TL experiences. Mezirow (2003) referred to emancipatory education relative to TL and stated that, “Emancipatory education is an organized effort to help the learner challenge presuppositions, explore alternative perspectives, transform old ways of understanding,
and act on new perspectives” (p. 212). In this study, I have not focused on behavior change or outcomes were not explored as actions as the result of TL after the learning experiences. I focused more on emotions, feelings, and the outcomes of behaviors during learning experiences based on narratives.

**Transformative Learning**

Transformative (transformational) learning is a profound shift in how one views the world and alters how one is in the world related to connectedness of self, community, and natural systems (O'Sullivan, 2002). I have learned through my own experiences that I have had “a fundamental change in one’s personality involving conjointly the resolution of a personal dilemma and the expansion of consciousness resulting in greater personality integration” (Boyd, 1989, p. 459). I have had a fundamental shift of thinking and way of being while in this program. This has led me to question more about the role of affect and emotions in transformative learning processes—my own as well as those of others in this program.

Mezirow (1990, 1991, 1997, 2009), the father of transformative learning, developed phases of the transformative learning process. Mezirow inaugurated transformative learning from conducting research based on his wife returning to college. His study included adult female learners returning to school and changes in a frame of reference, involving habits of mind and points of view (Mezirow, 1997, p. 5). Mezirow (1997) articulated that,

A frame of reference encompasses cognitive, conative, and emotional components, and is composed of two dimensions: **habits of mind** and **a point of view**. Habits of mind are broad, abstract, orienting, habitual ways of thinking, feeling, and acting influenced by assumptions that constitute a set of codes. These codes may be cultural, social, educational, economic, political, or psychological. Habits of mind become articulated in a
specific point of view—the constellation of belief, value judgment, attitude, and feeling that shapes a particular interpretation (pp. 5-6).

According to Mezirow (1997), learning was using prior understandings connected to new experiences to develop new understandings and ways of being. Calleja (2014) referred to Mezirow (1997) in that he understood learning as “the process of using a prior interpretation to construe a new or revised interpretation of the meaning of one’s experience in order to guide future action” (p. 119). Mezirow (2003) referred to Habermas’ (1984) three kinds of knowledge in his work: instrumental, communicative, and emancipatory (pp. 59-61). While also adding alternative terms from academia in hopes of navigating the scholarly jargon, these three kinds of knowledge include the following:

- **Instrumental or technical knowledge**: Based on scientific, empirical investigations. This is sometimes referred to as objective knowledge;

- **Communicative or practical knowledge**: Based on the interactions with others; one is gaining knowledge of selves and others and the norms of a community, a social system; and

- **Emancipatory knowledge**: Based on critical reflection and self-reflection (and self-awareness); leads to empowerment and emancipation for the learner (Habermas, 1971, as cited Stablein & Nord, 1985; Habermas, 1984, as cited in Mezirow, 2003; Habermas, 1984, 1987, as cited in Calleja, 2014).

Communicative knowledge connects learners to others and surroundings and helps ground each other in understanding. Through instrumental and communicative knowledge, learners can move through emancipation. Therefore, critical dialogue and reflection has been a critical part of Mezirow’s transformative learning theory.
Based on Mezirow’s earlier work (1990, 1991), he referred to disorienting dilemmas as dramatic triggers, such as those resulting from a major life change, which instigates a change in a frame of reference for the learner. A disorienting dilemma includes experiences that “illuminate and challenge heretofore invisible and unquestioned assumptions that determine how we know ourselves and the world around us” (Taylor & Elias, 2012, as cited in Calleja, 2014, p. 129). This largely influential trigger, a disorienting dilemma, was the initial phase of transformative learning (Mezirow, 1991). Previously mentioned in my theoretical framework, Mezirow’s (1991) phases in transformative learning have included:

- Experiencing a disorienting dilemma
- Self-examination
- Critical assessment of self and assumptions
- Understanding commonalities with shared experiences in TL
- Building self-confidence in reinventing new roles
- Planning and acquiring knowledge and skills in a plan of action
- Trying out new roles and action plans, building confidence, and reintegrating into society (pp. 168-169)

Through the years, Mezirow, along with others, have built upon these phases and have been open to changes in this learning. These phases have been looked at more recently as nonlinear and also that disorienting dilemmas do not need to be the result of a crisis or dramatic life change. Disorienting dilemma can be more incremental and/or smaller events that result in transformation. Yet, for clarification purposes in this study, I have distinguished between the meaning of disorienting dilemmas and smaller triggers. I have referred to disorienting dilemmas as those dramatic triggers large enough to invoke a transformation that may include alienation.
and other phases of Mezirow’s earlier work (1991) and triggers (or stressors) as potentially smaller events that can incrementally transform perspectives and eventually meaning schemes.

Learning more about transformative learning (TL) and these phases, I wondered about the role of self-examination and if it can occur before encountering a disorienting dilemma. I have also questioned the role of empowerment prior to facing a dilemma. During my own transformative learning experiences and through learning about more diverse ways of being in the world, I now question the norms of a society that I had long been a member of throughout much of my life. Through empowerment, I have questioned those in power and have felt that the disorienting dilemma had been happening simultaneously. This has led me to question events before and during the disorienting phase. In addition, balancing our desire to organize and categorize phases or stages needs to be balanced by an increased understanding of learning systems even through diverse moments of time and space. The importance of Mezirow’s (1990, 1991, 1996, 2009) work has changed the way we look at education and ourselves in our learning and ways of being. Yet, one should never place such a great importance on any singular scholar for then one falls into a trap in which the scholar becomes the expert, reflective of traditional education.

In transformative learning theory, Mezirow has been criticized for putting too much emphasis on the rational and cognitive aspects of learning (Stevens-Long et al., 2012). As Taylor (2001) reflected,

All things considered, the emphasis on rationality, particularly critical reflection, is imbalanced and much more attention needs to be given to both the roles of emotions and implicit memory in the transformative process. Despite the significant insight that the previously mentioned studies reveal about the role of emotions and the nonconscious play
in transformative learning, they are limited in describing their intricate relationship with rationality (p. 221).

More emphasis on affect and emotions will give us a deeper understanding into how students learn and feel throughout the transformative process which is meant to be a holistic learning process supportive of transformative sustainability education.

Another criticism of transformative learning has included dualism or focusing on one perspective or the other—such as focusing in on the individual or society. Both need to be addressed in our learning as well as other connections in learning, such as how transformative learning impacts our way of being in our natural systems. For scholars that have focused on individuals, they have found that transformative learning supports self-actualization, autonomy, growth, and individuality—which, in turn, helps individuals as they free themselves from cultural norms (Boyd, 1989, 1991; Boyd & Myers, 1988). I have focused largely on the individual learner in this study, but I have also considered the cohort of learners in the program. I have attempted to look at different nested systems in this study to consider connections of the learning system, including the context of the learning.

The context of learning, more on the role of constructivism, and the role of affect are also gaps in transformative learning theory and understanding. These gaps, the lack of understanding on the role of affect, collaboration, and the case of the missing context in learning, has been addressed either indirectly or directly (i.e., affect) in this study. For example, Cranton (1996, 2016) has written extensively and eloquently on transformative learning theory. She mentioned the importance of collaboration and integrated ways of looking at transformative learning. I have been drawn to ongoing work relative to the integrative perspective or in integrating diverse perspectives of transformative learning. This has led me to dive deeper into the role of affect in
transformative learning related to other dimensions of learning and the greater context of education.

The wave of research on transformative learning that has focused more on a holistic and integrated theory of transformative learning (TL) includes affective learning and emotions. This research has been gaining ground especially as it relates to a fuller understanding of theory and practice. Looking to scholars such as Dirkx (Dirkx et al., 2006; Dirkx & Prenger, 1997), Daloz, (1999), Lange (2010), Cranton (1996, 2016), Sipos et al. (2008), and Lawrence (2008), I have viewed these perspectives which are growing our understanding of the ever-expanding field of transformative education. Dirkx’s perspective on learning called for “a more integrated and holistic understanding of subjectivity, one that reflects the intellectual, emotional, moral, and spiritual dimensions of our being in the world” (as cited in Dirkx et al., 2006, p. 125). Supporting a sacred space or sanctuary for learning provides support for the learning that occurs in TL while considering the well-being of the learner, yet another consideration of TL that is more holistic (Dirkx et al., 2006; Dirkx & Prenger, 1997; Lange, 2009). Taylor (2000) found that fostering a TL environment has been particularly important to include: a safe and comfortable environment, autonomy, collaborative and exploratory activities, and critical reflection. Lange (2009) has also written on fostering learning sanctuaries or safe spaces for learning. Being drawn to learning that reinforces the well-being of the learner, I have learned from such theorists to consider external conditions and how they impact internal conditions of the learner in this study.

Current studies on transformative learning have covered methods and teaching practices, affective connections, and connections to sustainable development. With the increase of studies, the words ‘transformative learning’ have become used rather loosely. This has confused our understanding and even inhibited our learning—with some studies referring to the foundational
learning and theories of TL to less valid attempts at its inclusion. Yet, it seemed that regardless of its use in context, elements of TL kept appearing in the research, such as empowerment, critical thinking, agency, critical dialogue, and reflection. Methods of TL have also been studied, with experiential learning commonly mentioned as important in how we learn and transform our thinking. The role of affect is still unclear in current studies but more studies have been accepting of affective connections as well as other ways of learning and knowing, such as arts-based learning.

One study that connected art to TL included the work of Bentz and O’Brien (2019). They connected their study to climate change through arts-based learning by having high school students develop an art project based on a sustainability experience. In their study, Bentz and O’Brien (2019) referred to transformational change within three spheres:

- The practical sphere: The observable behavioral and technical responses that can be connected to goals or targets;

- The political (or systems) sphere: The rules, norms, and incentives that impact the practical sphere; and

- The personal sphere: The individual and their beliefs, values, and worldviews (p. 3).

The personal sphere has been the focus of most of the studies on TL. In this study, the personal sphere was inclusive of the other spheres as an embodied experience for the whole person in learning. Although valid connections to TL included connections to art as a way to invoke emotions and perspective change, their design (Bentz & O’Brien, 2019), a 30-day experiment with a poster and brochure product, led me to question how the experiments were chosen and why the products were restricted to posters and brochures. In other words, the experiment
reminded me of a traditional teaching lesson but with great results in behavior change. Did students define sustainable behavior? Did they have voice and choice in what their end product would be? The results of the study were also mixed in that some felt empowered as a result of their experience whereas others felt overwhelmed by the sustainability issues. The project demonstrated aspects of TL in promoting reflection and in hoping to promote empowered change agents, but it needed more explanation as to how this experiential activity promoted a critical shift in behaviors, especially if they were permanent shifts, one aspect of TL. More of an exploration would be needed to more deeply understand how affect and TL impacted future behaviors and decision-making. My study also did not fully explore resultant behaviors from affect beyond the moments of space-time connected to data and findings. Further research on behaviors shifts would be needed to better understand before-during-after TL experiences.

Other studies on TL have included ethical considerations. A critical shift in perspectives and way of being in the world has often fallen under the assumption that TL is a good thing—a thing for the greater good of selves and planet. A few have questioned this assumption, including Smith and Kempster (2019), who focused on ethics of care or care ethics. Care ethics “gives significance to the emotions—particularly compassion and empathy—of the person or people affected” (Smith & Kempster, 2019, p. 304). As learners go through TL, they will likely need emotional support. One phase of TL addresses this—when learners seek out support from others by sharing commonalities and by engaging in critical discourse as they integrate their new perspectives and self into social systems (Mezirow, 1990). Smith and Kempster (2019) referred to Taylor (2017) who stated that relational inquiry should be a part of the TL process, including sharing stories and learning processes with others to develop new stories (p. 21). Not only is this a way to share and reflect but also a way to learn other stories and perspectives. Reflection and
discussion, including inquiry, sharing, and stories, all help to support and involve the learner in their learning versus just trusting the process of TL. Smith and Kempster (2019) wrote,

The learners had been advised to ‘trust the process’. Yet there had been no discussion about the ethics of transformative learning and the range of possibilities this could make manifest. Neither had there been a conversation about the emotions that could be engendered nor the impact on relationships (p. 312).

Their own transformative learning experiences were not discussed nor was the process of their learning. Empathy for the learner and their potential learning should be addressed throughout the learning process.

A valuable component of TL has included empathy (Giotopoulus, 2018). Two types of empathy include: self-reflection and the measure of how much we enter into other perspectives and the openness and care for and about others (Boyatzis, 2012). For me, I have noticed through my lived experiences that empathy has been critical to transformative sustainability education (TSE) and has helped selves and others view diverse perspectives in a compassionate way. If both individuals in a situation have empathy, there is a greater desire to reach an understanding or respect for each other’s lived experiences and worldviews. A learning sanctuary (Lange, 2009) created in the beginning and throughout TL maintains consistent and ongoing support. This has led me to question higher-education doctoral programs which may focus on TSE but then adhere to traditional structures and practices in the larger nested systems in which the program lies.

_TSL Models & Theory_

Another important contribution to transformative sustainability learning (TSL) has been Förster et al.’s (2019) model which considered Higher Education for Sustainable Development
(HESD) and systemic transformative and affective learning. Focused on the learner, they referred to current transformative sustainability scholars and research which strengthened their model (Biberhofer, 2019; Wilhelm et al., 2015; Taylor, 2017) as well as normative sustainable development research (Schneider et al., 2019). Their study focused heavily on affect edge effects, liminal experiences, and transdisciplinary methods (Balsiger et al., 2017). The strength of this work lies in its deep understanding of transformative learning and the connection to feelings, behaviors, and the recognition of meaning perspectives, such as “paradigms, beliefs, worldviews, assumptions and values that guide our thinking and actions” (Förster et al., 2019, p. 324). Their model reflected this strong connection to emotions and to edge emotions and the liminal state where a “fluid” discomfort may occur for learners (Förster et al., 2019). If a learner experiences a trigger event that moves them out of a comfortable state of being, they may be able to integrate new information and form new meaning perspectives. The role of feeling safe helps to promote new meaning-making schemes, whereas fear may have learners revert to old perspectives. This correlates to systems thinking in that learning happens away from equilibrium on a reinforcing learning feedback loop. Supporting learners in this process will help them integrate new perspectives and in shifting their own. This model helps one understand the importance and role of emotions in transformative learning, but the implementation of this model, along with other models, has been insufficient, along with a clear understanding of how educators can support learners during transformative change.

O’Neil (2017) developed a Kitchen-Based Learning (KBL) framework—a living learning system (p. 323). Built upon a theoretical framework of agential realism and living systems theory, the living learning system included social, affective, and cognitive learning. O’Neil adapted KBL to the architecture of the EDSU program and curriculum. O’Neil further explored
theories and the synergy between Capra’s ecological relationalism and the intra-actions between all matter, both human and nonhuman, to Barad’s work on agential realism. O’Neil (2017) wrote about Barad (2007) in her work,

This epistemological and ontological theory of agential realism holds the notion that individuals (human and nonhuman) do not pre-exist but rather are materialized during ongoing intra-actional phenomena (Barad, 2007). Barad calls these “intra-actions” (as opposed to interactions) in which all living and non-living “things” entangled in forming matter and meaning. Additionally, “all bodies, not merely human bodies, come to matter through the world’s iterative intra-activity” (p. 152).

Built upon Capra’s (2002) ecological living systems theory and agential realism, O’Neil’s living learning system reflected a dynamic process. This has also correlated to Capra’s more recent work with Luisi (2014) on autopoiesis and structural coupling and explains how we need to look at living and nonliving matter and how they intra-act. O’Neil (2017) wrote that “the difference is significant because ‘interactions’ hold agency pre-phenomena, and ‘intra-actions’ are entangled living and non-living to form matter and meaning. Meaning and matter do not hold a priori agency to the phenomena” (p. 326). For this study, living systems theory has been explored, especially related to affective learning, within the program. Perspectives on learning emphasized an integrated learning approach inclusive of supporting learners and their emotional learning while also being reflective of living systems.

Agential realism is a form of relationality. A prominent scholar in TSL, Lange (2018) explored relational ontology and how a new way of being can help build more sustainable educational systems. Sustainability education considers relationality in theory and practice. Lange (2018) wrote,
In a relational ontology, transformative learning and sustainability education would attend to the dynamics of the whole, and nested systems as much as possible. This includes the contexts, properties, and patterns of interactions in which an individual is embedded, not just the worldview of an individual. It would address as much of the relational network as possible—geographic place and other nonhuman relations in that place, the myriad of work, personal, and familial relations brought into the room by learners, and the larger cultural, social, economic, and political relations as well as cosmic mythology and spiritual relations that exist at the historical moment. Providing opportunities for students to name the systems they are nested within, their positionality, the porous boundaries between systems, and to experience these connectivities are rich processes for transformative and sustainability learning (p. 291).

The work of O’Neil (2017) and Lange (2018) have been critical in moving forward with sustainable practices in education and how we can interact with our systems in a healthier way. Looking at educational programs, we should assess their sustainability education best practices by addressing living systems. As such, these attributes have been considered throughout this study:

- Networks (relational connectedness and relationships)
- Systems thinking
- Holistic teaching and learning

Networks are relational between humans and nonhuman matter. Although relationality will not be fully explored here in this study, connectedness will be at the forefront of networks reflective of living systems theory. Systems thinking, holistic education, and how humans relate to others is critical to human identity and how they learn.
These theoretical underpinnings and models need applied practice in order to fully grasp the meaning behind transformative sustainability learning. Some of the theoretical applications have included work based on experiential methods and on curriculum and program design. A few examples of this work: Cude and Kisirkoi (2018), Hathaway (2017), Burt (2019), Filho et al. (2016), and Iyer-Raniga (2016). Cude and Kisirkoi (2018) addressed the need for teachers to be trained in sustainability concepts and asked whether or not one class on transformative education for teachers could make a difference in transforming perspectives. Cude and Kisirkoi (2018) used qualitative methods (interviews and case studies) based on participant lived experiences. Although interviews were after final exams, there seemed to be bit of a power imbalance in how data was gathered in the study. Pre- and post-assessments were used to show a change in perceptions, skills, and knowledge. Information on qualitative case studies supported participant experiences to provide rich information, yet there was little to no mention on perspective or frame of reference change by the participants. They did learn more about sustainable teaching-learning practices but the lack of connection to transformative learning (TL) left a gap of knowledge, including on change agency, an important component of TL. Cude and Kisirkoi (2018) also found that more work needs to be done to build upon their study, including Education for Sustainable Development (ESD), and stated that,

Implications for practice include that more emphasis needs to be placed upon building a network, developing a support system, and a vision that is more broadly supported than just one methods class. Even the students themselves pointed out in their final exams that more emphasis is needed on embedding the revolutionary change to a learner-centered, ESD model of teaching into the whole teacher training curriculum more visibly, more
intentionally, and more comprehensibly. More exposure will give them the confidence to teach in this manner (p. 138).

The attitudinal shifts mentioned in the study could have made stronger connections to transformative learning and how that can impact future teaching practices.

Hathaway (2017) further and more deeply explored the transformative learning process by connecting to and implementing Joanna Macy’s “Work that Reconnects” (WTR). WTR, a transformative learning experience, supported learning which acknowledges, experiences, and understands the emotions connected to ecological issues. Hathaway (2017) wrote, “Through a four-step process employing meditations, interactive exercises, and conceptual insights, the WTR helps participants to experience, acknowledge, and understand their emotional response to the state of the world” (p. 297). Rooted in positivity and hope, this program recognized and supported emotions connected to the transformative learning process and how we can push our emotions to support positive change for self and planet. This work dealt with fear, avoidance, or a sense of being overwhelmed by planetary crises by offering positivity and hope as an alternative.

Through positive emotions and hope, experiential learning shows how connecting to self and place can promote sustainability and change agency. The recognition of the importance of internal emotional management is a powerful step to help people feel empowered in this time of change and uncertainty. Although, the great challenge in this study (Hathaway, 2017) was the limited amount of time on this work (a short 1-day workshop). More time on this learning and how people changed perspectives and implemented this learning relative to change agency has been an ongoing theme in transformative sustainability learning.
Other studies have worked to promote change agency through a social justice approach. One such study worked on using a cognitive justice approach connected to environmental learning (Burt, 2019). According to Burt (2019),

The context was the second iteration of a Changing Practice course for environmental activists in South Africa—part of a broader action research project, implemented by the Environmental Monitoring Group (EMG) and funded by the Water Research Commission (WRC) that investigated how civil society could monitor how South Africa’s National Water Resource Strategy 2 (NWRS2) brought about water justice...

I designed the second course by drawing on Freire-inspired critical and emancipatory pedagogy which emphasizes how a learning process has to respond to the historical and material realities of participants, and at the same time take into account how the learning process itself is situated historically (p. 1).

Although this study referred to cognitive justice which brought attention to the injustices of Western science and imbalanced power structures, it lacked more practical application of theory and how it could change teaching-learning practices to instill ongoing behavior change.

Other studies in practical application have involved connections to experiential methods, such as project-based learning connected to sustainable development. The work of Filho et al. (2016) aimed “to extend the link between employability and sustainable development by referring particularly to integrative approaches to sustainable development and suggesting how Project-Based Learning (PBL)…may enhance learning and development” (p. 127). Their work supported an integrative sustainability education and project-based approach, however, it focused too heavily on the economy and employment out of school. Although this has been considered a
pillar in ecological sustainability, it still lacked a holistic perspective reflective of transformative sustainability learning (TSL).

Including different components of a TSL system includes supporting different perspectives and a connectedness within networks and nested systems. These studies and models reflected systems thinking and other ways of knowing which contrasted traditional ways of knowing and being. Part of TSL has also included place-based learning, another experiential method that connects one to place (Sobel, 2004). Higher education programs in college need to consider systems and programs should vary according to place. A “sense of place describes the complex cognitive, affective, and evaluative relationships people develop with social and ecological communities” (Ardoin, 2006, p. 118). In addition to being place-based, it should be practical and problem-oriented (Orr, 2004). In this way, we can use problem-solving when looking at our natural and social systems connected to place. Although there have been advances that reflect experiential place-based learning and connecting to context (Pisters et al., 2019; Simm & Marvell, 2015), more studies on place are needed to fully understand how we can promote this connectedness in learning, including online learning.

Context and place has been significant to TSL and this study, especially related to online learning. In this study, there was a required face-to-face residency which was instrumental in cultivating community and strong relationships between students, faculty, staff, and place. Yet, the EDSU program has been mainly an online program. Students who are in online environments may have opportunities to build a sense of place through diverse ways of interacting with others, self, and with technology through interactive online platforms that support reflection and critical dialogue. In addition to more research into place-based learning and online environments, more research is needed on: theory applied practice, scaffolded perspective learning, long-term
implications, ethics of care of learners, and learner input into practical applications of transformative sustainability learning.

Summary

Through this literature review, I have worked to include an overview of theoretical knowledge as well as primary research that has supported transformative sustainability and affective learning—the foundation for my theoretical framework. This has been challenging relative to transformative sustainability learning (TSL) as the fields, models, and theories that support it make up a complex network. To navigate this, I searched for TSL (and transformative sustainability education) to ground myself in components that make up its whole. Ecological thought and understanding systems thinking, along with transformative learning, has been instrumental in my understanding of TSL. In addition, experiential education, rooted in holistic and embodied learning, strengthens this work. Key to embodied learning has been affect and its role in supporting students as learners and change agents in the world of TSL. Knowing that TSL has the potential to create change agents could help transform our way of being in the world to be more sustainable, yet there is still a great deal unknown about the universe of TSL. Studies reviewed in this chapter show that we are at a point of a new paradigm shift in education. I, and other students, attempt to defy gravity to put learning into a more balanced, holistic nested system within our global sphere.
Chapter 3. Methods & Design

The purpose of this photovoice research study was to examine learner experiences, especially connected to affect, in the EDSU doctoral program. The self-selected participants in the study were students from Cohorts I, II, and III in the EDSU program. I referred to my purpose and research questions as I worked on the research design and throughout this study. My three research questions were: How do adults experience learning in a transformative sustainability education doctoral program? How does affective learning play a role in adult learner experiences in a transformative sustainability education doctoral program? How do affect and emotions play a role in transformative learning? A transformative sustainability and affective learning theoretical framework within the context of the EDSU program provided a foundation for this study. Methods and analytical procedures were based on this theoretical and contextual framework. I addressed validity and trustworthiness throughout this study along with the research design which incorporated participatory action research and photovoice methods. An overview of this chapter is shown in Figure 13.

Figure 13. Methods & Design

Methods & Research Design

In this study, photovoice methods were used to study doctoral student learning to inform the field of transformative sustainability education and learning systems. It recognized a new
way of learning and being, learning as sustainability, which has been vastly different than traditional education. In this way, these students have attempted to defy gravity by learning differently than those who have learned in a traditional system. The design of this study was based on participatory action research and qualitative photovoice methods which reflected the EDSU program itself—a transformative sustainability education program rooted in strong sustainability.

Participatory action research (PAR) was developed from a Participatory Rural Appraisal (PRA) approach in which individuals within a community assessed and addressed their lifestyles (Chambers, 1994). PAR includes participants’ assessment of their own conditions or issues at hand and helps them express their voices in studying and improving their conditions. “PAR is an effective way to incorporate experiential learning and social justice into courses to improve student empowerment and feelings that they can make a difference in their communities” (Mordock & Krasny, 2001, as cited in Bywater, 2014, p. 929). Experiential and participatory education that empowers learners is reflective of transformative sustainability education. Diving into perspectives and equity issues also supports different ways of knowing and being which transforms how we learn and live in the world. This way of being supports more equitable social systems. Beh (2011) explained how PAR supports marginalized populations:

Participatory action research (PAR) methods have proven to be an effective way of soliciting multiple perspectives of knowing and including them in management schemes related to human livelihoods and development (Bradley & Puoane, 2007; Habgood, 1998). Additionally, PAR approaches have allowed historically disenfranchised
populations (e.g. women, ethnic minorities, at-risk youth) to have a voice in development of these management schemes (Berger & Peerson, 2009; Day, Higgins, & Koch, 2009) (p. 16).

PAR is participatory, intended to empower others, and has often been coupled with photovoice (Drainoni et al., 2019, pp. 1-2).

Photovoice, an arts-based research method, reflects PAR in that it is experiential, participatory, and is meant to empower the participants as they develop their own research to further the work in strong sustainability for learners. The term photovoice was developed by Wang and Burris (1997) as “voicing our individual and collective experience” (p. 381) or VOICE and is “a process by which people can identify, represent, and enhance their community through a specific photographic technique” (p. 369). Photovoice originated from a photo-novella project by Wang and Burris (1997) that included photographs and narratives. Evans-Agnew and Rosemburg (2016) wrote,

Building on the work of documentary and other visual research traditions, the goal of this method was first advanced by Wang and Burris (1994) in women’s health research in Yunnan, China (Wang & Burris, 1994, 1997; Wang, Burris, & Ping, 1996). They argued that photovoice could address social change through participant photography, critical reflection, and participant-derived text/title/caption to accompany the photos (p. 1019).

Relative to feminist theory, historically there has been male bias in research, but Wang and Burris (1997) found that “the work of Chinese village women as visual anthropologists has demonstrated the exact opposite is possible” (p. 370). Photovoice has been based on the theories of feminist theory, critical consciousness, and documentary photography while supporting participatory action research. For Freire (1971), the focus was on marginalized populations and
images to represent oppression. As a method, photovoice has allowed the space and means to support participants as they express themselves and represent their community.

Photovoice studies have usually included a needs assessment which involves a process intended to address the needs of a community. I did not do a needs assessment but based this study on the lack of support in considering affective phenomena as relevant to learning and the lack of information on higher education transformative sustainability learning. Through participatory action research and critical reflection, I included student voice in their own experiential learning, reflective of transformative sustainability education. This study also included an authentic, arts-based learning experience and an audience relevant to the work in moving sustainability education efforts forward in higher education. By looking at the learner and their learning, this research has taken a step forward in meeting the needs of those interested in teaching and learning as sustainability. Photovoice aligned well with this study and connected to the 3 goals of photovoice found in Table 2.

Table 2. Goals of Photovoice

<table>
<thead>
<tr>
<th>3 Goals of Photovoice</th>
<th>3 Goals of this Photovoice Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Enables people to record and reflect on concerns and strengths in their community.</td>
<td>1. Enables cohort members to record and reflect on their learning in the EDSU program.</td>
</tr>
<tr>
<td>2. Promotes critical dialogue about their community through discussion of photographs.</td>
<td>2. Promotes critical dialogue about learning through discussion of photographs.</td>
</tr>
<tr>
<td>3. Reaches policymakers.</td>
<td>3. Publicly share with others to move learning as sustainability forward in sustainability higher education (SHE) programs.</td>
</tr>
</tbody>
</table>

(Wang & Burris, 1997, p. 370)

Arts-based research that includes images and photography supports participatory action research and connects to affect. In addition, arts-based inquiry can be used as a way to “counteract the hegemony and linearity in written texts, to increase voice and reflexivity in the research process, and to expand the possibilities of multiple, diverse realities and understandings” (Butler-Kisber, 2008, p. 268). This promotes perspective shifts in how we see
our realities and helps learners reflect on their lived experiences. This also supports embodied and experiential learning. Winton (2016) explained this by writing,

Furthermore, this very act of looking can change the way the world is seen. In making photographs, participants may contemplate the reason behind the images, their gaze and its subsequent meaning (Liebenberg, 2009). The camera, then, creates a distance between subject and object, between the participants and their embodied experience, which in turn may invite contemplation and deeper reflection (see Dennis et al., 2009; Ho et al., 2010). It is this act of looking, and the process of reflection it enables, that together feed into a vision of participatory photography as a potentially transformative development tool: photographs can capture and tell people's power-imbued contexts (p. 432).

These images and reflective narratives can help give voice to thoughts and learning experiences. In this way, photovoice provides the context of shared lived experiences with others through action research. These concepts are further supported by Wang’s (1999) work which has been connected to my research design. Key concepts and procedures connected to photovoice experiences in this research design are shown in Table 3.

Table 3. Photovoice Key Concepts & Experiences

<table>
<thead>
<tr>
<th>Photovoice Key Concepts</th>
<th>Photovoice Experiences in Research Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Images teach.</td>
<td>Images teach.</td>
</tr>
<tr>
<td>Pictures can influence policy and worldviews.</td>
<td>Pictures can influence program design and educational policies/social systems.</td>
</tr>
<tr>
<td>Community participates in creating and defining</td>
<td>Cohort students participate in taking and defining photos that inform programs and educators.</td>
</tr>
<tr>
<td>images that shape policy.</td>
<td></td>
</tr>
<tr>
<td>Process requires that influential stakeholders</td>
<td>Shared dissertation/study findings upon completion.</td>
</tr>
<tr>
<td>are at the table (the audience).</td>
<td></td>
</tr>
<tr>
<td>Emphasizes individual and community action.</td>
<td>Emphasizes the student, the network which supports the student, and their learning connected to affect and sustainability.</td>
</tr>
<tr>
<td>(Wang, 1999)</td>
<td></td>
</tr>
</tbody>
</table>

This participatory action research design with photovoice methods included learners as participant researchers who took photos connected to their learning experiences in the EDSU
defy gravity transformative sustainability education program. Their photos helped them connect to and reflect
on their learning in a visual way. Student participants worked collaboratively to share these
experiences through written narratives and through verbal sharing in 2 online group sessions.
This emphasis on students as learners will help inform other programs nested in sustainability.
My research design, reflective of transformative sustainability education, is shown in Table 4.

Table 4. Research Design

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Focus on the EDSU program and learners. Develop a problem statement and research questions which guide the study. Address the contextual framework of the EDSU program.</td>
</tr>
<tr>
<td>2</td>
<td>Build the theoretical framework to inform the research design, methodology, and research methods.</td>
</tr>
<tr>
<td>3</td>
<td>Choose qualitative participatory action research and photovoice methods to include the students as participants.</td>
</tr>
<tr>
<td>4</td>
<td>Connect photovoice methods to the research. Design the photovoice experience. Include consent forms and information sheets (Appendix B).</td>
</tr>
<tr>
<td>5</td>
<td>Collect data from participant researchers (electronically; emails).</td>
</tr>
<tr>
<td>6</td>
<td>Analyze data (codes, categories, and themes).</td>
</tr>
<tr>
<td>7</td>
<td>Hold an online session with all cohort participant researchers to analyze narratives (top choices). Video record session.</td>
</tr>
<tr>
<td>8</td>
<td>Analyze data again based on participant researcher online session input and feedback. Transcribe video recording and analyze. Member check analytical coding.</td>
</tr>
<tr>
<td>9</td>
<td>Hold final online session to member check any analysis with participant researchers, to celebrate their work (slide show), and to answer any questions.</td>
</tr>
<tr>
<td>10</td>
<td>Further analyze, member check, and draw conclusions on learning and the role of affective learning connected to a transformative sustainability education program.</td>
</tr>
</tbody>
</table>

My theoretical framework on transformative sustainability and affective learning, along with my research questions, guided this study. I introduced the study to each separate cohort at the June 2019 EDSU summer residency. Students took photographs and wrote narratives and submitted this data electronically to me prior to 2 online sessions. Online sessions were with self-selected participants across Cohorts I, II, and III. Analysis and findings were member checked with student participants prior to dissertation completion.
Participants & Considerations

Participants were 14 self-selected students in the University of Wisconsin-Stevens Point (UWSP) Doctor of Education in Educational Sustainability (EDSU) program. Demographics were not collected in this study and participants included a sample from three cohorts, as follows: five from Cohort I, four from Cohort II, and five from Cohort III (Table 5; pseudonyms were assigned for student participants).

Table 5. Student Participants

<table>
<thead>
<tr>
<th>Cohort I</th>
<th>Cohort II</th>
<th>Cohort III</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI-1 Sonni</td>
<td>CII-6 Sam</td>
<td>CIII-9 Deena</td>
</tr>
<tr>
<td>CI-2 Lou</td>
<td>CII-7 Marin</td>
<td>CIII-10 Fenn</td>
</tr>
<tr>
<td>CI-3 Lee</td>
<td>CII-14* Dakota</td>
<td>CIII-11 Evin</td>
</tr>
<tr>
<td>CI-4 Reese</td>
<td>CII-8 Tatum</td>
<td>CIII-12 Kylie</td>
</tr>
<tr>
<td>CI-5 Tivy</td>
<td></td>
<td>CIII-13 Charlie</td>
</tr>
</tbody>
</table>

*Note: *Last submission coded CII-14

Cohort I was the first cohort in the program. Although a few students took two classes early (courses focused on social justice and leadership could have been taken prior to the official program start date), most students began their doctoral program studies at the first summer 2017 residency which took place at the UWSP campus and at the nearby Schmeckle Reserve, a UWSP field station. They also visited a local business rooted in sustainable practices. Students took their first classes after this residency in the fall of 2017. Cohort II students began their doctoral program at the summer 2018 residency at Conserve School in Land O’ Lakes, Wisconsin. The most recent cohort in this study, Cohort III, began their doctoral program at the summer 2019 residency, also at the Conserve School. All summer residencies were face-to-face and included experiential and place-based activities to introduce the program as well as to build community with and across cohorts. A support network of professors and staff were also available during this time to guide students in their learning. Summer residencies have been
approximately 5 days held in the month of June. Aside from the face-to-face residency requirement, the EDSU doctoral program has been held online. At the time of this study, students usually traveled in a cohort their first two years of coursework prior to their last year (dissertation writing and course completion).

This study was designed to build upon the cohort model in which the same group of students travel through their program with the common goal of being successful in their studies. This model helps build community and supports a learning sanctuary where students feel comfortable sharing with others (Lange, 2009). Photovoice was selected in this study to benefit and focus on the learner by helping them meaningfully connect to their learning process through reflection and sharing with others in their cohort community. Participatory action research and photovoice methods were also chosen to support change agency and to empower students. Overall, this study was intentionally designed to support learners reflective of transformative sustainability education.

Although no discomfort was expected, transformative learning (TL) has often involved a disorienting dilemma (Mezirow, 1991). Students reflected on their learning experiences and this could have led them to be emotional when reflecting or sharing with others. Students were supported during this process from myself and peers. Additional support was available from the director/advisor of the program, if requested. The cohort model was built to have a sense of community and support for all learners. Peers related to other learning experiences in the group, because they were in the same EDSU program. I was available in supporting others and in being sure anything that was shared was approved before dissertation completion. Ethical considerations and concerns identified in this study are shown in Table 6.
Table 6. Participants’ Considerations & Concerns

<table>
<thead>
<tr>
<th>Issue</th>
<th>Concern</th>
<th>Support for Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Privacy</td>
<td>Photos will be shared in a group setting, in public presentations, and in publications. Images chosen by the participants should be considered before sharing. Images should not be harmful to the participant. Additional people in photos taken by participants need to be aware of research and offer consent.</td>
<td>Participants will be given expectations of research protocol ahead of time in efforts to be transparent and so they may provide any feedback. Any human subjects that can be identified in photos should receive a consent form and sign it to approve any such photos.</td>
</tr>
<tr>
<td>Researcher, Peer, &amp; Participant Observer</td>
<td>Participants may want to take and display photos based on what they think the group thinks about them. This may influence authenticity. Participants may be tempted to guard their conversations or be less authentic when the researcher is also a participant observer.</td>
<td>Facilitator will try to support a learning sanctuary and place where participants feel comfortable with the space to share out. Be clear ahead of time about the researcher being a participant observer (i.e., what that means) and that participants may receive any data used to validate/approve to be used in the dissertation completion process.</td>
</tr>
<tr>
<td>Researcher &amp; Participant Observer Ownership</td>
<td>Participants release ownership rights of photos.</td>
<td>Be clear about expectations and have photo release forms for participants.</td>
</tr>
<tr>
<td>Photography Considerations</td>
<td>Any challenges in taking photographs.</td>
<td>Be sure to know your audience and consider visual diversity and/or impairment and provide alternatives, if the case. Be sure they have a means to take photos if they are participating in the study.</td>
</tr>
</tbody>
</table>

This study was approved through the UWSP Institutional Review Board (IRB). There were no incentives, reimbursements, or other compensation for the participants and participation was completely voluntary. Consent forms and photo release forms have been included in Appendix B. All data was kept on my personal computer, password protected, and backed up occasionally on a hard drive that was kept in a locked safe. Pseudonyms were given to research participants after the learning experiences (summer residency and online sessions) for purposes of the dissertation and sharing the work. Recordings, video, and notes with any associated real names were on my personal computer that was password protected and kept on a hard drive in a locked safe when not in use.
Data Collection

Study Introduction

This study was introduced in June 2019 at an in-person doctoral program summer residency held at Conserve School at 5400 N. Black Oak Lake, Rd. in Land O’ Lakes, Wisconsin. A school centered on environmental education, Conserve School property areas consisted of woods, gardens, trails, fitness facility, dorms, and a main building with classrooms, large open spaces, a kitchen, and an eating area. The locations at Conserve School included inside classrooms or open areas and outdoors on school grounds for this study. During this June 2019 residency, students were organized into their particular cohort (Cohort I, II, or III) for a group presentation and discussion on the photovoice study indoors. I did this three separate times, once for each cohort. Any students were invited to attend from all 3 cohorts and students self-selected to be a part of the study by the end of the introductory session by signing a consent form (or they let me know shortly after the session).

In the introductory session, students were asked to describe meaningful learning experiences and discuss this with another person in their cohort. I left the term ‘meaningful learning experiences’ up to them and their interpretations. Students dialogued with another student (1-2 other students) in their particular cohort, and then we shared out our thoughts in a large group. We also discussed the photovoice study and students were given opportunities to ask any questions about the study. As part of this study, students were asked to supply photographs (photos) that have meaning for them connected to their learning process in the EDSU program and to provide a written narrative (approximately 4 to 5 sentences) and a title connected to the photos. Students turned in 1 or more photo submissions with titles and narratives (approximately 3-10 photos were originally requested).
The main focus of the learning session held in June 2019 at Conserve School was to introduce the study and to promote discourse within their cohort. The hope was to build community and to cultivate a safe place to share and ask questions. To guide my thinking, I referenced many photovoice studies and scholarly work, including Olivier, Wood, and De Lange’s (2009) work in which they referred to pillars in setting the stage for a participatory action research (PAR) photovoice study: overview and conceptualization of the project; an introduction to the methodology; and a discussion of the prompt to guide photograph taking (pp. 13-15). A fourth pillar, training in camera use, was not done at my photovoice introductory session. I did ask prior to the session if anyone needed a camera. During the introductory session, I also provided helpful hints relative to taking photographs (photos) in an information sheet for participants.

I spent time going over their prompt and their definition of meaningful learning experiences to set the stage for them in taking photos of these experiences connected to their doctoral program. It was important to give student participants time for reflection and in discussion prior to taking photos so they were clear on expectations (Simmonds et al., 2015). Participants were able to take photos and write narratives during the summer residency and continued to take photos and write narratives after the residency. This time period of taking photos and writing narratives lasted from June 2019 until March 2020. Students were instructed to email me data electronically throughout this time.

Online Sessions

I connected with students after the June 2019 summer residency (through emails) to give updates prior to any online sessions. There were a total of two online sessions in this study which were in early March 2020 and early April 2020. After inquiring about potential dates that would
work for students (in emails), the online synchronous video sessions were held at a certain day and time. Since the June 2019 residency, students took photographs and wrote narratives connected to their learning in the EDSU doctoral program. They submitted their photos and written narratives to me, and I organized and analyzed them prior to the first online session. Before this first online session, I emailed and asked them to choose their top two choices out of their submitted photographs (photos) with written titles and narratives. I wanted to provide students enough time to share their top photo choice but also had them choose a second photo in case there was additional time in our online session. Participants that only submitted one photo could use that photo to share out in the online session. I reminded them of their objective (connecting EDSU to meaningful learning experiences) as well as gave them an introduction of the online session. A summary of this information is as follows:

- As a participant researcher, you will be involved in analyzing the photos together as a group. I will facilitate this process. This online session will include approximately 10 people across Cohorts I, II, III and myself as the facilitator.
- I would like to have each person share 1 photo (your top photo choice).
- Potential questions may include: What do you see here? How does it connect to a meaningful learning experience? How does it connect to your doctoral program?

In addition to myself, there were 11 out of 14 students that attended this first online session which was held in early March 2020. The initial 2-hour online session was implemented in the Microsoft Teams platform which was used in the EDSU doctoral program. This online session was recorded per agreement of the group. The agenda of this first session included (on a PowerPoint presentation software shared screen): an overview; time for sharing their top submission (photo with title and written narrative) choice; and wrap up and next steps. I asked
for any changes to the agenda based on student participant feedback. After a collective 
agreement, I started the agenda topics. The overview reviewed the study, covered research 
questions, and went over coding, including first and second cycle coding. For first cycle coding, 
I addressed codes and coding, the relationships between codes, reference to concepts, occurrence 
of codes, and sequences of codes. I was looking for underlying meanings of codes that would 
lead to trends or patterns in second cycle coding that would hopefully lead to categorization (and 
possibly themes, if time) in the online session.

I arranged their top photo choices ahead of time, and I asked others to look for what was 
 happening relative the role of affect and other learning once people began sharing, such as 
embodied, transformative, and/or sustainability learning. I went over possible ways to proceed 
but left it up to them on how they wanted to share. Possible ways included:

• Share your story on your top photo choice. What do you see here in this photo?
• How does this connect to a meaningful learning experience and to your doctoral 
  program?
• Are there key words that have significant meaning to you?

I also reminded other students who were listening to observe and reflect on the stories for 
potential discussion. Students did not read off of their written narratives but verbally shared their 
story based on their memory and additional insights. We were able to wrap up all of their top 
photo choice submissions. As student participants, they were involved in the qualitative analysis 
of their own data and other cohort member data throughout the session. This included key words 
or phrases that had significance for them and underlying categories or themes that they noticed in 
the narratives, including visuals/photos and written narratives, overall. At the end of the session, 
I asked if there were any questions and went over next steps. These next steps included sending a
follow up email and a review of my own analytical process and member checking, along with letting them know about the 2nd and final online session. I coded all student participant data again based on student feedback as well as based on their verbal narratives.

Video recordings of the initial online session included verbal data that was transcribed and built into analytical procedures. Between online sessions, students were asked to reflect on their photographs and prepare for the final online session. In an email, I asked about any additional information on their photos (when they took photos and any further insight), if they believed transformative learning had happened in their learning (and if so, explain), and any additional information on any key words and/or on how they would categorize their photos. I only received feedback on this email from 3 people but others did ask if I needed it or if it was optional. I made this part optional based on student participant time, capacity, and comfort level.

After more coding and analysis and prior to the final online session, I sent a member checking email and an additional preparatory email. For the member checking email, I sent each participant my data analysis and findings (categories, themes) for their submissions. This also included affect and other information that connected to their submissions. I asked each student to read over my work to ensure its accuracy and to let me know of any feedback prior to our final online session. For the preparatory email, I stated that this online session was optional and approximately 1 hour. This final online session would be an overview on analytical procedures, member checking, and time to celebrate their work and answer any questions. I was flexible on this agenda based on student participant feedback.

This final online session was held on the Microsoft Teams platform in early April 2020 and was recorded with the consent of research participants. In addition to myself, there were 11 out of 14 student participants that attended this second and final online session. For this session, I
created a Microsoft Sway presentation that had visuals of my analysis and interpretations of the data as well as my findings. I also had a slide show of their photos with music and a discussion which followed this. This session was mainly about sharing out my work (for member checking and to facilitate feedback and discussion) and about celebrating theirs. In the final online session, I took notes and recorded the session to help with member checking data and in drawing conclusions of the findings. Lastly, I sent follow up emails after the online session on member checking and to collect any outstanding photo release forms. I also gave students their pseudonyms and a copy of the findings for the study based on student participant submissions. Students were given the opportunity to request additional information prior to dissertation completion and to address any questions or concerns to myself or to my principal investigator. Collaborative, participatory work on behalf of the students, along with member checking, helped with trustworthiness of this qualitative photovoice research study.

Data Analysis

In preparing photos and narratives, I created a spreadsheet with all of the participant researcher names. They were assigned numbers and given pseudonyms for dissertation writing purposes. Photos, titles, and narratives were organized into a table. I analyzed participants’ data, including written narratives with titles, visual narratives (photos), verbal narratives from any online sessions, and any additional reflections (e.g., emails, Microsoft Teams Chat in online platform). Students were participant researchers and observers and also analyzed data. Codifying or coding the data was done manually and also with a computer-assisted qualitative data analysis software (CAQDAS), Dedoose, and included written, photographic, and verbal narratives. Student participants turned in a total of 57 submissions (65 photos within those submissions) that included 1 or a set of photos, titles, and written narratives (Table 7).
I initially hand-coded and used in vivo or emergent coding to begin codifying the actual data. Stuckey (2015) wrote,

The process of creating codes can be predetermined—sometimes referred to as deductive or “a priori” (Crabtree & Miller, 1999)—or emergent (Boyatzis, 1998), or a combination of both. Predetermined coding may be based on a previous coding dictionary from another researcher or key concepts in a theoretical construct (p. 8).

For the visual and written narratives, I pre-coded using emotion coding and took analytical memos. Then I went through first and second cycle coding, categorized codes, and eventually put categories into themes. This process happened prior to the online session.

Student participants shared and analyzed their top photo choices (Appendix D) during the initial 2-hour online session. If participants did not give me their top choice ahead of time, I chose their initial submission and asked for their approval to share. Students participated in analyzing their photo as well as other student participant photos to help construct meaning for analysis. After the online session, I coded the data again and used a CAQDAS program called Dedoose. I emailed reflection questions to participants based on their responses in the initial online session and prepared them for their final online session. This process is shown in Figure 14 and is explained in the following sections.
Coding

After data was collected and before any online sessions, I pre-coded data by hand using in vivo coding. In vivo coding is the “practice of assigning a label to a section of data, such as an interview transcript, using a word or short phrase taken from that section of the data” (Givens, 2008, p. 472). In particular, I used a form of in vivo coding called emotion coding. Saldaña (2016) states that “emotion codes label the emotions recalled and/or experienced by the participant, or inferred by the researcher about the participant” (p. 125) and that “emotion coding is appropriate for virtually all qualitative studies, but particularly for those that explore intrapersonal and interpersonal participant experiences and actions” (p. 125). In this case, I looked at emotions connected to their learning. Tyng et al. (2017) referred to Kleinginna and Kleinginna (1981) and wrote that emotions are complex interactions that occur within biological systems, such as the endocrine and nervous systems (p. 2). These emotional experiences that have been linked to neurodynamics and external sensory stimuli (Panksepp, 2005, p. 30) give evidence to support brain-neurons-affective responses that interact within systems. I considered this and embodied learning, along with variations of emotions and feelings and how those can be expressed in narratives.
Much of the literature has referred to emotions as positive or negative. I also found information that included flow and a neutral show of emotions. I used this information to ground my thinking prior to coding. I also considered if emotional expressions are in the moment or retrospective as well as considered the points of reference to self or others and context of emotions. Some considered emotions connected to learning are shown in Appendix C.

I referred to Saldaña (2016) for first and second cycle coding techniques. Throughout these cycles, I took notes and analytical memos. In first cycle coding, I looked at the relationships between the codes and in reference to different types of learning, the context of the program (and content of courses), my theoretical framework, and my research questions. I also looked at how often codes occurred and if there was a pattern or sequence of codes. I looked for meanings of groups of codes in all data. In second cycle coding, I went over all of my initial codes to look for patterns. I came up with categories and potential themes. The research questions were continually reviewed to ensure I addressed those questions. I also parallel coded written narratives and titles to photographs.

Photography was intentionally chosen in this study to do an arts-based research study. Students already had a means of taking photographs (or were instructed to ask for a camera) and sent photographs (photos) electronically to me. Photos help in prompting emotions and other ways of thinking about experiences (Harper, 2002). A reflective process can be easily initiated by helping participants think back to that moment and question why they took that photograph in a moment in time (Liebenberg, 2009). Other methods of arts-based research may have been more time-consuming and intimidating, such as creating original pieces of art in drawings or paintings. With photovoice, I hoped that participants would feel more comfortable taking a photo, and they were not expected to have prior photography experience.
Because I did not expect research participants to be professional photographers, and that they based their photos on meaningful learning experiences connected to their doctoral program, I looked at what was in the photos when coding them. Unless it was explicitly mentioned and requested by participants to look at photographic elements, such as composition, lighting, and line, I mainly looked at what was captured in the photos (i.e., what/who was in the photo and where it was taken) and compared it to their written narratives. I looked at the photo in its entirety and took memos. I read the titles and narratives and went back to look at the photo. This also connected to Wang’s (1999) SHOWeD method relative to what was happening in the photo (p.188). SHOWeD represented an acronym to express: “What do you See here? What is really Happening here? How does this relate to Our lives? Why does this situation, concern, or strength exist? What can we Do about it?” (Wang, 1999, p. 188). After I studied the photo, I then went back and looked at the photo again in more detail and wrote down any additional information, such as facial expressions or anything that could represent a feeling. I considered my assumptions and wrote about anything surprising in the photos.

**Validity & Trustworthiness**

Validity and trustworthiness was considered throughout the process of this study, including data gathering, codifying, discussion, and reflection. In quantitative studies, data and results have been dealt with in terms of a test whereas in qualitative studies it has been more processual (Hayashi et al., 2019, p. 98). This difference in quantitative versus qualitative research has stemmed from an epistemological difference between the two paradigms. Sadik (2019) wrote,

There are various interpretations of what validity is in qualitative research. This is due to epistemological grounds of qualitative research. Qualitative research does not accept a
single truth. Reality is not fixed in qualitative research. It is concerned with cooperation of the multiple constructed realities to reach the contextual truth (p. 145).

Qualitative research, in this sense, has been reflective of constructivism in which individuals construct meaning differently. This construction of reality from multiple researchers and perspectives has led us closer to the truth in the interpretation of data. In terms of validity, this reflects rigor, quality and appropriateness, and trustworthiness in the research (Golafshani, 2003; Wells, 2011). Noble and Smith (2015) discussed the trustworthiness of the findings, which are summarized to include the following:

- Account for biases;
- Attention to detail and decisions;
- Transparency of decisions and interpretations;
- Rich descriptions and demonstration of clarity;
- Inter-researcher reliability and diverse perspectives;
- Member checking and “respondent validation” on findings; and
- Data triangulation to include diverse methods (pp. 34-35).

Each of these components of trustworthiness was considered throughout the process of the research, including: attention to detail, considering diverse perspectives, being open to emerging ideas, triangulation, and bias.

My bias was shown throughout this design and how I approached this research. I have believed that we need a paradigm shift from transmissive, traditional education to transformative education and that transformative sustainability education promotes the necessary pedagogy to support a more holistic and just teaching-learning system. My own personal experiences have led me to this understanding and way of being and in recognizing that current systems disempower
learners. I have also believed that art and imagination are critical components of learning and that emotions are drivers in this process.

Navigating my relationships and this research has been challenging in that I have also been a student in this program and these participants have been my peers. I was in Cohort I and in the dissertation phase of the program during this study. As a student in the EDSU program, any experiences that I have had, either positive or negative, could have potentially biased my work. I needed to keep this in mind as I approached this study. Also, Dr. Joy O’Neil has been the inaugural director and designer of this program and has also been my mentor, advisor, and chair of my committee. I have been closely tied to this program and felt I had an understanding on the overall design and intent of the program. I have tried my best to know and own my bias and in not letting my bias influence other perspectives and in understanding how it may have impacted my interpretations and analysis relative to the data.

To deal with my own bias, I have given attention to detail and considered diverse perspectives. Part of considering diverse perspectives included openness to emergence and surprise. Hayashi et al. (2019) referred to Paiva et al. (2011) who stated that, “Surprise is a criterion of validity in qualitative research and it has an importance in tradition both regarding the discovery of inspirational evidence to new forms of thought on a specific theme, and the change in mentality already crystallized around the phenomenon” (p. 102). Recognizing my own bias and understanding that I have been a participant and peer, while also being open to other perspectives, has helped in supporting trust and outcomes based in truth.

In addition to personal bias, I have kept in mind participant bias. Participants self-selected to be in this study. Their time was limited while taking on additional responsibilities in a doctoral program, often with full-time jobs and family. In the summer residency, most people
signed consent forms to participate but only 14 students out of three cohorts participated in the study, out of a population of approximately 25. This yield suggested that students may have felt that they did not have much time to participate in the study. This may have also impacted participant behavior in the study as well. For instance, they may have looked for ways to save time, such as not having people in their photos. This may have been the result of needing additional consent forms and time to obtain those forms. In addition, participants may have provided photos and written narratives with their peers and others in mind and may have been concerned about what others may think. This could have biased their truth and meaning and impacted how they shared with others. Also, in the time they took the photo until the time they discussed their photo and written narratives, their interpretations and how they may have remembered the event and meaning may have changed. This made it more challenging in connecting their learning to the space-time moment of their learning in the program.

Recognizing these challenges and participant bias was helpful in online discussions and in providing a comfortable atmosphere for sharing between peers to cultivate an atmosphere of safe sharing and in developing trust between peers. A development of trust helped in sharing their truth of constructed reality and trustworthiness. Inter-researcher analysis supported trustworthiness during online sessions with student participants. I was thorough in analytical procedures and in reviewing findings and in continually checking the codes with the data to avoid “drifts in the definition of codes” (Creswell & Creswell, 2018, p. 202). Findings were supported through member checking during and after online sessions to check my own analysis and findings with participant researchers.

Dependability reflects trustworthiness, or consistency in how data has been gathered and analyzed. Triangulation, or using multiple methods, has been another way to support
trustworthiness. “Triangulation consists of the interrelationship between the information obtained from the data that was collected from different sources to increase the understanding of the study in question, thus improving the reliability of the results” (Hayashi et al., 2019, p. 101). In this study, I collected diverse narratives (i.e., visual, written, verbal) with different approaches, such as initial written narratives, discussion of photos, and further reflections. I had a theoretical framework that included both transformative sustainability learning and affective learning theory. These theories of learning, especially transformative and transformative sustainability learning, have stemmed from diverse fields of research. Looking at diverse fields of research to support theories supported theoretical triangulation. I was open to emergence and have data from multiple sources or individuals. Throughout the entire study, I have connected to validity and trustworthiness and considered this as a process in my meaning-making of data and interpretations.

Summary

I studied student learning in an EDSU program through participatory action research and photovoice methods. This study was grounded in a transformative sustainability and affective learning theoretical framework within the context of a transformative sustainability education program. Participants produced data by taking photographs of meaningful learning experiences connected to their EDSU program, wrote narratives about their photographs, and analyzed their data with myself and members from Cohorts I, II, and III. I used generally accepted techniques for coding data and for finding themes. Findings are reported in Chapter 4.
Chapter 4. Analysis & Findings

The purpose of this study was to understand adult learning experiences and the role of affect for doctoral students in a transformative sustainability education program. Through this photovoice research study, I examined participant reflections on learning, especially affective learning as it related to emotions, feelings, and behaviors. My research questions reflected the purpose of this study:

- How do adults experience learning in a transformative sustainability education doctoral program?
- How does affective learning play a role in adult learner experiences in a transformative sustainability education doctoral program?
- How do affect and emotions play a role in transformative learning?

Findings in this study included the analysis of submitted photographs with titles and narratives. I noticed that those who displayed analytical behavior were ‘focused’ for their affective code. When a person is in complete focus on their learning, this can also be referred to as flow or ‘in flow’ (Baker et al., 2007, p. 5). A neutral state of affect was considered throughout the analytical procedure. I found that participants were more aptly categorized as focused or reflective for neutral affect. Overall affective codes that were positive or neutral (focused, reflective) connected to ongoing learning whereas negative affect seemed to slow learning as participants spent their time on balancing themselves when facing triggers or stressors. Overall connections in life helped balance the learner as a living system. These concepts are further explored in Chapter 5.

The Photovoice Experience

There was one introductory session in June 2019 at the summer residency at Conserve
School. Anyone from Cohorts I, II, and III were invited to attend. There were a total of 14 student participants who self-selected to be a part of the study and submitted photos and written narratives electronically to me: Cohort I included Sonni, Lou, Lee, Reese, and Tivy; Cohort II included Sam, Marin, Tatum, and Dakota; and Cohort III included Deena, Fenn, Evin, Kylie, and Charlie. I was in email contact with all 14 participants during the study, including member checking. There were two online sessions with student participants. Out of the 14 total student participants, the same 11 people attended the initial and second online session (absent: Tatum, Evin, and Dakota). During our online sessions, students reflected on the photovoice experience and all students seemed to positively support others and myself in this experience.

In the first online session, student participants referenced the process of taking photos and the photovoice experience itself. Kylie referred to photos and said, “It’s not necessarily the quality of the photo from a photographer’s point of view but it’s more on what it means to you.” Student photos symbolized their learning and connectedness. Students were observed as feeling comfortable in sharing their experiences. In sharing their top submission choices (Appendix D) in the first online photovoice session, Reese said,

I feel like just the way you have arranged this…feel like the tone of the conversation is very different than when we normally come together online; and I don’t know if it is really using these pictures to symbolize these moments or you know the fact that you know a lot of us relating personally to these moments in these pictures; but I feel like I am noticing just a very different…even our cadence of our speech is just a calm, I don’t know, just a neat vibe.

This tone established a collaborative atmosphere with those in the online session. In response to Reese and her statement on how the session was arranged, Charlie responded by stating,
I’d have to agree with you…I was thinking the exact same thing right before you started talking. Just the fact we’re all staring at one picture, and we’re all getting what we connect with out of this picture, and then you’re hearing everybody else and their connections they’re making, the things they’re doing…There is a lot of education going on…it feels a lot more informal and able to just [have a] stream of consciousness, just kind of vomit forth words and feelings and emotions. I get the same vibe.

The interaction while people spoke and the positive support of one another was interwoven throughout the online session.

In addition, photographs provided thoughtful reflection on visual and online learning. Reese supported this point related to visual versus written ways of learning and said,

I just think the act of literally looking at these pictures and thinking about what these pictures and moments mean…it makes me think how we privilege text a lot in academia and so there is something about looking for the message that’s conveyed in this picture, whether that’s intentional or unintentional, I think there is something about drawing our attention in this way that, I don’t know, activates something.

This reflected symbolism and visual ways of knowing and learning while feeling comfortable enough to share learning experiences. Photovoice online sessions also gave insight into interactive ways of online participatory teaching methods and learning with students. In the second and final online session, Deena stated,

With all the e-learning, now I am going to do this with my students because this is a great way for us to still engage with each other in our ideas but they can still go and take pictures individually…this is a very profound means of people connecting with their thoughts and ideas.
Kylie supported this by stating,

I agree with you...I’ve been working with students...and trying to help their teachers with different ways to engage the students...they are still kind of in the lecture method of teaching...but this is something that could be done through an online means...This is a great example also not just go out and take a bunch of pictures but how to impart meaning into what they would be doing...I think you have given us a really great example of a way to do that and also practice some writing and really doing some reflective thinking...to put into practice as well as the research that we’ll benefit from as well.

Learning connected to ecological thought and systems was reportedly observed in narratives (visual, written, and verbal). In many photos, nature was a common symbol of student learning. Fenn, in Cohort III, connected to ecological thought through photos and written narratives (Figure 15).

Figure 15. Dog Vomit Slime Mold

I’ve always had a fascination with nature, especially the weird and gross parts. In high school, we did a large project where we had to collect samples of plants, fungi, molds, animals, and anything in between. I lost that in college and graduate school as I became focused on my studies, indoors, and at a computer. Joining the EdD program has renewed my love of the physical nature. I spend more time outdoors, walking or even just sitting, and noticing what is around me. The attached photo is a perfect example. It’s of a slime mold called “fuligo septica” and resembles dog vomit, hence the nickname. I have stopped to investigate this slime mold and other weird and random fungi and molds. I have also taken notice of the trees around my home and unique plants, finding wild onions nearby! By learning about the climate crisis and working with other nature lovers, I have learned to take a step back and appreciate what is near me. I am also motivated to actually learn more, turning to the internet and books on local fauna and foliage! -Fenn, Cohort III
A sample of a narrative expressive of ecological thought in this study also included Kylie’s statements about what she observed in photos. Relative to nature and being interrelated within natural systems, Kylie explained the following in an online session:

I saw that in a lot of the photos...just really reminded me of that concept that has spoken to me a lot during this program...I am trying to think about how can I incorporate that concept more with the students I work with...I think the ecological journals, that you referred to <Deena>, that also for me was right in there with this same concept and kind of building one thing on another with our readings as well...we are all interrelated, we’re not separate.

In this case, ecological thought connected to meaningful scaffolded learning in the program. Ecological journals were brought up in comments from at least 2 people in online sessions. From my own experience, I did an ecological journal experience at my first in-person summer residency. I remember this as a profound experience as I sat alone in nature, reflected, and wrote about my relationship to nature. This also reminded me of the experiential learning that happened during these valuable in-person residencies. Through journaling and experiential activities, relationship building to nature and people helped build a sense of belonging. I felt connected to a system of learners and to nature during this residency. In this study, ecological thought was interwoven throughout their program experiences—both online and in-person. Connections and reflections helped show this in findings, including the role of systems thinking.

Systems and systems thinking was an important component of these findings. I looked at learners as living systems as a result of findings that supported this concept. In the last online session, Lou emphasized systems thinking and also mentioned boundaries, an important
component I kept in mind when coding and analyzing data and in examining learners as living systems. About boundaries and the learner as a living system, Lou said (directed at myself),

What are the boundaries, and I hate to use that word boundaries, but you do at some point you kind of have to create some boundaries for a level of change...I think what we are getting at is that transformation is happening on a systemic level but the systemic level could be at that personal individual level, your own personal system, your own personal stress level system or your own personal learning system, but so many, so much of what we read is also dealing with the community system, right, the environmental system, so I think the parameters of the boundaries maybe for you are to determine at what point are people talking about transformation at the community level of the system and at what point are people talking about the personal change, changes they’re going through.

I looked at the personal learner system and set boundaries in this study. I observed that students also set their own boundaries. This was evident and reported throughout as students defined their EDSU program network—often including family and others outside of the direct program itself. This holistic system of learning and the learner system included connections between systems thinking, ecological thought, perspective shifts, and transformative learning.

In addition to systems thinking, Lou also connected his learning in the program to ecological thought or ecological literacy as well as to perspective shifts and transformative learning. In an online session, Lou explained,

For me, for the program, it relates to our program to transformative learning, for me it’s all about ecological literacy. I feel like I’m gaining a deeper sense of ecological literacy in that shift of perspective, physical perspective. I guess you would call this embodied or
psychomotor? I’m not sure. Definitely not just cognitive; it’s very much bodily-psychomotor maybe.

This reportedly tied into embodied learning and the overall learner as a living system. Belonging and connections promoted embodied learning that included positive affect which led to positive or focused behaviors. The affective dimension was entangled with cognitive and somatic (including psychomotor) dimensions but also seemed to drive behaviors as a result of embodied experiences. In addition, as the result of a physical change in perspective connected to his environment, Lou reported a perspective shift. He connected this to transformative and embodied learning and to our program. Another example that supported a perspectives change in this study reflective of transformative learning experiences included Lou’s submission ‘Isla with Tree’ (Figure 16).

Figure 16. Isla with Tree

I realize that shift in perspective from being looking down and being up high to being on the ground was a critical shift in not just relating to the experience playing outside with my kids but really changed my whole perspective of nature just that shift in being up high to being down low and that I tried to capture that in the photograph, because when I was down low looking up, I also gained this completely different view of how we would look at a tree...this was also a commentary about looking for new relationships with nature between humans and nature and just how powerful a different perspective, a visual perspective, can be in actually creating that relationship through the photograph—through the camera. I was conscious of that perspective change; it was an intentional perspective change.

-Lou, Cohort I
This photovoice experience was a different way of learning, through arts-based photography methods, rather than through just written text. The overall photovoice experience, including during the June 2019 residency and online sessions, and in taking the photographs themselves, helped students connect and reflect on their learning. Students reportedly connected to collaborative sharing with others, visual and online learning, ecological thought, perspective shifts and transformative learning, systems thinking and boundaries, and embodied learning. As a participatory action research study, students were involved in analyzing the data and felt a part of the process. Coding, analysis, and findings (including categories and themes) were also checked with participants to ensure student voice and choice in the experience.

From Codes to Themes

Affective codes were dynamic or changing based on external stimuli or events. I coded photographic and written data in spreadsheets to organize data into categories. Through analysis, I began to see patterns based on words and phrases that were significant to learning and affect (emotions, feelings, and behaviors). I also observed that participants had connections or a lack of connections in their learning experiences. When connections were lacking, behaviors or connections were mentioned as a way to stabilize their experiences. This indicated that participants were reportedly trying to maintain balance in their lives to include and continue with their doctoral learning experiences. Some students continued feeling stressed or anxious but found behavioral ways to adjust themselves and continue with learning. Through repeated coding and analytical processes, two main themes were developed—*Belonging* and *Lack of Belonging*. Self-organization in maintaining a life-balance to continue learning was reported throughout the *Lack of Belonging* theme findings. Themes and sub-themes can be found in Figure 17.
Belonging can be a feeling of connectedness to people, places, or things, and it varies with individuals. Rogoff (2000) understood belonging as “the ability to live out complex and reflexive identities which acknowledge language, knowledge, gender and race as modes of self-positioning” (p. 14), whereas Yuval-Davis (2006) goes on to reference Michael Ignatieff (2001) in that belonging is a feeling of safety. “Belonging is about emotional attachment, about feeling ‘at home’” (Yuval-Davis, 2006, p. 197). In this study, the theme belonging refers to connections in a learner system—a living system that is autopoietic. This reflected living systems theory and connections within a living system of the learner. A lack of belonging in this study referred to a lack of connections or unbalanced systems for the learner.

Connections in systems became apparent as well as maintaining a dynamic balance of themselves as a living system. For instance, if there was a disruption to their learning, a trigger or a stressor, students would reportedly find a way to reconnect to something to stabilize themselves. A sense of belonging usually displayed generally positive feelings, such as comfort.
and peace. A lack of belonging or a lack of connection to something would promote generally a negative affect, which would trigger a response to stabilize themselves to re-establish learning experiences.

In *Belonging-People & Place*, participants could be by themselves but the motivational driver was largely due to connections to others in place. External motivation would connect to family and/or kids or cohort peers connected to a place. The role of affect was positive due to feeling a sense of belonging, was integrated in embodied learning, and led to behavioral changes. For *Belonging-Content & People*, these submissions were mostly due to external motivation in content comprehension, language, and application of newly acquired knowledge to different situations. The role of affect was reflective/positive, integrated into embodied learning, and led to behavioral change. For *Belonging-Self & Place*, participants were typically alone in an area and the photo and written narratives were coded separately and then together to reinforce this. One participant, Fenn, was having coffee with a book (could have been in a public place), but her written narrative showed that she was reflecting on her own. In these circumstances, student participants would often reflect on overall connections in their lives, including to nature, and the EDSU program.

Submissions that potentially overlapped with sub-themes or categories represented challenges in reductionism and in categorizing living systems as many feedback loops were happening simultaneously within an embodied learning experience. By focusing in and then back out on systems, I was able to look for patterns in the overall learning network while keeping in mind the role of affect. As such, boundaries of connections and sub-themes and categories in a network were created by myself as a researcher. These boundaries helped develop a network in which to analyze data and further focus in on themes and sub-themes (Figure 18).
Visual, written, and verbal narratives reportedly represented belonging (connectedness) or lack of belonging (lack of connectedness). Photos were symbols that represented connections within themes. A few examples of these symbols included built or natural places, food/wine, books, posters, computer screen of work or classes taught, and outdoors/nature. Through symbolism and meaning-making in narratives, self was connected to place, content and people, and place and people.
**Belonging-People & Place**

There were 12 submissions (photo with titles and written narratives) from student participants that reportedly connected to people and place: Sonni, Lou, Reese, Marin, Deena, and Kylie. Participants reported connecting to people who included: peers that shared sustainability interests and motivations; cohort peers; director of the program; and kids and/or other family members. Places were reported as natural areas, UW-Stevens Point, Conserve School, and sustainability conference locations. Students seemed particularly comforted with shared commonalities in sustainability when going through the program. Affect examples in *Belonging-Place & People* included feeling reflective (includes introspective, self-reflective), a change in perspective, amazed, supported, comforted, motivated, peaceful, joy (includes joyful and enjoyment), love, appreciative, observant, profound reconnections, curious, creative, anticipation, a wanting to share nature, and foreboding.

In Cohort I, Sonni, Reese, and Lou submitted photos with titles and narratives. For Sonni, she connected to place as a symbol of belonging to a group of people who have similar interests rooted in sustainability. This was expressed in her two submissions entitled, ‘Sustainability Style’ and ‘Choices’ (Figure 19).

Figure 19. Choices
Sonni stated in her ‘Choices’ narrative that, “…the activities I chose to participate in support and surround me with people with the same passion and purpose.” For both of Sonni’s submissions, a sense of peace and comfort was observed as a result of analysis and from sharing a sense of purpose with others. This displayed an external motivation from others and was symbolized by signs/posters at conference events. Lou’s submission ‘Isla with Tree’ displayed embodied learning and perspective shifts—a result of external motivation through playing outdoors with his daughter (Figure 16). Joy, creativity, and curiosity was displayed in narratives through this connection to place and people. Reese had 3 submissions connected to people and place which included: ‘Integration’, ‘Creating Space for Real Selves’, and ‘Scaffolding’. In ‘Integration’ (Figure 20), there were connections of self to places and people. Reese stated that, “…my experience reconnecting to my childhood home through this doctoral program has been profound. This mix of bracelets around my wrist represents the way this return home has allowed me to grow and learn with the innocence of my childhood self intact.”

Figure 20. Integration

Reese showed the following affect: self-reflective; peaceful; and profound reconnections. Bracelets symbolized these connections as she demonstrated integrative systems thinking.
through diverse connections. Place for Reese was at Conserve School during the June 2019 summer residency.

In one of Marin’s submissions (Figure 21), she connected to the place at Conserve School during the June 2019 residency. Marin explained that, “...outside the arch, we are more informal and introspective. When we pass through the arch, we enter a place to learn and a place to share.” Marin’s affect that was observed in her narratives (visual, written, verbal) included: anticipation; introspective; reflective; comfort; and motivated to learn. All of Marin’s submissions connected to places outdoors as well as to education for kids, with only one exception (reference to indoors and adult learners in the program; Figure 21).

Figure 21. No Title (Conserve Entryway)

Kylie submitted ‘The Bottoms’ (Figure 22; also entitled ‘Gloomy Waters’; this was also observed in the overall ‘feel’ of the photo). Kylie referred to her photo by stating, “…place that is where I started my love for the environment...It’s an internationally-recognized wetland for migrating birds, but of more importance to me is that it’s where I’ve spent hours with my father,
learning about the patterns and habits of birds and getting to know nature.” Her affect was appreciative and love of nature and with time with her father. Yet, her affect was also foreboding when she referred to moments becoming memories with her father. These narratives (visual and written) connected to ecological thought and family while also demonstrating belonging and place.

Figure 22. The Bottoms

In my analysis, I found that participants reported connections in the belonging theme that were related to two categories: ecological thought and learning sanctuary. Participants who reported ecological thought indicated a connection to nature and seemed to feel a part of nature. It reportedly inspired them to be reflective and to exhibit systems thinking and perspective change. Affect connected to ecological thought included participants feeling observant, curious, reflective, joyful, a feeling of wanting to share a love of nature, love, appreciation and, in one case, foreboding. In the case of foreboding, Deena was appreciating time in nature with her father but, at the same time, felt a foreboding that those experiences would one day be only memories. In other submissions, from Marin, there were strong indications of connections to
nature and learning. Marin, from Cohort II, had three submission in *Belonging: People & Place*: ‘Duck, Duck, Goose’; ‘Housekeeping Pix’, and ‘Mud Kitchen’ (Figure 23).

Figure 23. Mud Kitchen

Marin was reporting connections to outdoor education. Teaching and learning outdoors were in all of these submissions and exhibited ecological thought connected to others and their learning. In these cases, she was reportedly observant and reflective of the kind of learning that takes place outdoors. In some cases, both ecological thought tied into other things, such as feeling comforted and supported for learning.

‘Scaffolding’ (Figure 24), a submission by Reese in Cohort I, could have been coded for ecological thought as she was making connections in nature, however, I coded student participants into learning sanctuary when they reportedly felt a sense of peace and comfort and supported in their learning. Reese referred to her photo (Figure 24) as she wrote,

This picture, from our residence site at Conserve School, shows a tree that is growing with the benefit of support. Its base is surrounded and fortified. It is protected, yet visible, by a circle of wiring. This support can’t do the growing *for* the tree, but it allows it to grow at its own pace without sustaining damage during this delicate time.
In this case, the image in the photo symbolized a learning sanctuary. She felt supported and protected as she was learning through scaffolded experiences. Reese further explained this verbally in the first online session,

This reminds me of how I felt especially during our first year. It is funny, I feel like I almost wanted to perform more...or like proving yourself or like, how am I supposed to be doing things since I’m a doctorate student, and it kind of felt that we were getting to incubate that year and just learn without being expected to perform a lot whereas once you are in the phase of...trying to create a proposal and defend it and do your research...at this point it is a lot about performance.

By connecting to place and the tree in nature, she was able to connect to and reflect on her own learning experiences during her first year contrasted with her dissertation year. The importance of scaffolded learning, protection, while having room to grow and learn represents what I have
referred to as a learning sanctuary (Lange, 2009) in this study. Reese showed another example of this in her submission ‘Creating Space for Real Selves in our Organizations’ (Figure 25). She even mentioned wanting this space to be present in other places in her life, such as at work—exhibiting change agency.

Figure 25. Creating Space for Real Selves in our Organizations

Reese, along with others in a learning sanctuary, felt safe in their learning. Coded as learning sanctuary, additional student participants felt amazed, appreciative, motivated, joy/enjoyment, and also supported in their learning. Perspective learning was a part of this larger idea of a learning sanctuary. As participants seemed to enter the program already in a state of readiness to learn, this further enhanced their learning processes. Positive affect connected to a sense of belonging in reference to people and place. Students enjoyed connecting to others and place which helped promote learning connected to the EDSU program.

**Belonging-Content & People**

Student participants that reportedly connected to content and people in their submissions included: Lee, Sam, Dakota, and Evin. These student participants reportedly connected their
learning content in the program to themselves and others. They either reflected on their own work and readings or on how to relate their content to others. Communication of content included visual, written, and verbal methods. When student participants shared and communicated with others, such as teaching, this was categorized as change agency. Those that shared their learning, shared in way that reflected their own learning process which was scaffolded learning. Affect examples connected to *Belonging-Content & People* included feeling love, insightful, sense of clarity, less alone, purposeful, excited, inspired, honored, empowered, motivated, goal-oriented, and reflective. Student participants also reported feeling a change of perspective. Categories included perspective learning and change agency. Participants made connections and were reflective during this process.

Lee, in Cohort I, submitted ‘humans exist only in fairy tales’. This submission included a photo of a movie poster. Lee stated that, “It reminded me of other forgotten memories of ecological teachings in my youth. We used to love this rap song about saving the rainforests back in the day...I’d love to see that again...This same poster now hangs in my daughter’s room. I want ecological teachings to be a big part of their growing up.” This submission could have been categorized as change agency and/or perspective learning. Perspective shift prompted this change agency in which he shared information with his daughter. Lee stated, “It suddenly occurred to me that this different way to see the world was right there all along, hidden in plain view.” Perspective shift was the catalyst for this behavioral change agency. Although ecological thought was a part of this submission, since this included sharing information or content with another (daughter, kids) and perspective of this content, I categorized this as perspective shift with *Belonging-Content & People*. This was another example of the challenge of categorizing experiences that are entangled through feedback loops and diverse learning and reflections.
happening simultaneously. Lee, who made several connections in ‘humans exist only in fairy tales’, looked at things differently after he reflected and was inspired to share what he knew in his own upbringing and ecological teachings. Perspective shift in this case was connected to pop culture and a movie that had an impact on his learning.

Lee also submitted ‘theoretical meanderings’ (Figure 26). In his written narrative, he wrote, “Somehow I need to reconcile these into a culinary sustainability education—a culinary education ‘as’ sustainability...It is my hope that through my study, literature to case study analysis, that I can achieve my goal.” His affect included being: reflective, goal-oriented, and motivated to learn. He reflected on his content and was feeling motivated to share this reconciliation of modern culinary and transformative sustainability education into a culinary education as sustainability, a strong sustainability in culinary theory and practice. This theoretical framework built into his study was guiding his motivation and reflective thought on something that would deepen knowledge on culinary sustainability education for others.

Figure 26. theoretical meanderings
Sam submitted ‘Hidden Curriculum’, ‘Different Viewpoint’, ‘No Escape’, and ‘Change Agent’. For Sam’s ‘Hidden Curriculum’ (Figure 27), she stated, “How do I share what I am learning? For my colleague, it was fostering foundational knowledge. He needs the terms and basic language to start making sense of the complexity of sustainability.” As a result of Sam’s sense of change agency, she wanted to communicate her learning with others. She wanted to begin laying a foundation of knowledge for a colleague. This reflected scaffolded learning in the EDSU program. For me, this was a good reminder that communication has been an integral component of this program in how we communicate with others who may have different meaning schemes and perspectives.

Figure 27. Hidden Curriculum

Dakota, from Cohort II, submitted a photograph and narrative on a presentation she gave at a national conference, ‘Presenting on Systems Thinking, Sustainability, and Environmental Justice’. Dakota felt honored, empowered, and excited to present what she knew and to share that
learning with others. This feeling of empowerment connected to taking action on learning and on sharing this information to impact change—a sense of change agency. Connections and reflections on meaningful learning helped her feel empowered to share this learning in a national platform.

Evin, Cohort II, connected to experiential learning and perspectives in her submissions. In one submission, she referred to formal versus other systems of education. She stated that, “...there are so many other ways to be educated. This passage also affirmed to me what may be useful in your community may be experiential, what you learned to do. I feel this program is integrating knowledge building with doing” (narrative connected to Figure 28). In this case, Evin’s affect included: reflective and change in perspective. She was reflecting on seeing things differently—in this case, education.

Figure 28. Experiential Doctorate

Perspective learning and change agency were two repeating categories within this theme and sub-theme. Perspective learning included considering and analyzing diverse perspectives as part of systems thinking. These did not resemble disorienting dilemmas (Mezirow, 1991), which I have considered as larger, dramatic life changes that have been linked to a feeling of alienation.
In this study, smaller events and perspective learning included scaffolded experiences. Change agency referred to planning and taking action based on their sustainability learning. I considered the behavior ‘action’ if a participant communicated with others or took action within a system. Ecological thought may have been interwoven as content throughout submissions, however, this theme and sub-theme were more about sharing information connected to perspective learning and change agency categories. Nature and ecological connections helped to symbolize this. **Belonging-Self & Place**

Student participant submissions (photo and written narratives) that reportedly connected to self and place were from: Lou, Reese, Tivy, Marin, Deena, Fenn, and Charlie. Student participants referenced connections to place while alone in places that included mostly natural areas, with 3 exceptions. One exception included the student, Lou, and two of his submissions: one based on a sketch of a created place and another focused on a built (human-constructed) versus a natural environment. Another exception included Fenn’s ‘Coffee & Book’ which could have been indoors or outside. Participants were often reflective and inspired through connections to place. Affective codes included: focused, reflective, wonder, observant, curious, marvel, inspired, peace, energized, fascination, appreciative, learning readiness, excited, profound realization, self-discovery, and motivated. Students also mentioned perspectives. Categories included ecological thought and perspective learning.

In his ‘Creative Construction’ submission (Figure 29), Lou explained,

Sketches represent my thinking on topics, as they are in a state of becoming. The sketch is the next iteration of an idea. It is entirely transformed however retaining traces of the idea...but the idea in sketch form takes on new meaning and dimension. To me this is the essence of action....and knowledge mobilization.
Lou observed that his sketches were in a ‘state of becoming’ and symbolized his scaffolded ideas. This was another reminder of how we can reflect through visuals and through embodied learning. Lou was physically showing what he was thinking, along with affect, through the outcome of a sketch. He also recognized this as representative of process versus product. Process and scaffolded learning are important components of ‘knowledge mobilization’. Lou’s affect included: focused and reflective (knowledge mobilization).

Figure 29. Creative Construction

Another participant, Reese in Cohort I, mentioned content (Figure 30: ‘Systems View of Life’; referred to Fritjof Capra and systems thinking) while alone in nature. Although content was mentioned, other people were not. Since she was alone reflecting in nature, I placed her in
Self & Place. This was an example of how nature can symbolize our learning and that reflective thought and internal dialogue was important in learning. In addition, systems thinking was mentioned along with Capra. In our program, I took a class that included an online class component that was led through video lectures by Capra. This course, along with Capra and Luisi’s (2014) book, The Systems View of Life: A Unifying Vision, had a profound impact on my learning and transformed how I view life. This extended to my family who also knew about Capra and systems. I easily connected to Reese’s submission and narratives—both visual and written.

In Cohort II, Marin submitted the narrative ‘Message from a Fox’ (photo in Figure 31). In her written narrative, she reported making connections to others, such as the fox. Marin wondered why the fox was in the ‘burbs’. She also connected and reflected on past learning which is important in experiential education. Marin mentioned in her narrative, “I prefer to think that the fox showed up to remind me of a passage from one of my favorite books—The Little Prince. ‘One sees clearly only with the heart. What is essential is invisible to the eye’.” Affect in
this case was coded as reflective. This was also observed to reference perspective analysis in that there is more to what we see and that sometimes we ‘see’ with the heart versus our visual senses.

Figure 31. Message from a Fox

For Cohort III, Deena’s submitted ‘Inspirational’ (Figure 32). She wrote, “One of the reasons why I decided to move forward to earn my Doctorate in Sustainability so that my Grandchildren will be able to walk along the banks of Lake Superior and know its beauty as my children have.” Her affect was: inspired (change agency). This inspiration was the result of change agency and in making the world a better place for the future. In this case, making the world a better place for her grandchildren.

Figure 32. Inspirational
One participant, Fenn in Cohort III, had two submissions that overlapped with *People & Place*. These included ‘Coffee & Book’ and ‘No title (tree in nature)’. Both of these are shown in Figure 33. Fenn was in a place by herself but did mention a feeling of connectedness to people in the program. I chose to place these two submissions into *Self & Place* due to reflecting by herself.

Figure 33. Fenn’s Submissions

For overall *Belonging*, there were strong connections to people, place, self, and content. While some connections overlapped, I recorded connections that were the most obvious in observations or shown in visual, written, and verbal narratives. Categories for belonging included: ecological thought, learning sanctuary, perspective learning, and change agency. Submission percentages of these categories are shown in Appendix F. Affect examples were reported as positive, neutral/in flow or flow (reflective, observant, focused). I observed that all students displayed attributes of experiential learning, such as connecting and reflecting on their learning. This was the result of taking photos and then reflecting on experiences for the purpose of the photovoice experience. I recorded and coded affect that was observed and/or reported by student participants.
Students were often reportedly observant, motivated, reflective, and had a sense of peace and comfort. Belonging and connections were clearly connected to positive affect. In addition, changes of perspectives were reported in Belonging. These were observed as scaffolded learning experiences and mostly reported in Content & People and Self & Place. Disorienting dilemmas were not reported by student participants. When student participants displayed a feeling of connectedness, I considered this a sense of belonging. When they referred to lack of connections, or a disconnect (possibly due to unbalanced systems), I considered this a lack of belonging. The Lack of Belonging theme was recorded with the sub-themes: People & Place and Self & Place. No submissions fell into a Content & People sub-theme.

**Lack of Belonging-People & Place**

Student participant submissions (photo and written narratives) that reportedly connected to people and place included: Sonni, Lee, Reese, Tivy, Sam, Tatum, and Kylie. Participants reportedly experienced lack of belonging or disconnections relative to people and places. There was a disruption event or trigger that created a disconnect to people/place. In this situation, affect examples in Lack of Belonging-People & Place included: feeling stress, in survival mode, crying, sad, indecisive, determined, anxiety, surprise and trapped, starving, disappointment, increased pressure, scary, frightening, and desire (to problem solve). Students responded to disconnections through re-establishing connections. In these circumstances, students reported a connection or reconnection to something that helped them balance themselves overall, referred to autopoietic balance in this study, relative to people/place. Affect responses to re-establish autopoietic balance included the following examples: energized, humor, goal achievement, restful (taking a break), delight, empowered, change agency, enjoyable, feeling connected to others, determined, thoughtful, appreciative, and motivated. Categories in Lack of Belonging-
People & Place included connections to the doctorate program (directly mentioned), personal (life) plans (outside of program and not work-related), and professional (work) plans.

In Cohort I, Tivy submitted the narrative ‘Survival’ (Figure 34) and her affect included: feeling in survival mode. This led to connections with cohort students at the summer June 2019 residency and the affect in feeling connected to others during dinner with wine as shown in the photo/visual narrative in Figure 34. I was there at this residency in which we ate together, all cohorts, along with professors, the director, and support staff. This was at Conserve School, and I felt this residency consisted of good food and company. The wine symbolized survival for Tivy—a feeling of lack of belonging (feeling in survival mode) to what helps one survive (wine bottles at residency that symbolized moments shared with others).

Figure 34. Survival

In Cohort II, Tatum’s disconnectedness was the result of moving from her home (Figure 35). This was not directly related to the program but was observed as an important life change. I did not code this as a disorienting dilemma as she self-organized in direct response to moving
and did not display other attributes reflective of a larger disorienting dilemma (Mezirow, 1991). Tatum stated, “Moving to a new place after deciding to uproot yourself from your home of 26 years…scary and frightening. Everything is new can elicit very different emotions.” Her affect included: scary and frightening. Her hope to establish new connections were reported, “in time, while creating new memories, the new place, and house transforms into a home.” As a response to feeling scared and frightened, Tatum had hope that things would feel like a home again. Their self-organizing affect included: thoughtful, reflective, and feeling of comfort (at making a home). Connections outside of the program while in the program were important to consider as part of student learning and honoring the whole learner.

Figure 35. Home

In the submission samples, I included disconnections and related affect as well as responses to these disconnections (self-organization). Responses included behaviors which helped participants reconnect to others, self, and/or place. Usually disconnections and lack of belonging included negative affect whereas re-establishing connections helped participants feel more balanced in their life. These re-connections included mainly positive affect. Categories that emerged in Lack of Belonging: People & Place included a disconnect as a result of the doctorate program or outside of the program, categorized as life or work plans. Almost all submissions
could have been connected in some way to the doctorate program, either directly or indirectly. Even Tatum’s ‘Home’ submission (Figure 35), the one possible exception, may have impacted learning. Yet, I recorded direct connections that were reported or observed with student participant narratives and categorized these submissions as ‘Doctorate Program’.

Students that experienced a disconnect or lack of belonging exhibited negative affect, whereas those that reconnected to people or place found ways to exhibit more positive emotions, feelings, or behaviors. Students in Cohort I, who were working on their dissertation, consisted of the largest percentage in Lack of Belonging-People & Place relative to their doctorate program and their total submissions. There were lacking submissions in Lack of Belonging-People & Place from Cohort III related to their doctorate program and from Cohort I and III related to their life or work (outside of the doctorate program). If disconnections occurred outside of their doctorate program, the situation could have indirectly related to what they were learning in their program.

*Lack of Belonging-Self & Place*

Student participant submissions (photos and written narratives) that reportedly connected to self and place included: Sonni, Lee, Reese, Tivy, Sam, and Charlie. Participants reported a lack of belonging or connectedness to self and place. There was a reported disruption or event/trigger that created a disconnect to self/place. In this situation, affect examples included: reflective, focused, hesitant, weary, tired, feels stifling, hard-working, determined, anxious, feeling scattered, lack of focus, struggle, emotional stress, bothered, sad, teary-eyed, and emotionally worked up. Students reported a connection or reconnection to something that helped them balance relative to self/place. Response affect examples included: focused, reflective, determined, trust, sense of clarity, mindfulness, bravery, peaceful, relaxing, restorative, feel
accomplished (but nervous), strength, trust, hopeful, change agency, and motivated. Categories in *Lack of Belonging-Self & Place* included connections to the doctorate program and/or natural systems. Participants who reportedly observed an imbalance in natural systems, responded to these disconnections by rationalizing or by wanting to change these circumstances. When participants analyzed a situation, their affect resulted in focusing in on a situation or place. When participants experienced a disconnect as a result of their program or they observed a disconnect of unbalanced natural systems, their affect was reportedly negative. When they re-established connections, they reported positive affect.

In Cohort I, Sonni’s disconnect included needing sleep or rest (photo in Figure 36). Her initial affect included: weary and tired and she stated, “…laying awake thinking about coursework and research.” She then described connections by stating “…I’ve become good friends with the moon and find that it listens and doesn’t judge...This program has taught me a great deal about finding those moments of quiet and that internal reflection is an important part of the learning process.” Her affect in response to feeling weary and then connecting to the moon and moments of internal reflection included: reflective (‘sense of clarity’; ‘internal reflection’).
Lou, also in Cohort I, displayed initial disconnections that included a perspective shift as the result of unbalanced or contrasting environments. He wrote that, in his photo (Figure 37), “…contrast represents the unnatural conditions with which the human consciousness can fabricate an environment in a contemporary setting.” As he reflected, he made the following connections: nature-built-structure-photography. This was shown through his written narrative when he stated, “…internal subconscious is perhaps closer to the natural condition while the mind creates a new layer for the ego to rationalize the contrast and normalize it—thereby reinforcing the unnatural environmental pattern of development.” His affect included: focus and reflective. Lou was focused on the contrast between the indoor and outdoor environments through reflection.

Figure 37. Contrast

Sam, from Cohort II, demonstrated a feeling of disconnect from observing unbalanced natural systems (Figure 38). Sam wrote that she “…hiked down to the ice cave seeing signs with the date when the glacier had been at that height” and that her affect included: sad and teary-
eyed. Sam wrote about this disappearing glacier by stating that, “I still get emotionally worked up thinking it’s gone.” This observation and reflection on an unbalanced natural system, from signs of a disappearing glacier, led Sam to feel motivated and display as sense of change agency. In response to feeling sad, this motivation and change agency was shown through prose when she wrote about this vanishing glacier in the photo and that it was a “…reminder of my intention for being in this program. I can make a difference in this climate chaos by being a change agent for education systems.” Their affect as a result was: motivated to learn and change agency.

Figure 38. Motivation to Learn

Charlie, from Cohort III, had reportedly similar disconnections relative to an unbalanced natural system. Charlie wrote about this in reference to harmful human agricultural practices (photo shown in Figure 39) when he wrote, “the destructive practices brought on by globalization have driven farming to monocropping, herbicide & pesticide overuse and penning livestock; in other words, corporate farming.” The resultant affect connected to this initial
disconnect included: reflective about destructive practices (bothered). Charlie then reflected on connections to sustainable practices and the environment. This was shown in his written narrative: “What I’ve learned is we need to return to farming practices used for generations before the advent of the Industrial Age – crop rotation, free-ranging livestock and renewable energy sources – and regain our stewardship, not dominion, over the land that provides everything we need to survive.”

Figure 39. Land Stewardship

When students experienced a disconnection and reconnection, they referred to their doctorate program or natural systems. These categories were consistent throughout Lack of Belonging: Self & Place.

Overall, in the Lack of Belonging theme, the highest percentage of categories were related to the doctoral program (Appendix F). This reflected the purpose of the photovoice study in connecting learning experiences to their doctorate program. Negative emotions and feelings were correlated with a feeling of disconnect whereas more positive emotions and feelings were
correlated with re-establishing some connections. In addition, most submissions in *Lack of Belonging* related to disconnections were from Cohort I, who were working on their dissertations. Participants in Cohort II reported fewer disconnections associated with the doctoral program; participants in Cohort III reported no disconnections associated with the doctoral program.

Students who lacked connections reported negative affect, such as a feeling or emotion as result of a trigger or stressor. Students reported a response affect and behavior that helped them maintain an autopoietic balance for themselves as life systems. This reported affect was mainly positive that led to behavior that re-established connections. Students stayed in a state of disconnect for undetermined periods of time. The length of time was not always reported; some quickly re-established connections but for others it seemed ongoing, such as in the dissertation phase. Most of the total submissions in *Lack of Belonging* that reported a disconnect were from students in Cohort I, during their dissertation phase, however, most submissions overall were from Cohort I in both *Belonging* and *Lack of Belonging* themes (approximately half). Other disconnections were participants that reportedly viewed unbalanced natural systems or an imbalance in work or personal life outside of the program. For viewing unbalanced systems, such as retreating glaciers or poor agricultural practices, students were motivated in their learning related to their program. For work or personal life, they would indirectly relate to their program as another way of motivating them to learn in the program (submission ‘Home’ a notable exception). Total submission percentages can be found in Appendix F.

**Limitations**

There are limitations in every study that should be addressed by the researcher. As the researcher creates the research design, including analytical procedures, for the study, they may
lose sight of particular variables that could impact interpretations and outcomes. In this study, I explored a complex learner system and attempted to simplify and create boundaries in my methods and analysis to accurately interpret data and form meaning. I considered limitations in my research design and analytical approaches, along with the following limitations: the number and types of submissions from cohort participants, the coding process and interpretation of affective behaviors, language and communication (including terminology, such as defining a disorienting dilemma), and my own limitations as a learner and researcher.

The number of submissions versus individuals and submissions need to be considered in the findings. For instance, the same person from Cohort II submitted photos that all exhibited change agency. Also, if the same person had more submissions and had an inclination for change agency, then that increased overall change agency submissions for that cohort.

Coding affective behaviors, such as emotions and feelings, have limitations depending on the one analyzing the data and their interpretations based on narratives and the coding structure and process. Coding affect was, at times, subjective, even with my analytical coding process. Any subjective categorizations were member checked with student participants to be sure I was coding and categorizing correctly. I member checked all data, especially as I was coding affect to experiences.

Reductionism and categorizing tend to limit studies, but, at the same time, are commonly done as understanding parts helps to understand the whole system. Sub-themes and categories tended to overlap and were, in reality, entangled in a nonlinear way. This made it challenging to code experiences when learning within living systems. This study does not account for all of the myriad of feedback loops in this dynamic, complex system of learning.
Although I attempted to focus in on parts to understand the whole of learning in this study, I also focused out on the overall learning process. This may have led to an incomplete picture of what was happening in transformative learning and behavior. Although change agency was exhibited, a sign of transformative learning, this was not explored beyond the learning experience itself for student participants. Although some behavior change was reported, I did not study this specifically to transformative learning but more generally related to transformative sustainability learning, affective learning, and behavior demonstrative of living systems.

Thinking of the big picture of the system may have led to an incomplete understanding of the transformative learning process related to behavior change. As a result of systems thinking, my attempt at viewing in and out within the system may have been too generalized in its approach to this study.

Language in this study was a barrier at times. For example, a negative and positive feedback loop does not necessarily mean bad or good as far as the feedback. This, along with the words behavior (behaviour), emotion, feelings, disorienting dilemma, disruption, stressor, and/or trigger presented trouble in communicating coding to participants and with interpretation and explanation of findings. A student participant, Lou, shared his thoughts on this in the second online session (as a result of a feedback loop discussion),

I think this is where maybe we get confused or thrown off because so many of these terms have value-laden meanings, like disruption we think of as a bad thing, or stress. That these [words] have negative connotations and yet they lead towards positive change and then when we use the word change agent that all of sudden has a positive meaning. I think part of the problem is value propositions with certain terms, and that we don’t
really have a language to really talk and what this diagram is really showing...like the diagram helps more than the terms, if that makes sense.

In this case, I was showing a diagram that went over how I coded data. Lou’s words emphasized that visuals are important in understanding concepts versus relying solely on written words. By sharing photos and diagrams, I was hoping to help others better understand the process as well as the products of this work.

The way I defined a disorienting dilemma in this study oversimplified the complexity of the transformative learning process and what actually occurs during this phase. Although disorienting dilemmas have been thought of differently over the years (such as being connected to a large event or to smaller, incremental events), for the purposes of this study, disorienting dilemmas were defined according to Mezirow’s earlier work (1990, 1991) in which I considered them as dramatic events that lead to a change in a frame of reference for the learner. As such, in this study, no disorienting dilemmas were indicated or reported by participants, but this does not mean they did not occur either in or outside of the program. Only one submission, ‘Home’ from Tatum, hinted at a potential disorienting dilemma in that she felt scared and frightened moving from her long-time home to someplace new. Yet, she responded by rationalizing that this new place would feel like home and did not display any evidence of a change in reference or meaning scheme resulting from a disorienting dilemma.

Overall any reference to perspectives, either perspective shifts, analyzing perspectives, or even transformative learning, was scaffolded and did not indicate negative affect. I member checked this with student participants as well, and they agreed that perspective learning was more scaffolded into their learning experiences. I felt that my own disorienting dilemma that occurred in a past workplace was the result of these scaffolded experiences as part of the EDSU
program. This led me to question how students re-integrated their acquired perspective shifts from their learning processes to experiences outside of the program.

Lastly, my own limitations in understanding may have impacted this work. Like many scholars before me, the greatest understanding in this work is that there is more learning to be done to shape our understanding of living systems. We are always learning and on a reinforcing learning feedback loop—some more so than others. In this sense, this is just a drop of understanding in the rain of transformative sustainability learning. Being open to discuss and improve upon this work is welcomed and encouraged so that we may learn and grow together as we move towards more sustainable systems.

Summary

Connections for learners became apparent as a result of findings. Students who felt a sense of connectedness as reported by their submissions were placed in the Belonging theme. Over half (59%) of the participants’ submissions were coded in the theme of Belonging. In this theme, there were strong connections to people, place, self, and content. Positive and/or neutral affect correlated to Belonging submissions. Categories for belonging included: ecological thought, learning sanctuary, perspective learning, and change agency. Students who reportedly lacked connections in their submissions were placed in the Lack of Belonging theme. Less than half (41%) of submissions were coded as Lack of Belonging. In this theme, there was a strong correlation to people, place, and self. There were no submissions that connected to content in this theme. Through self-organization, or autopoesis, students were able to re-establish ways to stabilize themselves to continue learning in the Lack of Belonging theme. A negative affect correlated with a lack of connectedness whereas a generally positive affect correlated with re-establishing connections for students.
A sense of belonging in this study included the context of: 1. people and place; 2. content and people; and 3. self and place. Within these contexts, ecological thought, learning sanctuary, perspective learning, and change agency was evidenced. Affect was positive or neutral connected to learning. Lack of belonging included contexts of people and place as well as self and place. Content and people was not evidenced. Within these contexts, lack of connections due to the doctoral program, personal life, professional life, and natural systems was evidenced. Negative affect was displayed initially, and then positive affect was displayed as a response to balance the learner—an autopoietic and self-organizing balance of a living system (Maturana & Varela, 1991; Capra & Luisi, 2014). These findings in the themes Belonging and Lack of Belonging will be explored in Chapter 5.
Chapter 5. Findings, Significance, & Recommendations

The purpose of this study was to understand adult learning experiences for doctoral students in a transformative sustainability education program as it relates to affective learning. Learner experiences in the EDSU program were studied through participatory action research and photovoice methods. My research questions reflected the purpose of this study:

- How do adults experience learning in a transformative sustainability education doctoral program?
- How does affective learning play a role in adult learner experiences in a transformative sustainability education doctoral program?
- How do affect and emotions play a role in transformative learning?

In this chapter, I will address the key findings, including the photovoice experience itself. I will also discuss my theoretical framework, especially related to systems thinking and autopoiesis. Through findings and my own lived experiences, I will provide significance and recommendations for further study of affect within transformative sustainability learning as it relates to programs in higher education.

Key Findings

The program, designed by O’Neil, includes a cohort of learners. This helped establish a community going into the photovoice experience. The photovoice experience itself consisted of diverse ways of communicating, including: a face-to-face introduction at a doctoral summer residency, email correspondences (group and individual emails), and two online photovoice sessions. For our online sessions, we used Microsoft Teams, an interactive online platform commonly used during our doctoral program. Key findings included the following topics:
transformative sustainability learning, learning sanctuary, photovoice, and belonging (connectedness, dynamic equilibrium, and feedback loops).

**Transformative Sustainability Learning**

It’s important to revisit O’Neil’s core principles when she designed the EDSU program, especially three that reportedly stood out in the findings: ecological thought, systems thinking, and transformative learning. Ecological thought, systems thinking, and transformative learning were prevalent in student learning and interwoven throughout a sense of belonging and connectedness for students. Ecological thought included various connections in the findings. The first one as symbolic for participants. Nature was often in photos to represent their thinking on nature and connectedness. In some cases, nature represented a sense of place that has been shared with family members or a desire to share with them and/or others. Students displayed an ecological mindset across cohorts, indicating that ecological thought was important to them and a potential reason or an external motivator to begin the program. Nature in peril was also a motivator. Disappearing glaciers, poor agricultural practices, and restoration projects were topics of learning and show that a land ethic (Leopold, 1949) and being a part of nature as well as stewardship was important to participants. An understanding of systems also played a role in ecological thought and was reported and reflected throughout findings.

Systems thinking was observed throughout findings which helped support concepts in perspective learning, ecological thought, and living systems theory. For systems, participants mentioned natural systems and respect of these systems. They also referred to community and selves as systems, along with boundaries in systems. The learner is a living system who works to establish an overall dynamic equilibrium with their complex network and feedback loops (Capra & Luisi, 2014). Davis and Sumara (2008) supported this by stating learners reflect a complex
system and “is capable of adapting itself to the sorts of new and diverse circumstances that an active agent is likely to encounter in a dynamic world” (p. 14). Embodied learning is a part of this network within the overall living system of the learner. These are nested systems that consist of energy exchanges and feedback loops (Capra, 2007).

Learners respond to their environment in the form of people-place-things through feedback loops that impact their overall dynamic balance or equilibrium and structure as a living system. This dynamic equilibrium is managed through self-organization or autopoiesis (Capra & Luis, 2014). Mason (2008) refers to self-organization as including “adaptability, open systems, learning, feedback, communication and emergence” (p. 17). Affect, as a result of feedback loops and autopoiesis, drives behaviors in this living system. This was particularly insightful when dealing with learners as living systems and will be further explored later in this chapter.

Systems thinking also provided ways to support perspective learning and a way to view things differently in systems. Perspective learning is learning about and analyzing diverse perspectives, integrating that learning, and can involve shifting perspectives. In these findings, perspective learning was scaffolded for students. Although other principles of the EDSU program were not necessarily directly mentioned in this study, they support perspective learning and change agency: pluralistic democracy, social justice and diversity, and ethical action. From my own experiences in my social justice course, and other sustainability courses that enabled me to reflect on diverse perspectives, I was able to view things differently in life. I remember reading about indigenous perspectives and other students/professors sharing additional readings outside of the program that led me to read more about diverse perspectives, such as Braiding Sweetgrass (Kimmerer, 2013). Kimmerer (2013) referred to Joanna Macy (1991) who stated, “...action on behalf of life transforms. Because the relationship between self and the world is
reciprocal, it is not a question of first getting enlightened or saved and then acting. As we work
to heal the earth, the earth heals us” (p. 340). This reciprocal relationship with nature is a deeply
meaningful perspective on the importance of healing selves and natural systems. Learning about
other perspectives, such as Indigenous and Eastern perspectives and epistemologies, help us view
things differently in contrast from Western, traditional viewpoints. Lange (2018) wrote,

The Western tradition veered toward logical empiricism, while Indigenous and various
Eastern epistemologies continued their focus on relationship, process, and change.

In his book, The Tao of Physics, Capra (1975/2010) elucidates the common
characteristics between quantum physics and Eastern mysticism, largely an aware-
ness of mutual interrelatedness and the inseparable parts of the cosmic whole. In
meditative states of nonordinary consciousness, space and time disappear and a higher
multidimensional reality is experienced. Buddhists see all objects or material as processes
flowing in dynamic patterns (p. 289).

Learning about diverse perspectives through reflective analysis and dialogue is a
powerful way to shift ways of thinking, viewing, and being in the world. I remember journaling
and reflecting quite a bit during my first two years (EduBlog, ecological journal activity,
reflections on Microsoft Teams Platform; verbal dialogue in Flip Grid; and dialogic narratives)
as well as sharing this learning with other students in conversations during courses. Methods that
allow students to read, analyze, reflect, and dialogue on perspectives support transformative
learning.

Transformative learning (TL) includes perspective learning that leads to a deep change of
perspective in an individual’s world. The learning in this study was experiential and scaffolded
and gave students the opportunity to connect, reflect, and dialogue on their learning. Scaffolded
perspective learning can happen in place of disorienting dilemmas that may be a more painful process. Although scaffolded perspective learning took place in this study, disorienting dilemmas could have still happened outside of the program, as in my own lived experiences. Great pain can result in having a disorienting dilemma, including alienation. Lange (2018) referred to Ollman (1971) in that alienation may include several of the elements found below.

- Alienation in work due to a lack of decision-making and by having an uncreative and difficult working environment;
- Alienation from products due to a lack of control over what they make or its outcome;
- Alienation from other people as a result from competition and a lack of community; and
- Alienation from the natural world based on the inorganic lifestyles of humans (p. 123).

The sense of alienation and fragmentation that occurs with TL experiences can be overcome through processing and a feeling of empowerment. Change can occur in a constructive way with the proper support (Lange, 2004). Connection, reflection, and dialogue on perspective learning should happen in an intentional and scaffolded way to more successfully integrate new meaning schemes into lives for learners.

**Learning Sanctuary**

Learning sanctuary (Lange, 2009) is a term that I have used to display a comfortable learning atmosphere for participants. A learning sanctuary was prevalent in the findings connected to student participant learning experiences. Scaffolded learning and space for true selves in the program was mentioned relative to feeling safe and growth. Making space for true selves and entering a place of learning were both mentioned relative to in-person summer residencies. The cohort model, along with other feelings of connectedness, supported student growth in this study, especially reported in the first two years of the EDSU program.
This study was intentionally designed to support a learning sanctuary. Creating a learning sanctuary in this experience was a collaborative effort between participants and myself as the facilitator. The methodology of participatory action research and the methods of photovoice lent themselves well in creating a space for learning and sharing. Photovoice methods helped students connect and add meaning to their learning process through reflection and sharing with others as a cohort community. Our learning sanctuary was not intended to create transformational change for students. It was built on creating an environment where students felt comfortable to reflect and share their learning experiences. Therefore, I deeply connect to cultivating learning sanctuaries as a way in helping learners stretch their thinking and deepen their understanding of their learning experiences collaboratively. Students and facilitators together create a learning sanctuary. Learning sanctuaries promote relationship building and connectedness and energize reinforcing learning feedback loops. A learning sanctuary can take many forms and should not have intended consequences, such as transformation. It should be open to help learners reflect and connect on their learning. Learners should have the power to choose what form their learning takes and to develop their own meaning schemes. Learning sanctuaries and student readiness help students make connections to content. Ecological and sustainability foundational knowledge is especially important in beginning a program. Through experiential education, students are supported through scaffolded opportunities, and transformative experiences do not need to be the result of a disorienting dilemma.

**Photovoice**

This photovoice experience has been profound for me, especially in interpreting the visual, written, and verbal narratives from participants, who reportedly viewed things differently through the lenses of their cameras. By having the tool to take photographs, students focused on
a scene and were put in a position to connect and reflect on their learning in the EDSU doctoral program. This process reflected experiential education by connecting learning to lived experiences and by having time to reflect and share on these experiences (Dewey, 1938; Kolb, 1984). In addition, participatory action research and photovoice methods reflect transformative sustainability education. Diverse methodology and methods that give participants more voice in the research leads to authentic studies. In this participatory action research (PAR) study, participants in the EDSU program took and collected photographs, wrote narratives, and then participated in analyzing the data. PAR is about empowering the participants as part of the process and hopes for change through the actions of the participants (Baum et al., 2006). This study also connected to two goals of photovoice (Wang & Burris, 1997) in that it enabled people to record and reflect on concerns and strengths in their community and promoted critical discourse about the importance of issues represented by photographs (p. 369). In this case, student participants reflected on their learning and what makes meaningful learning experiences, discussed their learning together, and helped provide information, through narratives, that will be shared out to others to improve teaching and learning practices.

**Dynamic Equilibrium & Feedback Loops**

Findings show that a sense of belonging and connectedness as a result of a learning sanctuary supports and empowers learners through motivational behaviors. Affect, including feelings, emotions, and behaviors, entangle with other ways of learning, such as cognitive and somatic learning dimensions. These subtle and not so subtle changes in affect builds upon learning experiences in and outside of the program through systems thinking reflective of a positive or reinforcing learning feedback loop. Dynamic equilibrium and feedback loops are an integral part of living systems. Dynamic equilibrium is based on multiple feedback loops for
learners as living systems. Moving away from dynamic equilibrium, dissipative structures and self-organization are critical to learning. Dissipative structures are the result of structural coupling with matter-energy that flows in and out of the student learning system. “To stress the fact that non-equilibrium self-organization in open systems requires the dissipation of energy, Prigogine coined the term ‘dissipative structures’, so as to distinguish them from equilibrium structures” (Prigogine, 1968, 1969, as cited in Goldbeter, 2018, p. 2). This reinforces that learning occurs away from equilibrium in reinforcing learning feedback loops and through dissipative structures.

Learning takes place away from equilibrium when content and experiences are integrated into prior learning to form new perspectives and meaning-making. This results in a learner’s development and growth. For instance, the first two years of the program have been focused on building a learning community, a learning sanctuary, and on scaffolded learning. Reflective of experiential education, ecological thought, and systems thinking, students felt a sense of belonging when connections to people-place-content-self were stable. This promoted learning in a reinforcing learning feedback loop (Figure 40).

Figure 40. Reinforcing Learning Feedback Loop
Students who had a sense of belonging and openness to learning were able to connect and reflect on content to integrate learning with their prior experiences. Participants in this study were reportedly open to diverse perspectives and reflected ecological thought when in a state of learning readiness. Content of the EDSU program helped to support ecological thought and literacy as students learned more about transformative sustainability education. Lou, a Cohort I student participant, explained the intersection of ecological thought-perspective-place-people. In this case, Lou’s affect was considered in flow or focused as he analyzed perspectives of the environment and referenced his daughter relative to space and perspective meaning-making (Appendix E: Isla with Tree). This was also an example of how photography and symbolism can be used in our learning. When participants were focused for affect or exhibited neutral emotions, they were able to analyze their experiences—affect entangled with cognitive and somatic dimensions as they took the photograph. In this way, students constructed their reality based on their senses—reportedly embodied learning.

A reinforcing feedback loop can be beneficial in learning but other reinforcing feedback loops that happen in life systems can be detrimental and make it more difficult to integrate new learning into prior meaning-making schemes. Students may continue to learn up to a point where their energy goes into maintaining a healthy life system versus energy into learning. This results in a reinforcing feedback loop focused on a lack of belonging or disconnectedness (Figure 41). Learners will either need to regulate and self-organize themselves to continue learning in the program, stay in a stressed state, or remove themselves from the program experience, hitting a tipping point. This may be a reason why no submissions connected directly to content and people when students had a lack of belonging as energy was elsewhere. Students who felt connected
also may have had more time to reflect on content and how they would communicate and apply their learning to different circumstances.

Figure 41. Reinforcing Lack of Belonging Loop

By creating a learning sanctuary, participants have a sense of belonging and are able to spend more energy on learning in healthy way. Learning sanctuaries (Lange, 2009) support a space in which you feel that you can be your true, authentic self. A learning sanctuary can be designed and cultivated by a person (Appendix E: Reese, Creating Space for our Real Selves in our Organizations), a group of people, or a place. In the EDSU program, a learning sanctuary was interwoven throughout all three cohorts and was especially prevalent in the first two years of the 3-year program where a cohort traveled together in their classes. In addition to a cohort community, other members or places made up a learning sanctuary for EDSU students. For instance, at times in this study the learner created a space of comfort for their learning in the outdoors with family. These connections entangled with ecological thought. Like embodied learning, learning and connectedness in systems often happens simultaneously or in response to each other (structural coupling), just as we are assimilating new information and reconstructing our perspectives in a scaffolded way.
**Experiential Connections to Place & Content**

A connection to others and places establishes healthy connections for learners. Place-based learning, an experiential education method, helps learners connect to place (Sobel, 2004; Pisters et al., 2019; Simm & Marvell, 2015). In this study, students connected to their residency place at Conserve School, UW-Stevens Point, sustainability conferences, natural places, or built places. They felt a sense of belonging and comfort that reinforced their learning. Students often connected curriculum or course content concepts to reflective thought processes in nature and even, at times, to family. Kylie, a member of Cohort III, made these connections in one of her submissions (Appendix E: Kylie, The Bottoms). Connections to EDSU content to natural environments and to other aspects of student life was a large component of this study.

Comprehension and communication of transformative sustainability content was also important when students were in a reinforcing learning feedback loop. Students reflected on their own learning and about how to communicate these thoughts. When student participants shared and communicated with others, such as teaching, this was categorized as change agency in this study (Appendix E: Sam, Hidden Curriculum). “Change agency, the competence and commitment to effect positive change, includes an ability to work with diverse others, communicate empathetically, and make decisions in the face of uncertainty” (Goralnik et al., 2018, p. 313). In this case, students displayed behavior that impacted others relative to sustainability education and supporting positive change and education.

Students also made connections to learning while alone in places. Such circumstances included mostly outdoor and/or natural areas, with two exceptions. One exception included a student sketching a created place and another, the same person, focused on a built or constructed versus a natural environment. Focused, reflective, wonder, and perspective shifts were some
affect examples that were given by students as they connected self to place. For perspective shifts, learning was scaffolded reflective of the transformative sustainability learning program itself (Appendix E: Reese, Letting go and letting come).

**Perspectives, Learning, & Affect**

All perspective learning in this study showed scaffolded perspective learning experiences versus a disorienting dilemma (Mezirow, 1991). This is not to state that students did not experience a disorienting dilemma one or more times during the program, just that they did not report it as part of this study. In this case, a disorienting dilemma would have needed to represent a change in meaning schemes and frame of reference for the learner as the result of a dramatic event (Mezirow, 1991). I referred to triggers or stressors as smaller events that resulted in a change in the learner as a living system. A change in a living system structure reflects dissipative structures and emergence of new structural formation (Capra, 2002, p. 1). To revisit Capra and Luisi (2014), they stated that bifurcation happens at a new formation juncture and that, in autopoiesis, living systems respond to triggers from their surrounding environment through structural coupling (p. 135). This structural change is the result of experiential reactions and can be understood through triggers both internally and externally as structural coupling occurs as part of the living system of the learner—representational of the learning process. Davis and Sumara (2008) explained that,

> Experience, rather, is better understood in terms of triggers than causes. Learning, then, is a matter of transformations in the learner that are simultaneously physical and behavioral—which is to say, in biological terms, *structural*. Learning is certainly conditioned by particular experiences, but it is “due to” the learner’s own complex biological-and-experiential structure, not an external stimulus (p. 13).
Triggers happen within or with matter internally and/or externally relative to the learner as a living system. The concept of triggers is generally something that impacts the behavior of the learner living system as the result of feedback loops and structural coupling. Although triggers may not be value-laden in this sense and can be used as a general term to evoke change, I often referred to them more specifically as stressors when it indicated a stress response from the learner.

In this study, affect and learning experiences were closely connected within the learner as a living system. Positive learning experiences correlated to positive or neutral/flow affect whereas negative experiences correlated to negative affect. Although I was surprised at this dualistic simplification, the learner living system was actually a complex network that consisted of many connections and feedback loops. Through focusing in on a few feedback loops in a learner living system, we can begin to understand how to reinforce meaningful learning experiences versus inhibiting learning through disconnectedness and lack of belonging. When students experienced a lack of belonging, their affect was reported as negative, such as stress, crying, sad, determined, and anxiety. Students who reported a negative affect always reported a reaction that would help them re-establish a life-balance through self-organization and connections. When connections were re-established, student affect included positive responses, such as energized, humor, empowered, determined, and motivated (Appendix E: Sonni, Lunch is Served). Students were in a feeling of discomfort for an undetermined amount of time.

In Förster et al.’s (2019) model of transformative learning (TL), they referred to learners in a stable state with their old meaning perspectives. A trigger pushed their ‘edge emotion’ out of their comfort zone into ‘fluid’ discomfort—a liminal state—to potentially integrate new information into forming new meaning-making schemes and perspectives (Förster et al., 2019, p.
325). Förster et al. (2019) also referred to Mäkki and Green (2014) by stating that, “highly unpleasant emotional states such as stress, doubt, fear or even worse, panic or depression, may hinder TL and trigger a desire to stay in or to get back to the original state, emotionally more pleasant since it is a well-known state” (p. 325). Therefore, the potential of staying in an overly stressed state could inhibit learning and/or have students revert to old meaning schemes where they would feel more comfortable (Figure 42).

Figure 42. Dynamic Feedback Loops

**Transformative Learning Feedback Loop**
- Trigger
- Discomfort in Liminal state
- Self-organization
- Integrate new meaning perspectives
- Stable, belonging

**Old Meaning Schemes Feedback Loop**
- Trigger
- Overly Stressed
- Discomfort in Liminal state
- Revert to old meaning schemes
- Stable, belonging

A trigger or stressor could be impactful enough to become a disorienting dilemma, however, students did not report such large events as part of this study. This is reflective of reaching a bifurcation point and the emergence a new structural form (Capra & Luisi, 2014) or a new frame of reference and meaning schemes (Mezirow, 1991). Students may have not reported disorienting dilemmas due to the personal nature and challenges of these experiences, such as alienation and feelings of negative affect (Mezirow, 1991). This may have been too painful to share in a group setting or may have seemed irrelevant to the study as being connected to the program.
**Autopoietic Feedback Loops**

When students reported too much stress, their reinforcing learning feedback loop and learning and development tended to slow down. A lack of belonging or disconnectedness occurred, negative affect resulted, and then the students self-organized to bring themselves back to a healthier dynamic autopoietic balance state to continue learning (Figure 43).

Figure 43. Belonging-Lack of Belonging Loop

Students in Cohort I in the dissertation writing phase reported a feeling of disconnect and were often spending energy to self-organize through re-establishing connections to achieve a life-balance. A change in leadership of the program occurred during the last year of this study, and this may have impacted student learning and their sense of belonging. Cohort II and III were also still taking classes together as a cohort whereas Cohort I was more focused on research and dissertation writing their last year. This may have also impacted learning. In addition, dissertation committee members may not reflect or practice transformative sustainability
education (TSE). These potential challenges along with the dissertation process and structure, such as writing in a particular style and following standardized rules, along with a program nested within a higher education system that may not reflect TSE, may create additional barriers to learning and a feeling of disconnectedness and a lack of control in student learning. This suggests that student voice, learning flow, support, and success should be taken into consideration to foster transformative sustainability education within the entire learning program. To address this, student input and collective decision making – a paradigm shift from a top-down approach to a bottom-up or a more integrated approach – may be necessary for a nested learning system.

Students who reported disconnect exhibited behaviors that would help them feel more connected to continue their learning. This represents self-organization or autopoiesis (Maturana & Varela, 1978, as cited in Capra & Luisi, 2014, p. 22). Students as a living system were displaying resiliency and solving their challenges to continue learning (feedback loop shown in Figure 44). In this way, “living systems contain their own solutions” (Wheatley, 2007, p. 106).

Figure 44. Autopoietic Dynamic Equilibrium Feedback Loop
Students showed trust and resiliency in themselves and trust in the process at times (Appendix E: Tivy, Keeping my eye on the prize). Positive affect that helped students re-establish connections to continue their work included: determination, trust, sense of clarity, mindfulness, relaxing, restorative, feeling accomplished (but nervous), strength, change agency, focused, and motivated.

Findings also showed a lack of connections to self-place-others at various times in their studies. These disconnections included observations of unbalanced natural systems, such as a disappearing glacier or unsustainable agricultural practices. Students that displayed initial negative affect were bothered or felt teary-eyed. Their response was to feel motivated to make positive changes on the environment to improve the health and dynamic balance of these systems. They felt motivated to become change agents to support healthier systems. In addition, a lack of sustainability in their personal or professional lives motivated student learning as well. One student, Sam, mentioned that there was a lack of sustainability education at her work. Sam wanted to be a change agent to improve teaching-learning systems that reflect sustainability. This reflected her motivation in her learning connected to the EDSU program. Triggers or stressors, such as natural systems in peril, have the potential to motivate students to be change agents to learn, grow, and contribute to more sustainable systems.

**Transformacy & TSL Phases**

As a result of these findings, I went back to my theoretical framework on transformative sustainability learning and configured phases to accurately reflect what was happening in data analysis and in this transformative sustainability learning process. I mainly focused on Mezirow’s (1991) phases and systems thinking to explain the dynamic balancing that was being exhibited and reported by students. In drafting these phases, I found it useful to use the word
congruency as a phase in which one is not open to change and is somewhat comfortable and/or accepting of their current frame of reference—including meaning schemes and perspectives. For example, individuals in this phase who are in a hierarchical system are either unaware of power hierarchy, have a willingness to be part of it, and/or are oppressed/in marginalized populations. I have not seen an example of congruency with student participants in this study but have experienced this during my doctoral program and in other lived experiences when communicating with others who are not open to change. This is valuable to note when communicating about transformative sustainability learning (TSL) with others and in honoring diverse ways of being in the world.

Those that are open to TSL are in a state of readiness. In this case, I used the word transformacy. One use of this word was in Vithal’s (2003) work on mathematical education: “Transformacy refers to the potential crucial descriptions carry for transforming theory and practice through critique” (p.114). I will be using this word to represent a phase in which individuals are ready and open to change—a readiness and potential to transform and change perspectives and meaning schemes. Ecological literacy, sustainability literacy, systems learning, systems thinking, and systems integration have also been relevant to learning in this study. The overall transformative sustainability learning (TSL) phases connected to this study include:

- Transformacy
- Ecological & Sustainability Literacy
- Systems Learning & Thinking
- Systems Integration
Transformacy is the phase in which individuals are ready and open to change. Students are open to discovery and to questioning current meaning schemes and perspectives. Individuals likely already have a sense of change agency in this phase. Establishing a learning sanctuary will help promote additional TSL experiences during and after this phase. In the Ecological & Sustainability Literacy phase, basic principles of ecological and sustainability literacy, including ecological thought and a foundation of systems thinking, are explored in the content of the program. Scaffolded experiential learning helps promote a stable learning environment as students take in and assimilate new information. In the Systems Learning & Thinking phase, learners use systems thinking to evaluate themselves in relation to other systems and in evaluating systems. Perspective learning, including analyzing perspectives and perspective shifts, occurs during this phase. In the Systems Integration (includes reintegration) phase, students continually use newly acquired learning to figure out how they relate to selves and systems through integrated connections. Change agency may look differently in this phase based on new information.

All of these phases do not necessarily go in a linear structure as feedback loops are continually happening throughout the evolution of learning and development within a network of a living system. An example of simplified feedback loops in this transformative sustainability learning (TSL) process can be found in Figure 45. I refer to a TSL feedback loop as a reinforcing learning loop. The autopoietic dynamic equilibrium feedback loop is concerned with the health and well-being of the learner and their life-balance as a living system.
The learner, as a living system, is within a network of external and internal connections and is nested within other systems (Capra & Luisi, 2014). A network of external and internal connections exist within the boundaries set by the learner. In this case, they are within a transformative sustainability learning (TSL) program. Their connections are between themselves, their cohort, their professors, and the learning support staff. These connections impact the learner in and outside of the program. Indirect connections in the larger higher education institution (HEI) can impact the learner as well, such as if the learner is in a TSL program that is nested within a traditional HEI system. Some of this traditional learning, such as dissertation structure, creates a lack of consistency and is a layer of complexity for the learner to bridge traditional learning and TSL for themselves to continue with their growth and development in the program. This indicates that communication and interpersonal skills are important considerations in transformative sustainability learning and autopoietic processes in order to bridge diverse perspectives for learners.
The learner constantly takes in information from their surroundings. This information is taken in through the body or the somatic dimension of the learner and is continually entangled with cognitive and affective dimensions leading to overall embodied learning. The complexity of interactions between affect-cognitive-somatic also reflects living systems. Immordino-Yang and Damasio’s (2011) work supports the concept that emotions are needed as rudders to guide actions (p. 115). Emotions and affect are critical in interpreting information—from input of information to entangled embodied learning—to behaviors and actions. This resulting behavior, driven by emotions and affect, are the outputs from the learner as a living system.

In this study, emotions and feelings connected to affect and behavior has been thought of as an outcome of affect as part of embodied learning experiences. We respond to others in the environment as part of these behaviors and make decisions accordingly. Action has been considered a behavior resulting from our learning and ways of being in the world. I have also viewed emotions as motivators of behavior. Although some scholars believe that motivational versus constructivism connected to emotions are two opposite views on emotions, I draw from both, along with other perspectives, to deepen my understanding on the role of affect and feedback loops within living systems. Throughout this study, I have looked at behaviors that occurred during narratives and learning experiences but not after these experiences. An example would be eating food as a result of feeling hungry or in making other connections to re-establish that sense of belonging and overall well-being.

Feedback loops are a critical part of the learning and the living system as the learner. Figure 46 gives a simplified overview of the learner as a living system and the role of affective learning—a Dynamic Affective Learner System.
Figure 46. Dynamic Affective Learner System

INPUTS
(External Connections)

Belonging

Lack of Belonging

Transformacy:
Feeling Learning Readiness

Trigger:
Feeling Disconnected

Somatic
(Internal Connections)

EMBODIED LEARNING

Cognitive
Affective

Energy

Energy

Learning Growth & Development

Self-Organization

Positive Affect

TSL Feedback Loop

Autopoietic Feedback Loop

Negative to Positive Affect

Identity & Meaning-Schemes

OUTPUTS
Behavior & Decision-Making

Autopoietic Feedback Loop
Positive inputs and connections include learning sanctuaries and transformacy. A learning sanctuary, created by the cohort and an educator, along with transformacy (learning readiness) leads to positive affect. Positive affect may also include neutral or flow (reflective, focused) affect. This stimulates ongoing learning as energy from the learner goes into a transformative sustainability learning (TSL) feedback loop. When a learner experiences a lack of belonging or connectedness, triggers create a feeling of disconnect. In living systems, triggers can be considered as a general term and not value-laden. Yet, in this system (Figure 46), they could also be referred to more specifically as stressors. Stressors are triggers that cause stress or a disconnect in a system. As the result of negative affect, learners self-organize in their autopoietic feedback loop. These feedback loops are a constant part of embodied learning and help form personal identity and meaning schemes to guide behavioral outputs and action throughout the learning process. If it involves taking an action to change circumstances for the better, this is often referred to as change agency. Evidence of change agency was considered during narratives and learning experiences in this study but not afterwards.

**Significance**

*Photovoice Research*

Participants were part of a photovoice research study. This study promoted a learning sanctuary for students and gave them ownership in the study. Students were asked to take photos and reflect on their learning. Through the act of taking photographs, student participants focused in on something that symbolized their experience—a metaphor of their learning. Lawrence and Cranton (2009) also used photography as a metaphor for understanding different perspectives—a snapshot in time which connects, reflects, and constitutes their meaning-making schemata and perspectives. Röttger-Rössler and Scheidecker (2019) stated that,
The agency of photographs is rooted in their polysemic quality: They store much more information than just the sight the photographer had in mind, and therefore continuously enable new (in)sights. In other words, photos always embody subjective ways of seeing, but as mechanical processes they also ‘memorize’ aspects that were not in the photographer’s focus of attention. Thus, taking photos and looking at them constitute different acts of meaning-making that might become highly diverse (pp. 81-82).

Multiple meanings, its polysemic quality, helped students construct their own meaning through symbolism. Often nature was used as a symbol to relate to connectedness and self (Appendix E: Fenn, Dog Vomit Slime Mold). In analyzing data, I understood how students used symbolism as a way to express and construct meaning of their experiences. I was also able to see how integral affect, such as emotions, feelings, and behaviors, are in learning. This participatory action research along with photovoice methods can be applied to research to help reflect experiential education which includes learners in the process while providing room to empower them through participation (Chambers, 1994; Wang & Burris, 1997). Arts-based learning promotes other ways of seeing, learning, and knowing and promotes perspective shifts in how we look at our surroundings. Connecting through our camera lens and reflecting on our learning is learning as sustainability.

**Transformative Sustainability Learning**

The student participants, in Cohort I, II, or III, in this study were in a transformative sustainability learning (TSL) system and the parts of this system influenced each other through structural coupling within and between nested systems in a network. The learner is a living system. TSL is holistic, experiential, and focused on the learner and how the learner makes meaning of intra- and interactions with matter and surroundings. Missing parts of the process or
disconnections may have a great impact on the whole TSL system. As a result, students self-organize when their learning becomes too stressful and they lack connections or belonging. When a student feels a sense of belonging through connections in a learning system, the more ‘stable’ they feel in their life system. This reinforces the learning process. Students who display positive or neutral/flow affect have positive or focused behaviors in their learning whereas those that display negative affect work to self-organize to continue learning. This implies that affect drives behavior in an autopoietic learning system.

Learning relates to dissipative structures in living systems (Capra & Luisi, 2014). In this case, learning happens away from equilibrium. Learners consistently work to self-organize as new information is integrated into their embodied way of knowing and being in the world. Feedback in the system influences the learning (relationships between ways of learning) and the operation of a system. A learning system with many feedback mechanisms supports the stability of this system, however, too many connections in learning also increases complexity and potentially leads to more challenges in understanding the learning process (Capra & Luisi, 2014). There is a dynamic balance between feedback loops that helps the learner feel stable in their embodied life system to continue learning.

When learning is experientially scaffolded, learning can continue while learners feel supported and connected. Feeling and emotions drive behavior. When learning becomes especially challenging, as shown by those in the dissertation phase of the program, students continue to learn but spend more energy maintaining this learning. When stress and a feeling of disconnect continues to increase, eventually a change in direction of learning will take place. A disorienting dilemma is an example of this high degree of instability. Capra (2002) wrote:
When the flow of energy increases, the system may encounter a point of instability, known as a “bifurcation point,” at which it can branch off into an entirely new state where new structures and new forms of order may emerge...It is technically known as self-organization and is often referred to simply as “emergence” (pp. 13-14).

Mezirow’s transformative learning phases (1991) are the result of this self-organization and the transformed emergence of a new form. This study shows that a disorienting dilemma does not need to occur for transformative learning to happen. Perspective learning in this study is scaffolded and learners make smaller adjustments to their way of being in the world as learning moves forward in an ongoing, reinforcing feedback loop.

A learner is a living system and reflects systems thinking (AAAS, 1993; Capra & Luisi, 2014) and living systems theory (Miller, 1978). For learners, their embodied learning consists of parts that influence each other within a system. In this study, I referred to affective-somatic-cognitive dimensions and these dimensions and other parts make up the whole learner. Through structural coupling, these parts (structures) and processes that occur between them influence each other. One missing part, such as the role of affect in learning, may be detrimental to the overall learner system. Affect is a critical part of learning and being in the world. It drives our behavior and through feedback loops we can observe these behavioral responses of learners. Two examples of feedback loops for learner systems include the reinforcing learning feedback loop and the autopoietic (self-organizing) feedback loop. They both show how feedback loops in systems can determine the overall well-being and behavior of the learner. Complexity within the learner as a living system and triggers, or more specifically stressors, may cause delays in feedback loops and inhibit learning. Therefore, as we look to the learner and their learning
experiences, we can further understand the value of belonging and that connections can lead to greater stability in the ongoing learning process.

**Recommendations**

**Learning within Educational Programs**

An overall autopoietic learning system includes reflection, connection, and space-time to structurally couple with matter to allow for self-organization. This promotes the overall development of the learner. Autopoietic systems consist of learning loops that are reinforcing and triggers may promote or inhibit learning. Stressors are triggers that cause disconnect in a system. Energy travels in and out of a learner system that has boundaries which include connections within their network, nested within a larger system. By applying living systems theory and systems thinking to learning, we can begin to understand the importance of feedback loops and connections for learners. The implications for learners and learning includes looking at these feedback loops in the learning system and how a person relates to their environment structurally (Capra & Luisi 2014, p. 135). Learners take in information from their environment, integrate (connect and reflect on) it, and grow in their learning development if they are on a reinforcing learning loop. “Self-balancing (negative) feedback loops maintain the system in a stable but continually fluctuating state, whereas self-amplifying (positive) feedback loops may lead to new emergent structures” (Capra & Luisi, 2014, p. 159). New emergent structures is where learning happens. This can happen in a myriad of ways, including suddenly or gradually and intentionally scaffolded.

Transformative learning and other ways of learning and knowing are important and help students understand transformative learning and potential complications with disorienting dilemmas and systems integration and reintegration. Scaffolded learning and integrating new
concepts into prior meaning schemes helps students feel comfort in assimilating new information. Students can and do have scaffolded perspective shifts, and they integrate and reintegrate into systems based on newly acquired information. Application of principles and sharing stories helps students dialogue about how they are applying their learning and integrating within other systems, such as natural and social systems. This authentic application of work should be a part of a program rooted in sustainability. Connections within and during the program are integral to the overall health and well-being of the learner. For affect, learners want to feel a sense of belonging and connectedness to continue learning. Feeling negative affect inhibits learning and other connections are lost as students persist with program learning. This needs ongoing attention in teaching-learning practices. These connections essentially provide support for the learner system and promote growth and development.

Connections in a learning community or cohort help build relationships and connections to others with commonalities—key in cultivating a sense of belonging. Ongoing cohort connections should continue throughout any learning program, including during the dissertation phase. In addition, committee members could become a learning community themselves to feel comfortable in how they work together, with diverse perspectives, and to model this relationship building in the program. Students should have more voice and choice in the dissertation process as well as in their learning to reflect strong sustainability. Once a learning sanctuary and relationships are established, they should be developed throughout the entire learning program process. The dissertation research and writing phase is integral to the learning process. More emphasis on connections for the learner should be in this phase to build upon prior relationships and connections in the program and to reflect experiential education. All courses should reflect experiential education in which students have time to make connections, reflect on their learning,
and critically dialogue with others. Online and face-to-face residencies include opportunities for students to have time for reflections and/or dialogue with their peers, professors, and on their own. Diverse opportunities provide different ways of knowing and being to help with perspective learning. This includes visuals in learning or other arts-based methods that are participatory within a transformative sustainability learning (TSL) program to promote ongoing and meaningful learning experiences.

**Content & Perspectives in Learning**

In developing content in a TSL program, the design of the program should experientially build ecological and sustainability literacy for students. Learners should have required foundational courses focused on connections to natural systems and selves that include self-reflective experiences, systems thinking, and diverse perspectives. Perspective learning, analyzing perspectives and shifting perspectives, should be scaffolded throughout learning. This can be accomplished through experiential education by connecting and reflecting on learning experiences in diverse ways. Content and learning opportunities need to provide diverse perspectives, such as social justice and equity courses, arts-based learning, and reflective journaling (examples: ecological journaling, Edublog, interactive online learning platforms, posts, and video reflections).

Including courses that focus on learning theories should happen within the first year of the program so students feel a part of their learning process versus ‘trusting the process’. Trusting the process indicates that the learner is not a part of the process. Having students involved in their learning and being aware of potential transformations through scaffolded perspective learning will help prepare them for perspective and meaning scheme shifts that could occur during the program. In addition, ways to communicate to others is important and can be a
part of critical discourse in the program. Communication and language are important components of TSL and help bridge understanding between diverse perspectives, including traditional and transformational ones. This is especially important when transitioning into a new TSL frame of mind and program as the higher education institution may likely adhere to more traditional, transmissive structures. How people see the world and be in the world is important within the nested systems that connect the TSL program network in order to support sustainable programs and people. The overall network of a program system should be properly connected to exemplify behaviors that are consistent with TSL. A community of learners, including administration, professors, and students, could help inform program practices and implementation. By including diverse perspectives and a bottom-up and top-down approach (a more integrated approach), a TSL program will reflect strong sustainability.

**Further Research**

*TSL Programs, Learning, & the Learner*

More research on higher education sustainability programs, including the program of this study, is needed to promote interactive reflection, critical dialogue, and learning as sustainability. This study focused on an Educational Sustainability program that was designed with the intention of strong sustainability and transformation. Therefore, I referred to this program throughout this study as a transformative sustainability education or learning (TSL) program. More research is needed on the program itself to find out if this is a true TSL program. The TSL phases mentioned in this study need further exploration as well as how these phases potentially contribute to a strong sustainability.

Although perspective shifts were reported and some evidence pointed to transformative learning, more research is needed to decipher if a change in a learner’s frame of reference or
meaning scheme occurred as a result of scaffolded perspective learning. More exploration into scaffolded perspective learning and phases of TSL, or more specifically transformative learning (TL), will help learners gradually integrate new learning and meaning-making to reduce negative affect in their learning experiences. How to create these scaffolded experiences and how it impacts learning and behaviors outside of the program, including changes of behavior as result of TL experiences, would contribute to our understanding of the overall learning process and of the overall health and well-being of learners.

Communication and language is also integral to TSL programs and should be considered especially relative to transformational perspective analysis and shifts. More of an understanding on language and symbolism would help promote more effective communication between individuals and build stronger relationships and TSL practices in and outside of programs. The bridges between traditional and transformative learning perspectives will help with transitions for learners and program networks that hope to exhibit strong sustainability.

Themes, sub-themes, and categories were coded in this study. Categories for the Belonging theme included: ecological thought, learning sanctuary, perspective learning, and change agency. For the Lack of Belonging theme, however, categories were more focused on what caused a disconnect in a system. These categories included: doctorate, personal, professional, and natural systems. Further research is needed on what happens in an autopoietic dynamic equilibrium feedback loop for learner living systems. What connections help students self-organize in autopoiesis? How do these connections relate to the categories in the Belonging theme (i.e., ecological thought and others)? What sub-categories would be included in the Lack of Belonging theme? Further exploration into disconnections and re-establishing connections would provide more support for students during self-organization. In addition, more research on
learning sanctuaries and belonging, including student supports in a doctorate program, is needed to also help students self-organize in their learning.

Learning in this study focused in on affect and attempted to focus out on the overall learner system. Triggers or stressors resulted in learner behavior and self-organization. Studying these triggers would gain more insight into how to help learners self-organize and could potentially help with resiliency and adapting to changes in learning and life. Triggers, potential entry points, caused change in the learner as a living system. Affect was the result or response based on objects or situations in this study, especially emotions as a part of embodiment. For instance, student participants felt an emotional response to unbalanced systems, such as the disappearance of a glacier. In the dissertation phase, this may have involved ongoing triggers that contributed to feelings of stress. Focusing in on this phase and other events connected to triggers would potentially support students in adapting and self-organizing in their learning experiences.

Relative to the overall learning process, more of an understanding on the role of affect in learning as well as embodied learning, including spirituality, is needed to provide more of a grounding in this work. Building on this and other work connected to living systems, learning, and the learner will help provide the foundation and insight into transforming education into learning as sustainability.

**Online Learning**

Online learning was not an emphasis in this study but was integral to experiential and transformative sustainability learning and needs further exploration. Overall, online teaching has been rapidly on the rise, and it has changed how education is structured for learners. Online learning practices have also incorporated diverse technology and pedagogies (Aparicio et al., 2016). Yet, there is still a gap in knowledge and in understanding how effective online learning
can be for learners and new technology cannot drive transformation alone (Colet, 2017, p. 77).
Also, individuals who have been raised with face-to-face classroom teaching are often skeptical
of online teaching and changing this mindset can be challenging to overcome (Simon, 2012).
Throughout my own lived experiences, online learning can be a useful tool to apply
transformative sustainability and experiential learning concepts to promote autonomy and
student-centered learning.

I am able to provide only a glimpse into methods of interactive online technology geared
towards learning. A technological platform in this EDSU program included Microsoft Teams
(transitioned to Canvas this last year for courses) which included FlipGrid, Chat, and interactive
dialogic narrative assignments. Mapping software was an important component of systems
thinking and learning in the program and included: Lucid Chart and Plectica. Tiki Toki software
was used to create a timeline of environmental and sustainability initiatives and milestones
which provided foundational and historical knowledge for students.

Especially important to online learning for me included: interactive ways to connect-
reflect-dialogue learning, holistic grading, and authentic projects (i.e., publishing an article and
assignments that applied to work-life for students). In a past journaling experience early on in the
EDSU program, I wrote:

One of the goals of this course is to adapt to a particular workflow. At first
overwhelming, I have come to appreciate the workflow overall. I love the Office Teams
and dialogic journaling. I appreciate synchronous seminars. I do sometimes feel that
I spend too much time on technology and trying to figure things out but this
semester is about diving into such things...if it helps in communication and supports
our learning, then I support it.
The type of software used and the way it is used can provide rich learning experiences for students. This EDSU program, reflective of transformative sustainability education and learning, has been able to utilize online learning in a meaningful way.

Reflection, along with writings and discussions, promote meaningful learning experiences. Discussion can also include critical discourse on diverse perspectives and worldviews. These attributes of reflection, especially self-reflection, and critical discourse are considered components of transformative learning (Mezirow, 1990). Studies have shown some progression on how online experiences can support transformative learning. Provident et al. (2015) wrote that “critical reflection, discourse, trusting relationships, and support are the main components in fostering student progression towards transformative learning” (p. 130). From my own experience, online learning can foster transformative experiences but more research is needed to further support this, along with understanding aspects of transformative sustainability learning, in online environments.

**Arts-based Learning & Research**

Arts-based learning is rich with reward in supporting other ways of learning and knowing and should be further explored to promote imagination, creativity, and perspective learning. Arts-based learning is defined as “particularly appropriate in understanding the affective, intuitive, relational, and often irrational ways of knowing beyond the limited cognitive perspective” (Merriam & Kim, 2011, p. 366). Arts-based learning promotes creativity and helps one see things differently. Lawrence (2005) argued that art is a way of bringing knowledge to the surface. It is an effective way in bringing our cognitive processes to light to reflect on our learning. Art and creative ways of expression show how affect drives this meaning-making process while supporting holistic learning and imaginative ways of being in the world.
Therefore, it is reflective of transformative sustainability education and perspective learning.

Arts-based research, including participatory action research and photovoice methods, should be studied further to learn how to be holistic and sustainable in our educational programs and systems. The history of visual art and research has been heavily focused on behaviors and how visual art has significantly improved health (Stuckey & Nobel, 2010). Arts-based research has grown over the years. Yet, there is still debate on the validity of the data. Sinner et al. (2006) wrote as follows:

In the 1970s, educational researchers began using the practices of artists and art critics to conduct educational research … With the introduction of aesthetics, arts-based forms of educational inquiry were formulated, and by the 1990s had grown to include narrative writing, autobiography, dance and movement, readers theatre, multi-media, hypertext, visual arts, photography, music, poetry, and creative non-fiction among others. Arts-based research incorporates the processes, forms or structures, and approaches of creative practices in academic scholarship (p. 1226).

These diverse methods have already added to a growing field of qualitative research and have helped to increase the dynamic balance of quantitative, traditional research to include more creative ways of learning and understanding. Studies that focus on arts-based research and learning, including photovoice and other methods, will support holistic practices in teaching-learning systems.

Summary

The purpose of this study was to understand adult learning experiences for doctoral students in a transformative sustainability education program, especially as it related to affect. In the findings, students experienced ongoing learning with positive affect and a sense of
belonging. When there was a trigger that impacted their learning as a result of a lack of belonging/connectedness, learners experienced negative affect. They then self-organized to re-establish connections while experiencing positive affect. This indicates that network connections, systems, including feedback loops, and dynamic balance are key in establishing a sense of belonging to support continued learning in a transformative sustainability learning program.

These concepts support system thinking and living systems theory.

Viewing life from a systems perspective requires one to look at an organism in its entirety. A learner system, including a transformative sustainability learning system, is self-organizing or autopoietic and responds to its environment. As we view autopoiesis related to learning systems, we look to symbolism, ideas, and communication. This abstractness versus the physical space of living organisms leads to different complexities within systems. Yet, this complexity leads to transformation and in living more sustainably. As such, we need diverse experiential methods of learning and communicating with one another and of understanding all living systems. This study lends itself to this purpose in understanding learning and learners as living systems, including the role of affect and a sense of belonging in this system.

Through a sense of belonging and connectedness, learners have accepted the challenge to learn and think differently with the hope of building more sustainable systems. Motivated to be sustainable, students who feel empowered transform systems of learning and being in the world—they defy gravity. This embodies transformative sustainability learning while supporting sustainable learners and systems. Through affect as drivers of behavior in a learner system, we can deepen our understanding of what this means—to support sustainable learners who will transform how we view education. This will result in the educational paradigm shift needed to live more sustainably with selves, others, and planet.
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## Appendix A. Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Affective Domain</td>
<td>The values, attitudes, and behaviors associated with learning; includes affect, emotions, feelings, and moods (Bloom et al., 1956; Birbeck &amp; Andre, 2009; Bolin et al., 2005; Holt &amp; Hannon, 2006). In this study, I referred to this as the <em>affective dimension</em>.</td>
</tr>
<tr>
<td>Behavior (also behaviour)</td>
<td>Naylor et al. (1980) stated that, “Behavior is defined here as an ‘ongoing act’ or process. It is the ‘doing’ of something by an individual...the basic unit of behavior in the theory is called the <em>act</em>” (p. 5 ).</td>
</tr>
<tr>
<td>Cognitive Domain</td>
<td>This “domain” or learning group involves intellectual skills and knowledge (Bloom et al., 1956). In this study, I referred to this as the <em>cognitive dimension</em>.</td>
</tr>
<tr>
<td>Core Affect</td>
<td>A “neurophysiological state consciously accessible as a simple primitive non-reflective feeling most evident in mood and emotion but always available to consciousness” (Russell &amp; Feldman Barrett, 2009, as cited in Ekkekakis, 2012, p. 322). Examples include pleasure and displeasure, tension and relaxation, energy and tiredness.</td>
</tr>
<tr>
<td>Ecological thought</td>
<td>Laferrière and Stoett (1999) state that ecology is literally the “study of the house,” and so ecological thought includes house or natural habitat (p. 24). A principle of the transformative sustainability education doctorate program in this study.</td>
</tr>
<tr>
<td>Emotion</td>
<td>Short-lived; Russell and Feldman Barrett (1999) defined a “prototypical emotional episode” (what is commonly called an occurrence of an emotion) as a “complex set of interrelated sub-events concerned with a specific object” (p. 806).</td>
</tr>
<tr>
<td>Ethical Action</td>
<td>Action that is ethical; ethically action. “Seeing things ethically is a way of transcending our subjective concerns and to identify with as an impartial point of view as possible” (Cunha et al., 2016, p. 334). Furthermore, “Ethical values constitute the foundation of group identity” (Cunha et al., 2016, p. 331). A principle of the transformative sustainability education doctorate program in this study.</td>
</tr>
<tr>
<td>Holistic Learning</td>
<td>Holistic education has been defined as “a multi-leveled experiential journey of discovery, expression and mastery in which students and teachers learn and grow together” (Jaison, 2017, p. 5).</td>
</tr>
<tr>
<td>Mood</td>
<td>Lasts longer than emotion; not necessarily about specific person-place-thing (Ekkekakis, 2012, p. 322).</td>
</tr>
<tr>
<td>Participatory Action Theory</td>
<td>A methodology that combines theory and social justice participatory inquiry to have participants take on the role as researchers to solve authentic problems (McIntyre, 2008).</td>
</tr>
<tr>
<td>Photovoice</td>
<td>Developed by Wang and Burris (1997) as VOICE, standing for “Voicing Our Individual and Collective Experience” (p. 381) and is “a process by which people can identify, represent, and enhance their community through a specific photographic technique” (p. 369).</td>
</tr>
<tr>
<td>Topic</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Pluralism &amp; Democracy</strong></td>
<td>“Pluralism assumes that diversity is beneficial to society and that autonomy should be enjoyed by disparate functional or cultural groups within a society” (Encyclopaedia Britannica, 2008, para. 1). Pluralistic democracy involves shared power in a political system. A principle of the transformative sustainability education doctorate program in this study.</td>
</tr>
<tr>
<td><strong>Social Justice &amp; Diversity</strong></td>
<td>Social justice examines inequities in our social systems and behaviors that “constrain possibilities for alternative, growth-enhancing, and satisfying interactions in peoples’ lives” (Killian, 2001, p. 28). Diversity is defined as “the state of being diverse; variety...a range of different things” (McKean, 2005, p. 494). A principle of the transformative sustainability education doctorate program in this study.</td>
</tr>
<tr>
<td><strong>Somatic Domain</strong></td>
<td>Includes psychomotor learning or meaningful hands-on experiences or ‘learning by doing’ (Dewey, 1938) or physical movement, motor skills and, development (Bloom et al., 1956) as well as other bodily or biological processes (senses and nervous system; endocrine system). Referred to as the <em>somatic dimension</em> in this study.</td>
</tr>
<tr>
<td><strong>Sustainability Development &amp; Sustainability</strong></td>
<td>Sustainable development can be defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987). Therefore, sustainability in this study will be referred to as meeting the needs of the present without compromising the future.</td>
</tr>
<tr>
<td><strong>Sustainability Education</strong></td>
<td>Sustainability education is nonlinear and includes systems thinking and living systems theory. In “understanding human organizations in terms of living systems, i.e. in terms of complex nonlinear networks, is likely to lead to new insights into the nature of complexity, and thus help us deal with the complexities of today’s business environment” (Capra, 2002, p. 100).</td>
</tr>
<tr>
<td><strong>Systems Thinking</strong></td>
<td>Viewing life from a systems perspective requires one to look at an organism in its entirety, including all of its parts, how those parts work together, and how the organism responds to its environment (Capra &amp; Luisi, 2014). A principle of the transformative sustainability education doctorate program in this study.</td>
</tr>
<tr>
<td><strong>Transformative Learning &amp; Education</strong></td>
<td>Transformative Learning (TL) is a profound shift in how one views the world and alters how one is in the world and involves changes in views related to connectedness of self, community, and natural systems (O’Sullivan, 2002). A principle of the transformative sustainability education doctorate program in this study.</td>
</tr>
<tr>
<td><strong>Transformative Sustainability</strong></td>
<td>Learning <em>as</em> sustainability is considered a strong sustainability and the transformative learning (TL) process is key in this learning experience (Sterling, 2011; O’Neil, 2018). This learning supports transformative sustainability education.</td>
</tr>
</tbody>
</table>
Appendix B. Invitations & Consents

Dear UWSP Doctoral Students,

As a Cohort I doctoral student in the UW-Stevens Point (UWSP) Ed.D. in Educational Sustainability (EDSU) program, I am focusing my research on the learner and the learning that happens in the program. Student participants in Cohorts I, II, and III are invited to self-select to voluntarily participate in this study.

As a participant in this study, you will be asked to supply approximately 3-10 photos that have meaning for you connected to your learning process in the UWSP EDSU program. I will ask that you provide a narrative of 4 to 5 sentences and a title connected to the photos.

My research involves photovoice experiences, and I will be holding an informational session on my research for Cohort I, II, and III at the June 2019 residency. You will be asked to focus on meaningful learning experiences and take photos connected to these experiences to share out during online sessions with other participants. Experiences in this study will be approximately a total of 4-6 hours with given time outside of those experiences to take photos and to write narratives.

I would ask that you use your phone to take photos and/or bring a camera. You will get a consent form for participating in this research. If you feel uncomfortable sharing photos and/or explanations of your learning, you may let me know at any time and either pull out of the study or provide me with a one-on-one sharing of your photo(s) and written narratives.

I will be keeping all research secure and names will be changed in my dissertation and in any publications or presentations. I will be checking in with you during the study to collaboratively analyze and share findings. Please request any additional information before dissertation completion. You may choose to remove any portions of your involved data, such as written work, photos, or verbal discussion components.

Please let me know if are interested in participating in this study and if you have any questions or concerns to help you in this process. Thank you for your time and consideration.

Sincerely,
Kim Wahl
UWSP Ed.D. Cohort I Student
Photovoice Participant Consent Form

Kim Wahl, a doctoral student in Cohort I in the UW-Stevens Point (UWSP) Ed.D. in Educational Sustainability (EDSU) program, is conducting a photovoice research study on the learner and their learning in the UWSP EDSU program. The principal investigator is Dr. Henry St. Maurice, UWSP School of Education Faculty Emeritus. Participants in this study include UWSP EDSU students in each cohort (Cohort I, II, and III). You have been invited to participate in this study, because you are currently in the program. By signing this form, you agree to be a participant in this research study. Participation in this study is completely voluntary.

The purpose of this study is to gain insight on student learning connected to the UWSP EDSU program. This study will involve contributing photos and written narratives along with 2 online sessions. At the summer June 2019 residency at Conserve School, you will have an introductory session on photovoice experiences and the study (each cohort will have a separate session from one another). Please bring a device, phone, or camera, to take photos while you are at the residency and a computer to be able to send Kim Wahl any photos or written work that connect to meaningful learning for you. If you are unable to bring a device to take photos, please let Kim Wahl know prior to the summer residency.

You will be given time to take photos (and include written narratives) during and after the residency. Your time at the residency, along with online sessions in this study, includes a total of approximately 4-6 hours. You will be given additional time to take photos and write narratives.

As a participant observer, Kim Wahl will be taking notes and making observations connected to this research during the residency and during online sessions. The consent forms and any research study materials will be kept in a locked safe and/or on a computer with special encrypted access. Kim Wahl may audio record or videotape events, and these will be listened to only by her. There will also be a pseudonym for you in the dissertation (and in any publications and/or presentations) connected to this research.

You will be given the opportunity to review your information and remove any material you do not wish to have used for this research prior to dissertation completion. The results of this research will be published in the dissertation and other potential documents or interviews, presentations, etc., to further the field in education.

Participating in this study will have little to no discomfort or risk for you, although we will be discussing transformative learning (TL) experiences. TL may involve a disorienting dilemma, and this may be uncomfortable to talk about connected to you and/or learner experiences in the doctoral program. You will be given information that will be written in the dissertation for approval prior to dissertation completion and/or you may request to discuss any learning experiences with the student researcher instead of in a group setting.
This study supports personal reflection and growth based on your learning as well as building a sense of community with your peers. This study will help gain more knowledge on the learner and how best to support the learner in a transformative sustainability education program. This will be a model for other programs and in moving transformative sustainability education forward in helping others lead healthy lives with selves, society, and planet.

There is no financial reward for participating in this study. Your participation is voluntary. Although the risks to you are perceived to be none or minimal, you may choose to withdraw from the study at any time without negative consequences. Any information connected to you will be destroyed.

This research project has been approved by the UWSP Institutional Review Board for the Protection of Human Subjects. The UWSP Institutional Review Board (IRB) will be given access to all signed consent forms. If you have any complaints about your treatment as a participant in this study or believe that you have been harmed in some way by your participation, please call or write:

[UWSP IRB Name & Contact Information]

The IRB contact person may request your name but any complaints will be kept in confidence.

If you should have any questions before or during this study, please contact Dr. St. Maurice at [contact information] or Kim Wahl at [contact information].

I have read and understand the above and agree to participate in this study.

____________________________       _________________________________       _______________
Print Name                          Signature                          Date
Photograph Consent Form

Kim Wahl, a doctoral student in Cohort I in the UW-Stevens Point (UWSP) Ed.D. in Educational Sustainability (EDSU) program, is conducting a photovoice research study on the learner and their learning in the program. The principal investigator is Dr. Henry St. Maurice, UWSP School of Education Faculty Emeritus. By signing this form, you agree to allow a photograph of you or your personal property to be a part of this research. This is completely voluntary.

The purpose of this study is to gain insight on student learning connected to the UWSP EDSU program. The results of this research will be published in the dissertation and other potential documents, interviews, and/or presentations to further the field in education. Students will contribute photos and written narratives as part of this study. They will need to obtain this signed consent form from any person identified in their photos (including personal property that can be identified). The consent forms and any research materials will be kept in a locked safe and/or on a computer with special encrypted access.

There are little to no perceived risks to you as part of your participation in any photographs. There is no financial reward for photographs in this study.

This research project has been approved by the UWSP Institutional Review Board for the Protection of Human Subjects. The UWSP Institutional Review Board (IRB) will be given access to all signed consent forms. If you have any complaints about your treatment as a participant in this study or believe that you have been harmed in some way by including your photographs in this study, please call or write:

[UWSP IRB Name & Contact Information]

The IRB contact person may request your name but any complaints will be kept in confidence.

If you should have any questions before or during this study, please contact Dr. St. Maurice at [contact information] or Kim Wahl at [contact information].

I have read and understand the above and agree to have 1 or more photographs of myself or my personal property as part of this study.

____________________________       _________________________________       ______________________
Print Name                          Signature                          Date

Thank you for agreeing to have any photos as part of this research.
Photovoice Study Participant Photograph Release Form

Dear Photovoice Study Participant,

Thank you for your willingness to participate in the photovoice study connected to your UWSP EDSU learning experiences. Kim Wahl is conducting the photovoice research study and the principal investigator is Dr. Henry St. Maurice, UWSP School of Education Faculty Emeritus.

As part of this study, you were asked to take photographs (including titles and written narratives of the photographs). Please fill out this form and sign it to provide permission to use your photographs (photos) in the photovoice research study, including in the dissertation or other ways of sharing this research (published articles, interviews, presentations, etc.). If you have other people that can be identified in the photo (or their personal property can be identified), you will need to have them submit a separate signed consent form. If you are in any of the photos, you give permission to have the photo(s) used for this research study by selecting “All photos” on this form or by listing the title(s) below.

If you should have any questions before or during this study, please feel free to contact Dr. St. Maurice at [contact information] or Kim Wahl at [contact information].

I agree to submit the following photos for this research study (please initial):

All photos _________________

I agree to submit only the following listed photos (titles) for this research study:

☐ Title: ___________________________ Write in additional titles in this space:
☐ Title: ___________________________  
☐ Title: ___________________________  
☐ Title: ___________________________  
☐ Title: ___________________________  
☐ Title: ___________________________  
☐ Title: ___________________________  
☐ Title: ___________________________  
☐ Title: ___________________________  
☐ Title: ___________________________  
☐ Title: ___________________________  

By signing this, I agree to submit the photos above.

___________________________         __________________________________     ______________
Printed Name                            Signed Name                       Date

Thank you again for participating in this study.
## Appendix C. Emotions/Feelings Examples

### Examples of Emotion/Feelings

<table>
<thead>
<tr>
<th>Examples</th>
<th>Negative</th>
<th>Neutral, Flow, Transitional, Overlap, Balanced Emotions</th>
<th>Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotions/feeling term examples</td>
<td>anxious, angry, or depressed, panic, anxiety, grief, depressed, fear/scared/afraid, boredom, confusion</td>
<td>Neutral: does not display obvious emotion&lt;br&gt;Flow: complete immersion and focus</td>
<td>enthusiasm, happy, joy, playful, giddy, caring, empathy, peace, delight</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surprised (could be positive or negative)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transitional: from one emotion to the next or physical state impacts emotional state or vice versa</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dynamic</td>
<td></td>
</tr>
<tr>
<td>Facial &amp; other movements/actions</td>
<td>slouching, dozing/sleeping, scratching head/chin, crossed arms, yelling, crying, pulling hair</td>
<td>Neutral: cannot tell any signs&lt;br&gt;Flow: leaning towards object of focus; staring</td>
<td>gasping, laughing, crying (from joy/care), sighs</td>
</tr>
</tbody>
</table>

### Transformative Learning Connected to Emotions/Feelings

<table>
<thead>
<tr>
<th>Mezirow’s (1991) phases in transformative learning</th>
<th>Emotions/Feelings</th>
<th>Notes/Behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiencing a disorienting dilemma</td>
<td>Confusion, frustration, anxiety/anxious</td>
<td>Miscommunications</td>
</tr>
<tr>
<td>Self-examination and critical assessment of self with assumptions</td>
<td>Confusion, reflective, frustration&lt;br&gt;Lonely, sad, depressed, stress, frustration, shame, embarrassment, misunderstood, feeling not valued, disempowered</td>
<td>Self-reflection</td>
</tr>
<tr>
<td>Alienation from societal norms</td>
<td>Sense of belonging</td>
<td></td>
</tr>
<tr>
<td>Understanding commonalities with shared experiences in transformative learning; Building self-confidence in reinventing new roles</td>
<td>Empowered, confident, determination</td>
<td>Courage, confidence, self-acceptance; changed identity; determination; new perspectives</td>
</tr>
<tr>
<td>Planning and acquiring knowledge and skills in a plan of action</td>
<td>Sense of determination; courage/bravery</td>
<td>Applying new information and perspectives; increased communication; empathy</td>
</tr>
<tr>
<td>Trying out action and reintegrating into society (p. 168)</td>
<td>Sense of belonging, happy, inspired, empowered</td>
<td></td>
</tr>
</tbody>
</table>
Appendix D. Photovoice Initial Online Session Photos & Written Narratives

Note: The following are submissions from participants and include: the participant author name (pseudonym) and their cohort (I, II, or III), along with their title and written narrative.

Sonni, Cohort I
Rocky Path

This particular photo was captured by my husband during a hike at Parfrey’s Glen. While scrolling through photos after the hike, a few things stood out in this picture. The first is the path that I’m navigating through the creek reminds me much of the journey through this program. On the surface it seems simple to cross, but as you move across, rocks underneath are unsteady and slippery making the journey a bit more daunting. I, myself, continue to look ahead instead of down, focusing on the end, and trusting in my strength and agility to lead me across. The last part of this that is so defining is that moment in a glen, when the world around you falls away and you find yourself taking in the beauty and quiet that is around you.

Lou, Cohort I
Isla with Tree

I feel that I am conscious of my own perspective changes, through the photographic process, specifically in the choice of composition of the photographic frame. The subject is consciously arranged to be in balance with sky and tree as a shared space between human and environmental. There is always choice in both the decision to shoot an image, and in how and why visual elements are choreographed and to tell a story or capture a memory in a certain light and form. The environmental, social, personal meanings are thus composed in parallel with these spatial factors as a shared moment.
Lee, Cohort I

Yakitori is to grill as brain is to dissertation.

These are yakitori on the grill. This is how my brain feels while working on my dissertation while working full time and trying to be a good dad and husband. My kids miss me. My brain misses time away from the heat.

Reese, CI

Scaffolding

This picture, from our residence site at Conserve School, shows a tree that is growing with the benefit of support. Its base is surrounded and fortified. It is protected, yet visible, by a circle of wiring. This support can’t do the growing *for* the tree, but it allows it to grow at its own pace without sustaining damage during this delicate time.

Tivy, Cohort I

After the storm came life.

*(Title & Narrative)*
Sam, Cohort II
Different viewpoint

The pictures are of the pre/post forest composition assessment the teachers develop in small groups.

For the last three years, I have been an instructor for the Forestry Institute for Teachers (FIT), a professional development program that brings together natural resource specialists and K-12 educators providing them with knowledge, skills and tools to effectively teach their students about forest ecology and forest resource management practices. The Forestry Institute for Teachers integrates environmental education curriculum and Next Generation Science Standards.

On day one we ask the teachers to create a forest composition---when thinking of a forest what does it need, what does a forest look like, everything you know about a forest have it represented. Then at the end of the week in the same small group of teachers, they create a forest composition addressing the same prompts. When we bring the pre forest composition out the teachers begin a comparison dialogue; I facilitate a debrief of their thinking which assesses their learning ultimately influencing their teaching.

My thinking shifted with this year's assessment. I was influenced by Sterling's work (thinking/learning orders) and some other authors who discuss teaching about, in and through the environment. Then I developed this table as a reflection of the teacher's comments when explaining the comparison of the pre to post forest composition activity. In addition, I drafted FIT II for Project 3 (develop a program) in EDSU 907. And reviewed FIT for Project 2 (program review) in EDSU 907.

<table>
<thead>
<tr>
<th>Pre-FIT</th>
<th>FIT</th>
<th>FIT II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education about sustainability</td>
<td>Education for sustainability</td>
<td>Education as sustainability</td>
</tr>
<tr>
<td>About the environment</td>
<td>For the environment</td>
<td>As the environment</td>
</tr>
<tr>
<td>First order thinking</td>
<td>Second order thinking</td>
<td>Third order thinking</td>
</tr>
<tr>
<td>Change within changelessness</td>
<td>Learning for change</td>
<td>Learning as change</td>
</tr>
<tr>
<td>Transmissive learning</td>
<td>Reformative learning</td>
<td>Transformative learning</td>
</tr>
<tr>
<td>Doing things better</td>
<td>Doing better things</td>
<td>Seeing different things</td>
</tr>
</tbody>
</table>
Marin, Cohort II

Nature is not for the myopic or the impatient.
I was out for a walk partly because I wanted to and partly to complete one of the ecological journal requirements. I crossed over a wooden bridge and looked down into the water. At first, I didn’t see the movement in the water but after watching a while I saw turtles skittering along the bottom and some poking their heads up out of the water. “Nature is like one of those line drawings of a tree that are puzzles for children: Can you find hidden in the leaves a duck, a house, a boy, a bucket, a zebra, and a boot?” (Dillard, pg. 19).


Kylie, Cohort III

Discovering

Last summer I took my nephews to visit Kaw Point Park, in Kansas City, Kansas. At the confluence of the Kansas and Missouri Rivers, it’s a special place to me because I helped develop it. As we walked along the trail and took in the view of the confluence, the boys were in awe. They had never been so close to the water before. As we talked about the movement of the water and the history of the park, a former Lewis and Clark Expedition campsite, I was reminded of why I am a teaching ecologist, instead of a field ecologist, and why I continue to learn: it’s to provide spaces for kids like these to discover and play, in a world that isn’t totally full of asphalt and concrete.
**Fenn, Cohort III**  
**Dog Vomit Slime Mold**
I’ve always had a fascination with nature, especially the weird and gross parts. In high school, we did a large project where we had to collect samples of plants, fungi, molds, animals, and anything in between. I lost that in college and graduate school as I became focused on my studies, in doors, and at a computer. Joining the EdD program has renewed my love of the physical nature. I spend more time outdoors, walking or even just sitting, and noticing what is around me. The attached photo is a perfect example. It’s of a slime mold called “fuligo septica” and resembles dog vomit, hence the nickname. I have stopped to investigate this slime mold and other weird and random fungi and molds. I have also taken notice of the trees around my home and unique plants, finding wild onions nearby! By learning about the climate crisis and working with other nature lovers, I have learned to take a step back and appreciate what is near me. I am also motivated to actually learn more, turning to the internet and books on local fauna and foliage!

**Deena, Cohort III**  
**Talking to Ferns**
This picture stood out to me as it looks like I am having a discussion with the fern. Each day I would pass the ferns and marvel at how the light hit the green petals. That we share our space with these sporophytes that have been on the planet for millions of years is inspiring. They are so peaceful.
Charlie, Cohort III
Underwater Grace

Until 10 years ago the ocean was a large, almost unfathomable, entity for me, whether I was flying over it in an airplane or on a boat. That all changed for me and I felt an almost spiritual awe for the beauty on display in every coral reef and with the almost unimaginable biodiversity on display, such as this curious sea turtle who slowed down to look at me. Learning isn’t just about the books you read, but the lived experiences that shape and define your place on this planet.
Appendix E. Submission Samples

Note: The following are submission samples from participants and include: the participant author name (pseudonym) and their cohort (I, II, or III), along with their title and written narrative.

Lou, Cohort I
Isla with Tree
I feel that I am conscious of my own perspective changes, through the photographic process, specifically in the choice of composition of the photographic frame. The subject is consciously arranged to be in balance with sky and tree as a shared space between human and environmental. There is always choice in both the decision to shoot an image, and in how and why visual elements are choreographed and to tell a story or capture a memory in a certain light and form. The environmental, social, personal meanings are thus composed in parallel with these spatial factors as a shared moment.

Reese, Cohort I
Creating Space for our Real Selves in our Organizations
At each residence, I’m amazed at how our program director creates this incredible space for us to be our true selves. So many workplaces do the opposite, and I’d like to understand why this happens and how to change it.
Kylie, Cohort III
The Bottoms
This photo is of a place…where I started my love for the environment. It is Cheyenne Bottoms Wildlife Refuge, in the middle of Kansas. It’s an internationally-recognized wetland for migrating birds, but of more importance to me is that it’s where I’ve spent hours with my father, learning about the patterns and habits of birds and getting to know nature. Because of my father sharing his knowledge, I can identify many of the migrating birds by their wing speed or calls. This photo was taken on a gloomy, windy day that somewhat reflected my mood, as my father is getting older and so our drives through The Bottoms, as we call it, are even more meaningful.

Sam, Cohort II
Hidden Curriculum
My colleague…is curious about sustainability. He knows I am studying Educational Sustainability so he asks about things. I recommended he read “Doughnut Economics” as he was inquiring about a circular economy…How do I share what I am learning? For my colleague, it was fostering foundational knowledge. He needs the terms and basic language to start making sense of the complexity of sustainability.
Reese, Cohort I
Letting Go and Letting Come
I discovered this little clearing while exploring UW-Madison’s campus. It reminded me of Otto Scharmer’s Theory U and his idea of letting go and letting come. I discovered his work from a brief reading…and have been looking out for little clearings ever since.

Sonni, Cohort I
Lunch is Served
This past summer, 2019, was an exceptionally busy summer. I took on a load of 9 credits and that included completing the research portion of my dissertation. I spent a great deal of time on the computer and often missed meals or forgot to emerge for a break. My daughter, nine years of age, took it upon herself to make sure I ate by cooking me surprise meals. She tends to not follow a recipe and this meal consisted of green peas, tater tots with taco seasoning, bread with cheese and salsa and for dessert, ritz crackers with a peach chutney that included some melted marshmallows. It was oddly delicious and kept me energized to keep working!
Fenn, Cohort III
Dog Vomit Slime Mold
I’ve always had a fascination with nature, especially the weird and gross parts. In high school, we did a large project where we had to collect samples of plants, fungi, molds, animals, and anything in between. I lost that in college and graduate school as I became focused on my studies, in doors, and at a computer. Joining the EdD program has renewed my love of the physical nature. I spend more time outdoors, walking or even just sitting, and noticing what is around me. The attached photo is a perfect example. It’s of a slime mold called “fuligo septica” and resembles dog vomit, hence the nickname. I have stopped to investigate this slime mold and other weird and random fungi and molds. I have also taken notice of the trees around my home and unique plants, finding wild onions nearby! By learning about the climate crisis and working with other nature lovers, I have learned to take a step back and appreciate what is near me. I am also motivated to actually learn more, turning to the internet and books on local fauna and foliage!

Tivy, Cohort I
Keeping my eyes on the prize.
(Title & Narrative)
Appendix F. Submission Percentages

Belonging Theme: Category Submission Percentages including Ecological Thought, Learning Sanctuary, Perspective Learning, & Change Agency

Lack of Belonging Theme: Category Submission Percentages including Doctorate, Personal, Professional, & Natural Systems

Total Submissions: Belonging (Connect) & Lack of Belonging (Disconnect) Themes with Sub-theme Submission Percentages