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Walden University
2017

Abstract

Effect of Contemplative Pedagogy on the Ecoliteracy of Undergraduate Public State University Students

by

Michael Lees

MA, Naropa University, 1999

BA, Naropa University, 1995

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Education

Walden University

August 2017

Abstract

Undergraduate students lack the opportunity and environment to contemplate and develop ecoliteracy skills that serve to integrate subject matter into their everyday experiences. Ecoliteracy is grounded in Capra's web of life theoretical framework and represents students' capacities to read world systems objectively with their head, heart, hands, and spirit. Contemplative pedagogy provides educators with exercises that give students time to reflect on the integration of learning. Ecoliteracy and contemplative pedagogy research has shown little quantitative data pertaining to how contemplative pedagogy affects undergraduate student ecoliteracy. To address that gap, this causal-comparative study measured the use of contemplative pedagogy exercises relative to undergraduate student ecoliteracy. A convenience sample of 150 undergraduate students who did and did not experience contemplative pedagogy exercises completed the New Ecological Paradigm Scale and Self-Compassion Scale–Short Form. Independent-samples *t* tests measured the differences between the 2 groups. Findings indicated that students who did not experience contemplative pedagogy exercises in the classroom were more likely to self-report higher ecoliteracy. A possible interpretation of these findings is that current contemplative pedagogy exercises may focus students' attention internally and not adequately promote the world-centered view that would more readily advance student ecoliteracy skills. Results of this study provide further insight that may inform professional development and contemplative pedagogy exercises that empowers students' ecoliteracy skills by encouraging critical thinking, action, and compassion towards positive social change.

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Dedication

This dissertation is dedicated to my family and loving wife, Evelyn Lees, who is my support, rock, inspiration, and steadfast companion throughout the last 14 years of life and during the entire PhD program. I love you. To my fantastic research assistants and pooches-in-residence Grizzly Bear and Spirit, you both constantly reminded me when it was a good time to take a break and go for a long walk before jumping back into my dissertation writing.

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May this work be for the benefit of all beings and for all of my relations, ah-ho Mitakuye Oyasin.

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Chapter 1: Introduction to the Study

Background of the Study

Bateson (1979) argued, "Break the pattern which connects the items of learning and you necessarily destroy all quality" (p. 7). Contemporary approaches to learning in higher education require a shift in how students create connections, adapt, and process what they are learning in the context of their academic experience and the world at large. This involves fostering the ability to provide students with a means to contextualize learning in their everyday life experiences in relationship to individual, local, and global systems. Failure to address systems and systemic approaches to learning, along with the ability for students to observe, recognize, and adapt to the multifaceted connections that exist within systems, will not adequately prepare students for solving the problems of the future challenges of globalization (Barbezat & Bush, 2014; Barnett, 2011; Gidley, 2012; Zajonc, as cited in Gunnlaugson, Sarath, Scott, & Bai, 2014; Kineman & Poli, 2014; Orr, 1992; Rainbow, 2012; Stolz, Weger, & Veiga, 2017; Wapner, 2016; Yang, Kong, & Sarder, 2016; Zinser, 2012). Attention to students' ecoliteracy and the use of contemplative pedagogy offers a method to examine if students are learning how to read the world with what they are learning throughout their academic journey and how learning fits within their everyday lives and the world at large. Ecoliteracy is a transdisciplinary systems-based process form of learning where students learn to read the world through four constructs that include the head, heart, hands, and spirit (Capra, 2014; Capra & Luisi, 2014; Goleman, Bennett, & Barlow, 2012; McBride, Brewer, Berkowitz, & Barrie, 2013; Orr, 1992, 2004; Stone, 2010). Contemplative pedagogy employs

engaged instructional exercises in the classroom that provide the students with the time, space, and place to objectively and critically reflect on learning via mindfulness, experiential contemplative practices, and compassion as it relates to meaning making and purpose (Barbezat & Bush, 2014; Bush, 2011; Grace, 2011; Kaufman, 2017; Zajonc, 2013). Ecoliteracy and contemplative pedagogy are further defined briefly in the next two sections of Chapter 1 and in more detail in Chapter 2.

Ecoliteracy in Contemporary Higher Education

Ecoliteracy provides undergraduate students the ability to be aware of the processes involved in adapting knowledge, experience, and problem solving constructs to their life experiences as an interrelated part of the dynamic environments that constitute individual, local, and global systems (Barnes, 2013; Capra, 1996, 2004a, 2004b, 2004c, 2007a; Capra & Luisi, 2014; Orr, 1992, 2004; Stanger, 2011). Ecoliteracy is a transdisciplinary systems-based process learning approach that involves the development of learner capacities to read systems in the world using their head (cognitive), heart (social, emotional, and ecological intelligence), hands (embodied and experiential learning), and spirit (development of purpose, feeling, and empathy within the world; Capra & Luisi, 2014; Goleman et al., 2012; McBride et al., 2013; Orr, 1992, 2004; Stone, 2010). Preparing students with not only knowledge pertaining to individual academic disciplines and individual lives, but an ability to connect that knowledge across a broad scope of academic disciplines and communities, constitutes a vital part of graduating students who are ready to participate as global citizens (Barnett, 2011; Zinser, 2012). Zinser (2012) argued that a “need for a new approach to education that transcends subject

disciplines and institutional boundaries by taking a global perspective" is required for preparing students for a global world (p. 64). Connecting students with an ecoliterate systems perspective requires a different kind of learning approach than that found in traditional academia.

The term *ecoliteracy* was pioneered by and appeared in the works of Capra (2007a, 2007b) and Orr (1996, 2004). The foundations of ecoliteracy are based on responses to the industrial and modern models of education stemming back to Dewey's alternative and experiential learning styles (Semetsky, 2010). Ecoliteracy challenges the last 200 years of traditional education in which knowledge (epistemology) trumps experience and context (ontology) in how learning is presented in higher education (Barnett, 2011). Barnett (2011), Gidley (2012), and Stolz et al. (2017) showed that higher education has evolved and changed from the metaphysical approach to learning in the middle ages, towards the advent of the research-university and industrial era, along with current shifts towards the entrepreneurial and postmodern forms of learning today (Barnett, 2011; Gidley, 2012). Orr (2004), Barnett, Gidley, Semetsky (2010), and Stolz et al. essentially argued that learning methods and processes began to be deconstructed and less integrated throughout educational history.

The metaphysical curriculum combined what students know with how students process what they come to know in epistemological and ontological forms of learning (Barnett, 2011). The metaphysical curriculum provided a contextual ground for connecting knowledge with meaning that did not separate the interdependent relationship between knowledge and experience (Barnett, 2011). The separation of knowledge from

experience was popularized by Cartesian reductionist, third person, and objectivist approaches to learning found within the scientific revolution and industrial era and has persisted in contemporary higher education (Barbezat & Bush, 2014; Barnett, 2011; Bateson, 1979; Gidley, 2012; Kineman & Poli, 2014; Mahani, 2012; Morgan, 2014; Orr, 1992; Rainbow, 2012; Semetsky, 2010; Smalley & Winston, 2010). Zinser (2012) stated, "The current need to improve education is based on the larger paradigm change of post-industrialization, which emphasizes big picture and long-term thinking" (p. 64). Big picture and long-term thinking are integral to what constitutes ecoliteracy's dynamic approach to systems thinking, which includes recognizing systems are more than just the sum of their parts (Capra, 2004b; Capra & Luisi, 2014).

Ecoliteracy consists of systems and systemic environmental awareness for understanding the multifaceted dynamics that operate within an integral approach to synthesizing ecological and social systems (Barnes, 2013; Capra, 1996, 2007a, 2007b; Capra & Luisi, 2014; Goleman et al., 2012; Kineman & Poli, 2014; McBride et al., 2013; Rainbow, 2012; Orr, 1992, 1994). Orr (1992) stated that ecoliteracy fosters "the practical competence required to act on the basis of knowledge and feeling" (p. 92). Orr further argued, "Knowing, caring, and practical competence constitute the basis of ecological literacy" and that "it presumes both an awareness of the interrelatedness of life and knowledge of how the world works as a physical system" (p. 92). Capra (as cited in Stone & Barlow, 2005) maintained that educating for ecoliteracy requires a number of perceptual shifts that include the examination of "relationships, connectedness, and context" (p. 20). Capra (2004b) argued that changes in perception involve the adaptation

of systems thinking, looking at the whole of a system as more than the sum of its parts, and a move from analysis to context, from objects to relationships, from hierarchies to networks, and from structure to process within an open system. Capra (1996) introduced a living systems approach that encapsulates these ecoliteracy components called *the web of Life*. Capra's (1996) living systems approach combines ecological environmental factors and social factors together to create a theoretical framework for ecoliteracy. Capra's (1996) web of life served as the theoretical framework for this study and finds further examination in Chapter 1 and the literature review in Chapter 2.

Orr (2004) and Capra (1996, 2004a, 2004b) both emphasized the importance of including the relationship of social structures and societies to ecoliteracy as crucial elements in the development of whole and open-systems thinking. Orr (1992) maintained "Ecological literacy, further, implies a broad understanding of how people and societies relate to each other and to natural systems, and how they might do so sustainably" (p. 92). Capra (2004b) explained, "The link between ecological communities and human communities exists because both are living systems, and this is where systems thinking comes in" (p. 1). Capra (1996) and Orr (1992, 2004) initiated movements to include a living systems approach to the integration of ecological and social paradigms as a part of ecoliteracy (Barlow & Stone, 2011; Capra, 1996, 2004a, 2007b; Moore et al., 2011; Stanger, 2011). The development of ecoliteracy provides learners with an objective awareness for how they fit within natural and social ecosystems, whose parts function as interrelated, interchangeable, and interdependently connected based on direct experiential contact within living systems (Moore et al., 2011; Stanger, 2011).

The ecoliteracy approaches introduced by Capra and Orr are now included in curriculum and educational research (Arnold, 2012; Balgopal, Wallace, & Dahlberg, 2012; Cermak, 2012; Goleman et al., 2012; Hampson, 2012; Hiller-Connell, Remington, & Armstrong, 2012; Puk & Stibbards, 2011, 2012; Singleton, 2015; Stanger, 2011; Stone & Barlow, 2005; Widhalm, 2011a; Williams & Brown, 2011). Research showed a gap in how student ecoliteracy is being facilitated within curriculum as it pertains to learners connecting themselves to what they have learned beyond the classroom and within individual, local, and global systems (Barnett, 2011; Cermak, 2012; Hampson, 2012; Pappas, 2012; Puk & Stibbards, 2012; Singleton, 2015; Stanger, 2011; Walton, 2011; Widhalm, 2011a). In this context, students should be able to gain awareness for a systems approach to learning that includes interrelatedness, objective big-picture thinking, awareness for subjective experiences, and an ability to identify, adapt, and solve problems that appear within a system or systems.

The development of ecoliteracy is a process view of learning that supports the embodiment of how students come to learn about the world and the relationships they share within personal, local, and global systems. The ecoliterate ability to read personal and global systems that students find themselves in requires an objective open awareness that requires learning methods in the classroom that work with the stressors that exist in the direct life experience of learners in higher education. Learners in higher education are attempting to gain knowledge of the world, understand their place in world systems, and satiate desires for individual purpose and meaning. All of this activity is taking place while students are trying to complete heavy academic course loads, manage personal life

experiences, and balance the rigors involved in juggling personal and worldly day-to-day manifest frustrations. I sought to examine the use of contemplative pedagogy as a tool for the development of student ecoliteracy as a means to address the aforementioned challenges learners face in higher education.

Contemplative Pedagogy in Contemporary Higher Education

Zajonc (2013) described the current emergence of contemplative pedagogy in higher education as a "quiet pedagogical revolution" (p. 83). Zajonc outlined contemplative pedagogical outcomes as including student attention, emotional balance, empathetic connection; compassion, altruistic behavior, creativity, and the learning of course content (p. 83). The educational outcomes Zajonc outlined support foundational constructs of contemplative pedagogy as this pedagogical practice continues to grow throughout undergraduate higher education (Albrecht, Albrecht, & Cohen, 2012; Barbezat & Bush, 2014; Bush, 2011; Chano, 2012; Duerr, 2011; K. Fisher, 2017; Fort & Komjathy, 2017; Gunnlaugson et al., 2014; Kaufman, 2017; Mahani, 2012; Morgan, 2014; Rogers, 2013; Wapner, 2016; Zajonc, 2013). Contemplative practices share a long history of presence within Eastern, Western, Indigenous, and Mystic oriented religious traditions in which integrative reflective practices have played a role in how individuals learn, gain knowledge, and cultivate that knowledge in life-experience with the whole world around them (Barbezat & Bush, 2014; Duerr, 2007; Mahani, 2012; Morgan, 2014). Contemporary contemplative practices, and the development of contemplative pedagogy in education, have moved away from religious orientations and towards the development of secular methodologies (Barbezat & Bush, 2014; Bush, 2011; Coburn et al., 2011;

Duerr, 2007; Grace, 2011; Morgan, 2014). Contemplative pedagogy is founded upon transformative, integrative, and experiential learning in order to attend to student attention and analytical problem solving skills; deepen their understanding of what they are learning; develop connection and compassion relative to self, other, and the world; and develop purpose and meaning making (Barbezat & Bush, 2014). The movement towards the secular development of contemplative pedagogy has led to the use of mindful learning exercises in the college classroom (Albrecht et al., 2012; Bush, 2011; Mahani, 2012; Mind and Life Education Research Network [MLERN], 2012; Napora, 2011; Roeser, 2012; Rogers, 2013; Shapiro, Brown, & Astin, 2013; Webster-Wright, 2014; Zajonc, 2013). The secular approach to contemplative pedagogy allows students to actively engage in reflecting upon course material relative to their own direct learning experiences.

Contemplative pedagogy provides the ability to deepen introspective contextualization of learning and connect students with the importance of mindfulness and reflection that higher education objectives seek. Langer (1989, 1997) described mindful learning as the ability to contemplate and observe the processes involved in achieving outcomes. Contemplative pedagogy focuses student attentions on the processes of achieving academic and life goals in the present moment versus only thinking about future outcomes (Barbezat & Bush, 2014). Ryan and Ryan (2013) argued that "reflection is commonly embedded into assessment requirements in higher education subjects, often without necessary scaffolding or clear expectations for students" (p. 244). Ryan and Ryan further maintained that reflection in learning also requires a "specific pedagogic

intervention to do well" (p. 244). Contemplative pedagogy provides educators with a tool to foster first person objective approaches towards the integration of knowledge and subjective experience relative to the educational, social, and environmental spaces of their students (Barbezat & Bush, 2014; Bush, 2011; Chano, 2012; Fort & Komjathy, 2017; Gause & Coholic, 2010; Grace, 2011; MLERN, 2012; Roeser, 2012; Wapner, 2016).

Barbezat and Bush (2014) stated that contemplative pedagogy seeks to "teach the whole person, with an intention to go beyond the mere transfer of facts and theories…to challenge and develop students' analytical and problem-solving skills" (p. 3), and "create the opportunity for our students to engage with material so that they recognize and apply its relevance to their own lives, to feel deeply and experience themselves within their education" (p. 3). Grace (2011) maintained that contemplative pedagogy provides methods for developing present and life-long learning perspectives of self-knowledge that integrates not only obtaining knowledge, but what to do with that knowledge once it has been obtained. In summary, a growing body of research has suggested that creating space for students to contemplate and integrate learning relative to their academic journey has shown to be beneficial for student educational outcomes and personal wellbeing.

Research further showed that student cognitive, social, and emotional capacities respond positively to contemplative pedagogy exercises facilitated by educators in higher education classrooms. Supporting research included aspects of student learning relative to the development of skills useful for future learning (Chano, 2012; Dounas-Frazer & Reinholz, 2015), stress reduction, sleep problems, increased mindfulness, self-

compassion, wellbeing, and gratitude (Greeson, Juberg, Maytan, James, & Rogers, 2014; MLERN, 2012) cognition and metacognition (Helber, Zook, & Immergut, 2012), anxiety, depression, high stress levels, physical, and psychological problems (Medin & Lindberg, 2013), GRE performance, and mind wandering (Mrazek, Franklin, Phillips, Baird, & Schooler, 2013), and consciousness and cognition (Zeidan, Johnson, Diamond, David, & Goolkasian, 2010). Grace (2011) and Shapiro et al. (2011) provided extensive reviews of research pertaining to studies relative to the aforementioned aspects of student learning with examples of previously conducted qualitative and quantitative studies. Individuals, organizations, and groups of educators working together have continued to conduct research in the field of contemplative pedagogy throughout college institutions (Duerr, 2007; Morgan, 2014).

Providing students with the opportunity to critically reflect on their learning and life experiences in the classroom is central to the instructional approach of contemplative pedagogy. Instructors are familiar with, trained, and have contemplative practices in their own lives in order to facilitate contemplative pedagogy effectively in the classroom (Barbezat & Bush, 2014). Zajonc (2009) asserted that students then have the opportunity "to think in terms of relationships instead of objects, metamorphosis instead of stasis, and agency instead of mechanism" when learning (p. 156). Smalley and Winston (2010) argued,

> We are immersed in a society of speed, technology, and information overload…we live in an age of increasing anxiety and increasing doubt in our

> capacity to make decisions and to effect change, whether in our bodies, our lives, or the world around us (p. xv)

Barbezat and Bush (2014) maintained that contemplative pedagogy and the exercises used in the classroom are "not intended to replace other effective means of learning…rather, they are powerful complements for instruction across the curriculum" (p. 19). Contemplative pedagogy offers instructors and students the opportunity to pause and critically reflect on their direct experiences with what they are doing in the classroom, on campus, in their own lives, and relative to the world systems around them.

Measuring the Effects of Contemplative Pedagogy on the Ecoliteracy of Undergraduate Students

Ecoliteracy is a systems-based process learning approach to understanding people's relationship to this world through obtaining knowledge with the aim of being able to identify, adapt, and solve problems when systems fail (Orr, 1992, 2004; Capra 1996). Barnes (2013) identified the five phases of learning created by the awareness to action continuum that address ecoliteracy in education. The five phases include awareness and appreciation, knowledge and understanding, attitude and values, problem solving skills, and personal responsibility and action (Barnes, 2013). The application of the five phases in education involves fostering student ecoliteracy in ecological and social systems thinking (Barnes, 2013; Capra, 1996; Orr, 1992). McBride et al. (2013) stated, "An ecoliterate person is prepared to be an effective member of sustainable society, with well-rounded abilities of head, heart, hands, and spirit, comprising an organic understanding of the world and participatory action within and with the environment" (p.

14). A systems-based and process approach to learning creates an objective view of a system, thus creating the ability to become aware of the parts that constitute the big-picture perspective from a first person objective point of view (Capra, 1996, 2002; Mella, 2015). Understanding personal relationships within a system, how a system works, and the processes of change in a system require an objective point of view that includes being able to objectively view subjective responses to systemic experiences of the world as well.

Contemplative pedagogy provides the ability for individuals to identify a first person objective worldview of subjective responses to world systems. The development of mindfulness provides a "nonjudgmental attention to experiences in the present moment" (Hölzel et al., 2011, p. 538). Being mindful with nonjudgmental awareness then provides individuals with the ability to examine environmental spaces and make informed decisions that affect executive control, self-regulation, and thoughts that eventually generate moods, emotions, and feelings (Hölzel et al., 2011; Vago & Silbersweig, 2012). Hölzel et al. (2011) identified four components of mindful practices and their effects that included "attention regulation, body awareness, emotion regulation, and change in perspective on the self" (p. 539). Addressing the aforementioned aspects of contemplative pedagogy in practice provides students with the opportunity to see themselves in relationship to what they are learning, what they are experiencing in the classroom, and how the learning and experience translate into knowledge that they can take with them into their personal and global lives within an ecoliterate context.

The first person objective approach of ecoliteracy provides students with a framework for understanding how they are participating within systems personally and globally. Contemplative pedagogy presents students the opportunity to think, observe, and critically reflect on how they affect systems and how systems affect them. Ecoliteracy and contemplative pedagogy provides students the opportunity to observe their thoughts, feelings, and processes that ultimately generate meaning, thus establishing the requisite connections necessary for interdependently experiencing contact with systems (Barbezat & Bush, 2014; Capra, 1996, 2016; Goleman et al., 2012; Puk & Stibbards, 2012; Rogers, 2013; Unsal, 2016; Wapner, 2016; Zajonc, 2009, 2013). The ecologically and socially constructed environments of the world have a direct effect on how individuals respond to the systems in which they participate (Bronfenbrenner, 1977, 1994; Bronfenbrenner & Morris, 2006; Capra, 1996; 2002; Puk, 2011; Unsal, 2016; Yang et al., 2016). The response to such environmental stimuli forces individuals to adapt and change dependent upon new experiences, tacit knowledge, and reactions to the mind's processing of new information (Bronfenbrenner, 1994; Bronfenbrenner & Morris, 2006; Hölzel et al., 2011; Puk, 2011; Unsal, 2016; Yang et al., 2016). Individual intrinsic and extrinsic processes work with an already established historical knowledge base in the life experience of an individual that provides present-moment experience with past information in order to achieve a semblance of balance in the present moment (Bronfenbrenner, 1994; Bronfenbrenner & Morris, 2006; Carbonell, Stalmeijer, Konings, Segers, & Berrienboer, 2014; Fazey et al., 2007; Tozer, Fazey, & Fazey, 2007). This seeking of balance in the present moment challenges individual choices to either remain

constant or change in response to ecological and social systems (Bronfenbrenner, 1977, 1994; Bronfenbrenner & Morris, 2006; Carbonell et al., 2014; Fazey et al., 2007; Tozer et al., 2007; Unsal, 2016; Yang et al., 2016). Giving students the opportunity to reflect on how they perceive and experience the world through exposure to contemplative pedagogy then provides them the ability to foster an ecoliterate worldview. An ecoliterate worldview aids in grounding student academic and life experiences relative to personal, local, and global systems.

Contemplative pedagogy provides educators with a tool that develops an individual's objective personal and world view towards understanding how they fit within the head, heart, hands, and spirit constructs of ecoliteracy. For exploratory and "heuristic purposes" (Bronfenbrenner, 1977, p. 517), I used two surveys to measure if there is a higher level of ecoliteracy present in college classrooms where undergraduate students are experiencing contemplative pedagogy versus college classrooms where undergraduate students are not experiencing contemplative pedagogy. The two surveys included the NEP Scale (Cronbach α coefficient is .83; Dunlap, Liere, Mertig, & Jones, 2000) and the SCS–SF; Cronbach α coefficient is .86; Raes, Pommier, Neff, & Gucht, 2011) to examine and infer if contemplative pedagogy effects the development of undergraduate student ecoliteracy. Further information pertaining to the NEP and SCS–SF appears in Chapter 3.

A gap in ecoliteracy research showed that more research pertaining to how students view the world in relationship to themselves and the development of systems thinking is required in support of how educators can facilitate learning for ecoliteracy

(Barnes, 2013; Barnett, 2011; Bloom, 2013; Fleischer, 2011; Kineman & Poli, 2014; McBride et al., 2013; Puk & Stibbards, 2012; Rainbow, 2012; Widhalm, 2011a). A gap in contemplative pedagogy research showed little research pertaining to how contemplative pedagogy affects undergraduate student ecoliteracy (Albrecht et al., 2012; Bush, 2011; Chano, 2012; Dounas-Frazer, & Reinholz, 2015; Duerr, 2011; Rogers, 2013; Shapiro et al., 2011; Zajonc, 2013). Findings justified the need for more research supporting the use of contemplative pedagogy and ecoliteracy in undergraduate higher education curriculum.

Problem Statement

Students in contemporary higher education face a particular challenge: they lack the opportunity to develop ecoliteracy skills that serve to integrate subject matter into their everyday experiences. This problem is exacerbated by the fact that higher education institutions are not adequately providing the time or environment for students to develop ecoliteracy skills. Ecoliteracy involves developing systemic awareness and the ability to adapt to environmental factors and work with problem solving in ecological and social systems (Goleman et al., 2012; Orr, 1992, 2004; Stone & Barlow, 2005). Currently, higher education fails to address the systemic outcomes of curriculum in the college classroom, leading to a lack of contextualizing subject matter and failure to cultivate student motivation and alleviate stress and burnout in the undergraduate student population (Mahmoud, Staten, Hall, & Lennie, 2012; Rockenbach, Walker, & Luzader, 2012) . Contemplative pedagogy provides educators a means to address student learning and development in the college classroom through mindful learning (Barbezat & Bush,

2014; Gunnlaugson et al., 2014; Langer, 1989, 1997, Rechtschaffen, 2014; Zajonc, 2009). Contemplative pedagogy offers educators the ability to enhance student ecoliteracy skills by providing a critically reflective and systemic approach to connecting students with learning.

Undeveloped ecoliteracy skills mean that students lack the ability to mindfully contextualize, adapt, and connect what they are learning in a classroom with real world problem-solving experiences (Goleman et al., 2012; Hovland & Schneider, 2011; Rieckmann, 2012). Real world problem-solving experiences include demands made by employers in the workplace, political pressures, worldwide warfare, and environmental degradation and climate issues that require the attention, knowledge, and caring of college graduates who are ready to engage in these demands from mindful and grounded dispositions (Barnett, 2011; Brooks & Normore, 2010; Burns, Vaught, & Bauman, 2015; Gidley, 2012; Hampson, 2012; Hovland & Schneider, 2011; Kaufman, 2017; Stolz et al., 2017; Zinser, 2012). There are many possible factors contributing to this problem, among which include failure to provide students with the opportunity for critical inquiry, reflection, and contemplation related to the integration of curriculum material into their lives (Busch, 2014; Ericson, Kjonstad, & Barstad, 2014; Grace, 2011; Greenberg & Turksma, 2015; Mahani, 2012; Rockenbach et al., 2012; Rogers, 2013; Stolz et al., 2017; Wang, Pascarella, Nelson, Laird, & Ribera, 2011). In conducting research, I wanted to contribute to the body of knowledge needed to address this problem by examining the effects of contemplative pedagogy on the development of undergraduate student ecoliteracy.

Purpose of the Study

The purpose of this quantitative survey study was to measure the effect of using contemplative pedagogy in undergraduate college classrooms as a method for the development of undergraduate student ecoliteracy. I used Capra's (1996) web of life as a theoretical framework in examining the introduction of contemplative pedagogy into the environment of a college classroom and measuring for student learning outcomes relative to their ecoliteracy. The dependent variable was ecoliteracy. The independent variable was contemplative pedagogy. Efforts were exploratory in seeking to define, examine, analyze, and demonstrate if there was a higher level of ecoliteracy present in learners who are experiencing contemplative pedagogy instruction versus students who are not. If a higher level of ecoliteracy was present in classrooms where students experience contemplative pedagogy, then my efforts would yield a metric for critical characteristics that foster ecoliteracy among college students and provide the groundwork for further investigation and research.

Research Questions and Hypotheses

I examined if undergraduate students exhibit a higher level of ecoliteracy relative to experiencing contemplative pedagogy in the classroom versus undergraduate students who do not experience contemplative pedagogy in the classroom. Measuring the relationship of contemplative pedagogy on undergraduate student ecoliteracy provides a method for examining how students understand themselves in relationship to their individual and worldviews. The NEP and SCS–SF provided the ability to test the independent and dependent variables in this study in order to determine if contemplative

pedagogy fostered undergraduate student ecoliteracy. I addressed the following research question and hypotheses:

Research Question: To what extent do undergraduate students exhibit a higher level of undergraduate student ecoliteracy with instructors that use contemplative pedagogy versus the undergraduate students of instructors that do not use contemplative pedagogy?

Null Hypothesis ($H_0$1)*:* A higher level of undergraduate student ecoliteracy is not found in classrooms with instructors that use contemplative pedagogy versus the students of instructors that do not use contemplative pedagogy.

Alternative Hypothesis ($H_1$1): A higher level of undergraduate student ecoliteracy does exist in classrooms with college instructors that use contemplative pedagogy versus the students of instructors that do not use contemplative pedagogy.

The independent variable for this study is contemplative pedagogy. The dependent variable for this study is ecoliteracy. The defining and operationalization of these variables is found in Chapter 2 and Chapter 3.

Theoretical Framework: The Web of Life

I used Capra's (1996, 2002) living systems approach called the web of life as the theoretical framework. Living systems exist as networks that interact with other systems interdependently (Capra, 2007a; Capra & Luisi, 2014). Capra (1997a) argued that living systems consist of integrated wholes and that the "whole is more than the sum of its parts" and exists within systems of mutual relationships (p. 4). Capra's (2007b) theoretical framework emphasizes understanding patterns, structures, processes, and

meaning. Cognition and knowledge are not built, but evolve within a network and respond to "a dynamic web of interrelated events" that creates individual autopoietic (self-organizing) responses to ecological and social environments (Capra, 2002, p. 39; Maturana & Varela, 1992). Mind and cognition are not a *thing* but a process of adaptation that includes the entire breath of life and individual human capacities to recognize patterns and connections (Bateson, 1979; Capra, 2002; Widhalm, 2011a). Understanding the world through the lens of Capra's web of life theory requires a shift in the way individuals experience, think, and ultimately act within individual, local, and global systems.

Capra (2007a, 2007b) described this shift as gaining awareness for relationships, connectedness, and context. Capra (2007a, 2007b) maintained that individuals' shifting awareness leads to the emergence of new thinking patterns, forms, and experiences within a living system. The generation of new thinking patterns, forms, and experiences within cognitive processes leads to creative processes and the need for individuals to work with adaptation within open and dynamic systems (Capra, 2007a). Capra (1997a) emphasized that within an open living system, feedback plays a crucial role in the adaptation, recognition, and participation within the cyclical networking patterns of living systems. Capra (1997a) stated, "Because of feedback, living networks can regulate themselves and can organize themselves" (p. 6). Capra (2007a, 2007b) emphasized the importance of feedback within systemic understanding so that individuals might become intrinsically, extrinsically, and consciously aware of the interdependence that exists mutually between "biological, cognitive, and social dimensions" (p. 478).

Understanding the function of mind and person as a participant in the web of life provides a framework that supports the examination of contemplative pedagogy in the development of ecoliteracy. Capra and Luisi (2014) described the mind as operating in processes within a living systems web of life. Bateson (1979) characterized the activity of mind as the capacity to recognize mental processes, patterns, relationships, and ultimately metapatterns found within systems. Langer (1989, 1997) maintained that mindful learning, the central aspect of contemplative pedagogy (Barbezat & Bush, 2014; Gunnlaugson et al., 2014; Rechtschaffen, 2014), focuses on patterns versus outcomes in the development of thinking. The learners' practice of contemplative inquiry provides the capacity to connect individual experiences with systems thinking in cognitive and metacognitive terms that result in the synthesis of first person objective and subjective perspectives resulting in embodied cognition (Bateson, 1979; Capra & Luisi, 2014; Roth, as cited in Gunnlaugson et al., 2014; Varela, Thompson, & Rosch, 1991).

Embodied cognition asserts that processes of knowing and processes of life take place simultaneously and exist interdependently (Capra & Luisi, 2014; Varela et al., 1991). Measuring the response of undergraduate students' ecoliteracy as a result of having been introduced to contemplative pedagogy exercises in the college classroom aligns with the living systems web of life theoretical framework. As outlined in this theoretical framework, these processes include individual biological, cognitive, and social adaptability within systems. More information pertaining to this theoretical framework appears in the literature review of Chapter 2.

Nature of the Study

The nature of this research was exploratory and I used a quantitative study consisting of a causal-comparative research design. The use of independent-samples *t* tests measured the differences in the means between both groups. The additional use of the Levene's test for the equality of variances and the kurtosis and skew analysis in SPSS allowed for further testing of the research data's validity. Group 1 consisted of undergraduate students with whom the instructors did use contemplative pedagogy in their courses. The instructors of these courses were made up of a contemplative pedagogy group of educators at a university in the northeast. Group 2 consisted of undergraduate students with whom instructors did not use contemplative pedagogy in their courses. The instructors of the Group 2 courses consisted of various departmental faculty members. The students were not randomly assigned to either of the two groups. Trochim (2006) maintained that it is possible to not include random selection or random assignment in a "non-equivalent group design in education" (para. 3). The experimental, or natural experimental conditions were already present for a posttest causal-comparison research design (Bronfenbrenner, 1977; Johnson, 2001; Schenker & Rumrill, 2004). The causal-comparative research design allowed me to test and infer whether a significant causal difference existed between students who were and were not engaged in contemplative pedagogy relative to ecoliteracy (Bronfenbrenner, 1977; Johnson, 2001; Schenker & Rumrill, 2004). Further information concerning this research design, defining Group 1 and Group 2, population, and sampling procedure is described in Chapter 3.

A posttest only NEP Scale and SCS-SF Scale were used to gather data. The NEP Scale (Cronbach α coefficient is .83) measured individual worldviews in terms of anthropocentric (person-centered) or ecocentric (world-centered) attitudes, values, and beliefs towards humans and the ecological world (Dunlap et al., 2000). The NEP Scale was used to measure the objective view of the head, heart, hands, and spirit of undergraduate student ecoliteracy. The SCS–SF (Cronbach α coefficient is .86) measured individual objective responses to the inward subjective relationship individuals experience relative to how they responded to environmental factors affecting them in terms of self-kindness, common humanity, and mindfulness (Raes et al., 2011). The SCS–SF was used to measure the objective responses to the inward subjective relationships of the head, heart, hands, and spirit of undergraduate student ecoliteracy.

Two independent *t* tests were run for each of the groups of undergraduate students and the surveys. If both *t* tests for the surveys showed a greater statistical significance for the undergraduate students who had experienced contemplative pedagogy, versus the undergraduate students who had not experienced contemplative pedagogy, then a significant relationship between the use of contemplative pedagogy and the development of undergraduate student ecoliteracy between the two groups would be inferred. The independent variable was contemplative pedagogy; the dependent variable was ecoliteracy. The use of the NEP and SCS–SF provided a means to measure whether undergraduate students exhibited a higher level of ecoliteracy in college classrooms where instructors did use contemplative pedagogy versus college classrooms where

college instructors did not use contemplative pedagogy. Further information regarding the use of these two surveys is detailed in Chapter 3.

Definition of Terms

Autopoietic: A self-organized system engaged in a process of self-making, adaptation, and maintenance based on interactions with environmental factors acting on a living system in coevolutionary processes (Capra & Luisi, 2014; Maturana & Varela, 1987; Widhalm, 2011a). An individual human being is participating in autopoietic processes when they are responding to environmental factors that necessitate the need to create, recreate, and work with adaptation, transformation, and change (Capra, 2002, 2007; Capra & Luisi, 2014; Maturana & Varela, 1992; Widhalm, 2011a).

Cognition: Defined as interactions with the "very process of life," cognition is further understood to be the mental activity found within living systems that include perception, emotion, and behavior that create self-generating and self-perpetuating autopoietic networks in response to problem solving (Capra, 2002, p. 34; Capra & Luisi, 2014; Varela et al., 1991).

Contemplative pedagogy: Contemplative pedagogy employs practices and creates the space for students to critically engage first person objective responses to subjective experiences of what they are learning with critical and empirical methods of self-inquiry (Bush, 2011; Barbezat & Bush, 2014; Grace, 2011; Zajonc, 2013). Contemplative pedagogy teaches students how to observe the observer through an epistemological approach that seeks knowledge through the application of objectively observing the nature of reality and being in the present moment (Bush, 2011). Contemplative pedagogy

exercises involve mindful learning, connection, concentration, and open awareness for sustaining contradictions found in individual, local, and global learning experiences (Bush, 2011; Bush & Barbezat, 2014; Zajonc, 2013).

Ecoliteracy: Defined as a systems view of life that connects ecological and human systems together (Barnes, 2013; Capra & Luisi, 2014). Ecoliteracy is an understanding that ecological and human systems exist as living systems that share in methods of organization, networking, dissipation, and autopoiesis (Capra & Luisi, 2014). Through dynamic processes of evolution and emergence, ecological and human systems participate in forms of creativity and adaptation that lead to new systems (Capra, 1996, 2002; Capra & Luisi, 2014). Ecoliteracy focuses on the development of understanding the connections that exist between the head, heart, hands, and spirit of people who find themselves existent within the world (Capra & Luisi, 2014; Goleman et al. 2012; McBride et al., 2013; Orr, 1992, 2004; Stone, 2010). Ultimately, an ecoliterate person fosters a worldview that recognizes the creative and destructive capacities inherent within systems as it pertains to interdependence, relationships, cyclical movement, change, feedback, partnership, networking, flexibility, resilience, diversity, equity, empathy, multiple perspectives, wonder and awe for all living things, and problem solving (Barnes, 2013; Capra, 2007a, 2007b; Capra & Luisi, 2014; Hampson, 2012; Orr, 1992; Stone, 2010; Widhalm, 2011).

Embodied cognition: Defined as an embodied enaction that emphasizes experiential cognition as dependent on sensory experiences that are nested in biological, psychological, and cultural contexts in which mind (self) and matter (world/living

systems) do not exist separately but interdependently (Capra & Luisi, 2014; Varela, 1999; Varela et al., 1991).

Metacognition and metacognitive awareness: Defined as individual awareness for the processes of cognition, minus bias and attachment through the act of being a neutral observer to personal responses concerning sensory experiences, feelings, and activities (Efklides, 2011; Smalley & Winston, 2010).

Metapatterns: Defined as individual capacity to recognize that within living systems mutual relationships exist (Bateson, 1979; Bloom, 2013). The individual now sees that these relationships exist in a state of continuous movement that create patterns that connect with other patterns that lead to the formation and emergence of metapatterns (Bateson, 1979; Bloom, 2013).

Mindfulness: Mindfulness is defined as the ability to be cognizant of experiences in the present moment with an unbiased, unattached, and objective view in addition to the subjective responses to internal and external relationships within environments (Bush, 2011; Hölzel et al., 2011; Langer, 1989; Smalley & Winston, 2010).

Mindful learning: Mindful learning teaches that individual mental constructs of the world exist as one construct amongst many (Langer, 1997). Mindful learning approaches facilitate learners' recognizing that thinking consists of the continuous creation of new categories, openness to new information, and awareness for multiple perspectives (Langer, 1997).

Web of life: Defined as a systems approach that recognizes the web of life as consisting of living systems that function as networks and interact interdependently with

other living systems in nested patterns of organization, structure, dissipation, and cyclical processes (Capra, 1996, 2007a, 2007b; Capra & Luisi, 2014).

Assumptions

Assumptions made for this study are as follows:

- The use of the NEP Scale and the SCS–SF was selected as appropriate for measuring undergraduate student ecoliteracy.
- The NEP and SCS–SF were worded appropriately so students could respond accordingly.
- The research participants answered honestly on the survey.
- The undergraduate students had a similar reaction to an instructor who did use contemplative pedagogy in their classroom.
- The undergraduate students had a similar reaction to an instructor who did not use contemplative pedagogy in their classroom.
- The use of undergraduate students in undergraduate college courses drew a useful and purposeful sample.

Scope and Delimitations

The scope and delimitations in this study included the following:

- The population that was sampled for this study included a mix of men and women and there was no ability to control for gender balance or representation in the sample.
- The population for the control group was nonequivalent due to the causal-comparative research design.

- The class-based distribution of the survey meant that additional demographics of this undergraduate population may not have been represented as there was a nonequivalent control group.
- Additional demographic delimitations included cultural, ethnic, religious, or socioeconomic backgrounds and years of undergraduate education.

Limitations

Limitations in this study included the following:

- The use of a survey method presents limitations related to the variation of students' responses to the posttest survey questions.
- Variations in responses to the survey include being impacted by age, experience, motivation, effort, and survey completion practices (guessing at answers looked for, and filling in the blanks to just complete the survey, etc.).
- The study was conducted using a nonprobability convenience sample and was limited to students of this university.
- The research design was exploratory and designed using only a posttest-only causal-comparative nonequivalent control group design.
- The independent variable cannot be manipulated, so causality was inferred.

Significance and Social Change

I sought to add to the emerging field of contemplative pedagogy and the underresearched development of ecoliteracy in college classrooms. Results provide educators and researchers further insight into effective practices for the cultivation of undergraduate students' ecoliteracy. Undergraduate students are continuously looking to

connect real-world experiences with what they are learning while working through the problems and challenges that the rigor of academia and life create (Brooks & Normore, 2010; Burns et al., 2015; Busch, 2014; Rockenbach et al., 2012). A student empowered with contemplative pedagogy and ecoliteracy skills has an opportunity to take these tools out into the global community and effect positive social change.

Graduating students with developed ecoliteracy skills provides them with a means with which to objectively understand their connection to the world with a sense of personal equanimity and balance. An ecoliterate sense of balance provides students with the ability to solve problems using critical thinking skills, action, purpose, and compassion as they compete in highly demanding work environments, engage in the challenges and manifest frustrations of cultural and social constructs, adapt to ecological planetary climate change, experience warfare indirectly and directly, and juggle a fast-paced technology- and media-saturated world (Barnett, 2011; Burns et al., 2015; Ericson et al., 2014; Greenberg & Turksma, 2015; Hampson, 2012; Kaufman, 2017; Rockenbach et al., 2012; Wapner, 2016; Zinser, 2012) . A student who graduates with the ability to work with difficulties, problem solving, and mindfulness with compassion is equipped with necessary life skills for developing positive social change in terms of the wellbeing of their individual, societal, and natural world relationships.

Summary

Contemporary higher education learning strategies require attention to how undergraduate students are adapting and solving problems that exist within their academic learning experiences. Current undergraduate students are working with

numerous individual, local, and global stressors that adversely affect their satisfaction with personal and academic lives, coping styles, and worldviews. More research concerning the use of contemplative pedagogy in the college classroom and the fostering of student ecoliteracy through a living systems lens can address these contemporary undergraduate student problems.

My quantitative causal-comparative study addressed undergraduate student learning by examining undergraduate student ecoliteracy and the use of contemplative pedagogy in college classrooms. A convenience sample of 150 undergraduate students consisting of male and female students completed the NEP Scale and SCS–SF Scale in their classrooms at the end of a college semester. Students were not randomly assigned and I used a causal-comparative nonequivalent control group design including independent-samples *t* tests that measured the difference between the groups. If undergraduate student ecoliteracy was being fostered by contemplative pedagogy, it offered college educators an additional tool to graduating students who are ready to engage in the contemporary pressures and stressors that are representative of solving personal, local, and global concerns in the 21st century. The next chapter presents a literature review of research pertinent to the web of life theoretical framework, ecoliteracy, and contemplative pedagogy in definition and higher education contexts as the groundwork for my research study.

Chapter 2: Literature Review

Introduction

The purpose of this study was to examine how contemporary approaches to learning in higher education have not been addressing how students create connections and process what they are learning relative to personal, local, and global worldviews. This review demonstrates how current literature on ecoliteracy and contemplative pedagogy has addressed serving the contemporary needs of undergraduate students. Connecting undergraduate students with their academic, personal, local, and global worldviews in a living systems theoretical framework is described. The following review provides a foundation for how these variables are related to fostering undergraduate student achievement and addressing the problems students experience in contextualizing contemporary undergraduate education.

Research Strategy

This literature review contains a report on the use of a living systems theoretical framework and the variables of ecoliteracy and contemplative pedagogy. The research studies included relevant peer-reviewed articles, books, and websites pertaining to living systems theory, ecoliteracy, and contemplative pedagogy. Databases providing research included Education Research Complete, Education from Sage, Google Scholar, EBSCO, and ProQuest Central. These databases were accessed through Walden University and a university in the northeast region of the United States. Keyword searches included *contemplative pedagogy*, *ecological literacy*, *ecoliteracy*, *living systems*, *mindful learning*, *systems thinking*, and *web of life*.

Theoretical Framework: Web of Life

I used Capra's (1996, 1997a, 1997b, 2007a, 2007b; 2016; Capra & Luisi, 2014) web of life living systems theory as the theoretical framework for my research study. This theory contains four main constructs: pattern (form), structure (matter), process, and meaning (Capra, 2007a, 2007b). Capra (1996) stated, "All living systems are networks of smaller components, and the *Web of Life* as a whole is a multilayered structure of living systems nesting within other living systems—networks within networks" (p. 209). Capra (1997a, 2002, 2004a, 2004b, 2007a, 2016) maintained that living systems include the individual(s), parts of the whole, and communities of living systems that exist as more than just the sum of the parts that constitute the whole. These parts that are participating within an open living system constitute the web of life's theoretical foundation relative to the interdependent connections between the ecological, social, and individual experiential patterns that exist in living systems found in the natural and human constructed world (Capra, 1997a, 2002; Capra & Luisi, 2014).

Individuals participate in the experiential patterns of ecological social systems on a daily basis (Capra, 1996, 1997a, 1997b, 2002, 2007a, 2016; Capra & Luisi, 2014). The web of life includes individual capacity to recognize that experiential patterns and connections that emerge already exist and are established within and between individual, ecological, and social systems that affect all of life continuously (Capra, 1996, 2002, 2007a, 2007b). The web of life represents individual autonomous acts of being, producing, and living within systems that are nested within systems (Capra, 1996, 2002, 2007a, 2007b). The autonomous act of being, taking, and giving is an aspect of cognition

and requires a physical and conscious response on the part of individuals to the direct experience of being connected to a multifaceted living system as a whole (Capra, 2007a, 2007b; Maturana & Varela, 1980; Strachan, 2009; Vanderstraeten, 2000; Varela et al., 1991; Widhalm, 2011a; Yang et al., 2016). Strachan (2009) stated that a systems approach involves the activity of individual processes of learning how to respond to the patterns of experience nested within a systems view of life. The systems view of life represents an individual's capacity to engage in their own thinking patterns (Mella, 2015; Strachan, 2009; Unsal, 2016; Widhalm, 2011a, 2011b; Yang et al., 2016). Individuals contextualize learning through engaged application and direct responses to the complex interplay of experiential processes that exist on personal, local, and global levels (Mella, 2015; Strachan, 2009; Unsal, 2016; Widhalm, 2011a, 2011b; Yang et al., 2016).

Understanding the relationships that exist within and between livings systems requires individuals to work with continuously changing perspectives in how everyday activities affect ecological systems as a whole and vice versa (Capra, 2004b). Capra (2002) described the dynamic of changing perspectives as the ability to identify the hidden connections that exist interdependently within ecological networks. Bateson (1979) stated that an interdependent viewpoint is a cognizant state of mind that recognizes systems exist as "a dance of interacting parts" (p. 13). Interdependence means that no interaction and no activity in the web of life exists independently or on its own, but is a product of emergent or mutual causality (Capra, 2002, 2004b). Bateson maintained that understanding the interdependent nature of systems requires an overarching acknowledgment that an independent, objective worldview does not

ultimately exist. Everything in life is subject to the relative interactions that represent constant states of change within a whole system (Bateson, 1979). Individual ability to recognize and experience the interactive dances taking place within a whole system identifies the fundamental difference between only seeing the surface of a whole system objectively, popularized by a Western Cartesian worldview, versus an authentic understanding of recognizing the whole system from a deeper objective experiential standpoint (Bateson, 1979). Capra (2004b) described this fundamental shift in identifying an interdependent worldview as realizing that living systems contain interrelated parts that constitute a whole open system and are not just parts, or the sum of parts, that function individually in the construction of a living system or systems.

An ecological system is defined by the interactive parts that exist in a cyclical, spiral, and dissipative fashion where patterns of cause, effect, life, and living constitute the product of mutual actions and relationships found within a living system (Capra, 2004b; Prigogine & Stengers, 1984). Capra (2004b) emphasized the importance of needing to shift from understanding a living system through traditional forms of analysis, logic, reason, and deduction alone to that of contextualizing what individuals experience in life as well. Contextualizing what an individual experiences within a living system requires not just seeing the parts that constitute a whole system, but realizing that parts of a living system do not exist independently from one another (Capra, 1996, 2002, 2004b, 2016; Capra & Luisi, 2014). Through this lens, individuals come to understand that the parts of a living system constitute a pattern(s) found within and between relationships

that generate the various participatory strands connecting the web of life together (Capra, 1996, 2002, 2004b; Capra & Luisi, 2014).

Recognizing a shift from a worldview that only observes parts of a system, or whole system, rather than the contextualization of the whole system requires that individuals step back from traditional Cartesian and mechanistic Western analytical approaches to observing the nature of relationships found within living systems (Capra, 1997a, 2004b, 2014). Capra (1997a, 2004a, 2004b, 2007a) identified a number of needed shifts from traditional Western Cartesian, scientific, and academic analytical approaches that include

- a shift from observing only the parts to recognizing the whole of a system through the identification of patterns and networks that function within the positive and negative feedback loops of living systems, thus creating cyclical and spiral patterns in life;
- a shift from analysis to context in that the parts that constitute a living system do not display intrinsic qualities but exist in the context of a larger whole; that is, one cannot just break a system down into its parts without understanding the context within which the parts constitute an open dynamic, changing, and emergent system;
- a shift from only addressing objects within a system to that of relationships found within and across ecological and social living systems;

- a shift towards understanding that these relationships exist interdependently within greater networks, thus making the relationships the central focus of understanding living systems;
- a shift towards recognizing that objects and parts play a role in a living system's total construct;
- a shift from thinking in terms of hierarchies to that of networks by understanding that systems are interdependent and do not function independently of one another but as networks that are nested within networks and flow ad infinitum and
- a shift from a focus on structure to that of the processes taking place in terms of the connections, contexts, and relationships found between the parts of living systems, recognizing that give and take manifest in negative and positive feedback loops.

The web of life theoretical lens serves to recognize that individuals are constantly participating within multiple systems of life that include interactions with their own life system and with other ecological life systems in the world. Individual, other, and ecological processes and patterns of self-organization are taking place as individuals move with the flow of life while struggling to maintain a sense of equilibrium and balance in a dynamic world full of continuous change (Bateson, 1979; Capra, 1996, 2002, 2007a, 2007b, 2014; Capra & Luisi, 2014; Maturana & Varela, 1980; Varela et al., 1991). New patterns emerge constantly as place, space, and learning changes while individuals move through and within ecological environments (Capra & Luisi, 2014; Strachan, 2009;

Widhalm, 2011a). The web of life lens provides a means to see that within living systems old patterns give way and morph into new patterns, old energy gives way and morphs into new energy, that loss and gain exist simultaneously, and death gives life to birth in an emergent process of constant change and creative potentiality (Capra, 1996, 2007a, 2007b; Capra & Luisi, 2014; Prigogine & Stengers, 1984). The web of life provides an individual with the capacity to become cognizant of what effect life has on, and within, their own living system of existence and that of the other living systems of which they play an interrelated part (Capra, 2007a, 2007b; Luhmann, 1990; Mella, 2015; Varela, 1999; Vanderstraeten, 2000).

The importance of an individual's understanding that expecting the unexpected exists as a constant backdrop within in a living system provides an individual with the ability to change or work to maintain equilibrium dependent upon internal and external ecological factors (Capra 2004a, 2004b; Capra & Luisi 2014; Gallopin, 2006; Mella, 2015; Prigogine & Stengers, 1984). Life dynamics exist in a state of potentiality that point towards opportunities in which the feeling of becoming overwhelmed or satiated provides the capacity to generate positive creativity and change while counterbalancing negative or harmful self, social, and environmental degradation (Capra, 2007a, 2007b; Capra & Luisi, 2014; Luhmann, 1990; Strachan, 2009; Vanderstraeten, 2000). An individual's mind is in a perpetual state of becoming as cognitive processes work with recognizing patterns, adapting to change, and absorbing the effects change creates (Bateson, 1979; Capra & Luisi, 2014; Mella, 2015; Varela, 1999; Varela et al., 1991). Becoming cognizant of how the mind is working in relationship to experiencing the

world within a living system provides the opportunity to understand that meaning making plays a strong role in the processes inherent in the human experience of the web of life (Capra, 2007b; Capra & Luisi, 2014; Luhmann, 1990; Maturana & Varela, 1980; Varela, 1999). The next section addresses the four main constructs of the web of life that include pattern, structure, process, meaning, and their subtheories that Capra (1996, 2007a, 2007b; Capra & Luisi, 2014) adapted and synthesized in the construction of the web of life living systems theory.

Subtheories in Capra's Web of Life

Capra's (1996, 2007a, 2007b; Capra & Luisi, 2014) web of life living systems theory synthesized the work of Maturana and Varela's (1980, 1992) autopoiesis, patterning, and organization of living systems, Prigogine and Stengers' (1984) dissipative structure, Bateson's (1979) and Maturana and Varela's (1980, 1992) theories of cognition, patterns, and the processes of life found within living systems, and Luhmann's (1990) autopoiesis of social systems. Pattern (form), structure (matter), process, and meaning constitute the groundwork of the web of life and are supported by these theoretical foundations in the following paragraphs (Capra, 2007a, 2007b).

Pattern (Form)

Individuals within a living system are tasked with responding to all of the ecological and social patterns that continuously require organizing, reorganizing, and reacting to phenomena that exist relative to environmental and social experiences (Capra, 1996, 2002; Capra & Luisi, 2014; Luhmann, 1990; Maturana & Varela, 1980, 1992). Autopoiesis represents how individuals react and form patterns of organization that are

dependent upon external environmental and internal biological forces that manipulate and facilitate change within a living system (Capra, 1996; Capra & Luisi, 2014; Maturana & Varela, 1980, 1992). Capra (2002) maintained that, "an autopoietic network means that the phenomenon of life has to be understood as a property of the system of a whole" (p. 10).

Capra (1996) described the activity of autopoiesis as being, doing, production, transformation, and change within a living system's network. Capra (2007b) maintained that, "autopoiesis exists as networks that are functional beyond just material structures; the networks exist as networks of relationships that lend to the generation of change; and creativity within dynamic open systems" (p. 476). Autopoiesis is a self-organized system engaged in a process of self-making, adaptation, and maintenance based on interactions with environmental factors acting on a living system in co-evolutionary processes (Capra, 1996; Capra & Luisi, 2014; Maturana & Varela, 1980, 1992; Widhalm, 2011a). The dynamic open systems within autopoietic processes represent the interdependent relationship that exists between patterns (form), flow, and change within the structures of living systems (Capra, 2007b; Maturana & Varela, 1980, 1992; Prigogine & Stengers, 1984). Individuals are constantly engaged in, experience, and represent the autopoietic processes of living, learning, and adapting to changes found within the patterns and structures of living systems (Capra, 2007b).

Structure (Matter)

Capra (2007b) used the work of Prigogine and Stengers's (1984) with dissipative structures to address the dynamic interplay between patterns (form), flow, and change

that exist within the structure(s) of living systems. Prigogine and Stengers maintained that a dissipative structure exists in a state of nonequilibrium in which the processes involved in striving to maintain a system supports the emergence of relative forms of equilibrium and sustainability. Dissipation represents the loss and transfer of energy and form as systems change (Prigogine & Stengers, 1984). This particular kind of change means that one structure gives way to the emergence of another as energy seeks to recreate, create anew, and or maintain equilibrium, stability, and balance (Prigogine & Stengers, 1984). Dissipation represents order in an open system in which self-balancing negative feedback loops strive to maintain balance amidst constant change and self-amplifying positive feedback loops that support creative capacity and the emergence of new structures (Capra & Luisi, 2014, p. 159).

As the energy within dissipative structures increases, and the self-amplifying positive feedback loops create stronger degrees of flowing energy, instability within a system arises (Capra, 2007b; Capra & Luisi, 2014; Prigogine & Stengers, 1984). The instability felt within a system forces change, or what is referred to as a bifurcation point (Capra, 2007b; Prigogine & Stengers, 1984). The bifurcation point forces the energy to change into new states of being in which new structures and forms now have the potentiality to emerge and ultimately create a new system (Capra, 2007b; Prigogine & Stengers, 1984). Capra (2007b) described this interrelated and interwoven dynamic process of dissipative emergence as the, "dynamic origin of development, learning, and evolution" (p. 476). Capra (2002, 2007b) identified these emergent properties found within dissipative structures as representing the groundwork for creativity found within

the emergent characteristics of life and living. This viewpoint represents a fundamental shift from only focusing on form and structure alone to that of the processes involved in seeing the emergence of a living system (Capra, 2002). This is reflected in an individual human being's striving to understand and participate in patterns inherent in the web of life (Capra, 2002).

Process

The work of Maturana and Varela (1980) and Bateson (1979) with cognition, cognitive processes, and pattern recognition inform the process aspect of the web of life (Capra, 2007b; Capra & Luisi, 2014). The method employed by human beings striving to understand and participate in the web of life is represented by the mind's cognitive processes (Capra, 2007b). Cognition is the mental activity found within living systems that include perception, emotion, experience, and behavior (Capra, 2002, p. 34; Capra & Luisi, 2014; Maturana & Varela, 1980; Varela et al., 1991). Cognition translates individual external environmental encounters into internal individual experiences (Capra & Luisi, 2014; Maturana & Varela, 1980; Varela et al., 1991). The individual experiences then translate into individual autopoietic processes and become self-generating and self-perpetuating aspects of mind, matter, and form within autopoietic networks (Capra & Luisi, 2014; Maturana & Varela, 1980; Varela et al., 1991). These aspects of cognition exist as a direct response to problem solving, adaptation, and change as a product of individual movement within ecological systems (Capra, 2002, p. 34; Capra & Luisi, 2014; Maturana & Varela, 1980; Varela et al., 1991). Capra (2007b) stated that ultimately life and cognition become inseparably connected (p. 478). Capra (2007b) further

emphasized that the web of life approach synthesizes mind, matter, and the direct experience of life into a first-of-its-kind unifying scientific theory (p. 478).

Maturana and Varela (1980) asserted, "Living systems are cognitive systems, and living as a process is a process of cognition" (p. 13). Cognition involves the existence of individual interactions with networks both internally and externally through the direct experience of the biological and phenomenological world (Maturana & Varela, 1980). It is this aspect of mind, through recursive productive responses to interactions, that allows for the emergence of being self-conscious (Maturana & Varela, 1980). Maturana and Varela asserted that being self-conscious occurs through the processes of self-observation as a result of repeated, or recursive, interactions within living systems. Self-observation and thinking are synonymous and orient an individual towards the development of reacting to environmental factors, the emergence of language, and necessitates how an individual will align themselves within nested systems and the whole-system in which they participate (Maturana & Varela, 1980).

The process of thinking is the mind's reaction to what is present and taking place between the interdependent interactions provided by any given ecological niche (Bateson, 1979; Maturana & Varela, 1980). Bateson's (1979) central theory is that patterns of form and matter interact interdependently as connections are created and ultimately emerge in the form of metapatterns. The capacity of an individual's mind to recognize and respond externally to the environment, and realize that within living systems mutual relationships exist, establishes the criterion for the mind's ability to identify the individual patterns and metapatterns that create all of the connections experienced in life (Bateson, 1979; Bloom,

2013; Widhalm, 2011b). The conscious recognition of metapatterns provides individuals with the knowledge that a living system(s) relationship exists in a state of continuous movement (Bateson, 1979; Widhalm, 2011b). Continuous movement and change creates patterns that connect with other patterns that lead to the formation and emergence of metapatterns (Bateson, 1979; Bloom, 2013; Widhalm, 2011b). Recognition for these aforementioned principles of mind, matter, and life culminate in the experience of what Varela et al. (1991) called the embodied mind or embodied cognition, and embodied enactment.

Varela et al. (1991) defined embodied cognition as an embodied enaction that emphasizes experiential cognition as dependent on sensory experiences that are nested in biological, psychological, and cultural contexts in which mind (self) and matter (world/living systems) do not exist separately but interdependently (Capra & Luisi, 2014; Varela, 1999; Varela et al., 1991). Embodied enactions include individual actions within a living system and will create change dynamics that affect the individual and the world around them in a mutually interdependent context (Varela, et al., 1991). Varela et al. maintained that individual perception, experience, and contact with the world exist mutually in a system of reciprocity in order to maintain balance and equilibrium. Varela (1999) furthered that cognition is an embodied enaction that synthesizes intrinsic and extrinsic contact and experience with the world. The world in its natural and human/social terms is not pre-given (Varela, 1999). The world is enacted upon throughout a natural and human/social history of enaction that creates worlds within worlds and the numerous micro-worlds that are the product of activity in every given

moment (Varela, 1999). Embodied cognition and enaction gives rise to the knowledge and wisdom capacity of the human mind and contributes to the emergence of how we come to know what we know or that which is called meaning making (Varela, 1999).

Meaning

Capra (2007b) maintained that the application of autopoietic processes to human and social domains requires grounding the web of life theoretical approach with the final component of meaning. Ultimately Capra's web of life is synthesizing life's biological, cognitive, and social dimensions (p. 478). Capra (2007b) used Luhmann's (1990) theory of autopoiesis and socialization to define autopoiesis in the social domain of human experience. Luhmann maintained that social autopoietic processes are found in communication and within the numerous networks of communication that signify the establishment of patterns and connections. Communication then plays a central role in defining autopoiesis in terms of the ecological and social domains of patterned human experiences (Capra & Luisi, 2014; Luhmann, 1990). Individuals are autonomously participating in autopoietic processes when they find themselves responding to ecological factors that necessitate the need to create, recreate, and work with adaptation, transformation, and change within the structures of nested living systems (Capra, 2002, 2007b; Capra & Luisi, 2014; Luhmann, 1990; Maturana & Varela, 1992; Strachan, 2009; Widhalm, 2011a).

Luhmann (1990) asserted that communication is indicative of the self-referential autopoietic processes that include reproduction, recursive reproduction, and information gathering that is ultimately reproduced by networks of communication. Communication

consists of networks that engage in the creation of information, utterance, and understanding whose synthesis is found inside the communication networks existent in ecological and social systems (Luhmann, 1990, p. 3). Luhmann maintained that information, utterance, and understanding cannot exist independently of a system but are co-created by the environmental factors that constitute systems within systems as desires seek to be satiated and actions ensue (pp. 4-5). The self-referential autopoietic processes create the capability to engage in "simplifying self-observation" and create a societies' ability to "create a world of its own" (Luhmann, 1990, p. 7). Luhmann further asserted that conscious and social systems constantly produce dissipation in order to maintain a modicum of sustainability that allows the past and present moments to exist and dissipate in order to avoid overtaxing a system.

Capra (2007b) applied Luhmann's (1990) autopoiesis of socialization to the web of life by connecting the social domain with the application of a living system's networks, patterns, and principles of organization (Capra, 2007b, p. 478). Capra maintained that biological and social networks share in the properties that define a living system. Capra claimed "Biological networks operate in the realm of matter; social networks operate in the realm of meaning" (Capra, 2007b, p. 479). Individuals find themselves participating in both the biological and social domain processes of a living system daily (Capra, 2007b). An individual's ability to synthesize a personal understanding of the biological and social processes taking place affords the opportunity to understand and develop, in a much deeper context, the role that they play as an interrelated part of life's ever-changing system (Capra, 2007a, 2007b).

Capra (2007b) further maintained that the fostering of the web of life creates the potentiality to lead individual and social human activity within ecological niches towards practices of sustainability, equilibrium, and overall healthy systemic and systems growth. Capra's (1996, 2002, 2007a, 2007b) web of life has found application to how learning is taking place within education through fostering student ecoliteracy. The next section will describe how the web of life is finding application in education as well as how it serves as the theoretical framework for my dissertation study.

The Web of Life: Living System Theory in Education

The web of life is an ecological lens for understanding the relationships that exist interdependently within and across systems in terms of community building and learning (Capra, 2004a; 2007a). The web of life provides the foundation for developing a systems approach to ecoliteracy related to how students are learning in educational settings (Capra, 2004a; 2004b; 2004c; 2007a). Banathy (1995) described a systems approach to education as fostering learner awareness for the interactions taking place within and across systems that inherently support the development of students' personal, local, and global worldviews. Banathy stated, "A worldview is framed by its dimensions and becomes a window on the world…or it is a lens through which we perceive the landscape of life that becomes our reality" (p. 53). The introduction of a living systems theoretical framework in education provides a process view of learning that contextually and experientially integrates curriculum with knowledge in the construction of student ecoliteracy (Banathy, 1995; Capra, 2004b, 2004c; Widhalm, 2013). The integration of contextual knowledge builds on the experience students' encounter as they process what

they are learning while simultaneously connecting new information to personal, local, and global worldviews (Capra, 2004c).

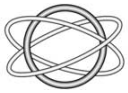
In the application of the web of life to educational settings, Capra (2007a) emphasized the importance of considering key ecological principles of what he called, "the breath of life" (p. 13). Capra (2007a) asserted that educating for student ecoliteracy requires a fundamental understanding that systems consist of networks, nested systems, interdependence, diversity, cycles, flows, development, and dynamic balance (Table 1; Capra, 2007a). The breath of life addresses how the web of life connects the underlying fundamental principles of a living system theoretical framework within the ecoliteracy approach to the development of student learning in educational classrooms, settings, and communities (Capra, 2004a, 2007a; 2016; Widhalm, 2011a, 2013). Each of the breath of life principles provide student learning with the following:

- systemic understanding;
- differing complexity in how systems organize themselves;
- that no single system exists in isolation;
- diversity supports greater resiliency;
- experience is cyclical and subject to change;
- systems are open to constant change;
- change leads to development, adaptation, and learning;
- that learning exists in dynamic feedback loops as systems change;
- that learning leads to the emergence of contextualized knowledge in real world experience;

- contextualized knowledge supports the processes required for taking learning into real world experience and providing the potentiality for creativity to emerge (Capra, 2007a, pp. 13-17).

Table 1

Living Systems Principles

Systems Principle	Definition	Felt Sensation and State of Awareness
Nested Systems 	"Throughout nature we find multi-leveled structures of systems nesting within systems. Each of these forms an integrated whole within a boundary while at the same time being a part of a larger whole."	Belonging; feeling part of a larger whole; feeling co-responsible for that which is smaller and larger than us.
Network 	"All members of an ecological community are interconnected in a vast and intricate network of relationships, the web of life. They derive their essential properties and, in fact, their very existence from these relationships."	Connecting across difference; learning through diversity; feeling part of the web of life.
Dynamic Balance 	"All ecological cycles act as feedback loops, so that the ecological community regulates and organizes itself, maintaining a state of dynamic balance characterized by continual fluctuations."	Feeling seen & heard; compassion; empathy; honesty; transparency.
Cycles 	"The interactions among the members of an ecological community involve the exchange of energy and resources in continual cycles. The cycles in an ecosystem intersect with larger cycles in the bioregion and in the planetary biosphere."	Feeling attuned to the cycles and seasons of life: active (expressing – creating), resting (reflecting – integrating).
Flows 	"All organisms are open systems, which means that they need to feed on a continual flow of energy and resources to stay alive. The constant flow of solar energy sustains life and drives all ecological cycles."	Feeling open to change and being changed, open to new influences and ideas, and to letting go what is no longer needed.
Development 	"The unfolding of life, manifesting as development and learning at the individual level and as evolution at the species level, involves an interplay of creativity and mutual adaptation in which organisms and environment co-evolve."	Feeling open to new developments unfolding; appreciating that which was not there before: awe; curiosity, wonder.

(table continues)

Note. This table represents Capra's web of life living systems theory in experiential context along with Widhalm's felt sensations and state of awareness. The living systems "systems principles" represent the interactions that occur within living systems as individuals participate in the web of life and the networks found therein. From "Educators as Architects of Living Systems: Designing Vibrant Learning Experiences Beyond Sustainability and Systems Thinking," by B. Widhalm, 2011a, *Journal of Sustainability Education, 2,* p. 5. Reprinted with permission.

Capra (2007b) included meaning as a main component in the web of life. Widhalm (2011a, 2011b; Table 1) furthered that Capra's living system approach to learning also provides a capacity for learners to experience a "felt quality of relating" in relationship to the ecological principles constituting the breath of life (p. 4). The felt quality of relating includes felt sensations and states of awareness as it relates to student learning experiences in social and educational domains (Widhalm, 2011a, 2013). Widhalm (2011a) maintained that the addition of felt sensations and state of awareness supports fostering the whole-person, affective dimensions, compassionate awareness, and experiencing interconnectedness and interdependence within living systems (p. 4). Widhalm (2011a, 2013) emphasized the need for students to experientially connect with learning in terms of real world contexts on personal and global levels through the development of understanding the living systems principles (Table 1).

Widhalm (2011a) asserted that Capra's (2007b) web of life approach provides the lens needed to additionally address student belonging, feeling a part of the web of life, expressing compassion and empathy, feeling attuned and rested, open to influences and ideas, letting go, and expressing love and interest in life (Table 1). Widhalm (2011a, 2013) argued that in making this connection to learning, educational environments are providing students with the opportunity to feel that they are wholly participating in life on

individual, local, and global levels. Graduating students with a sense of strong personal capacity, resiliency, and connection then fosters student attitudes towards being a participative and effective change agent in the world (Widhalm, 2013).

Capra's (2007b) web of life, with the inclusion of Widhalm's (2011a) subjective learning dimensions, served as the theoretical framework as it is found in ecoliteracy for my dissertation work. The web of life provided the theoretical foundation for testing to what extent contemplative pedagogy exercises significantly influence the ecoliteracy of undergraduate students in higher education classroom settings. Ecoliteracy is supported by Capra's web of life approach to learning and contemplative pedagogy provides tools to facilitate the development of student ecoliteracy using a living systems lens. I undertook a quantitative approach to offer further evidence regarding the fostering of ecoliteracy highlighting how students are processing and experiencing the establishment of connections to academic learning, social and emotional life stressors, and ecological worldviews in higher education. I used the NEP Scale and SCS–SF Scale to measure student ecoliteracy in terms of the objective and subjective approaches to the web of life living system theory. The NEP and SCS–SF are further detailed in Chapter 3. The next two sections of this review offers working definitions of ecoliteracy for the purposes of my study and ecoliteracy in education.

Ecoliteracy: Clarifying Terminology

Numerous schools of thought have emerged in the study of the fundamental principles of ecology that include addressing how ecology is defined, how ecoliteracy is developed, and how ecoliteracy is applied in educational systems (Barnes, 2013; Capra,

2002; Capra & Luisi, 2014; Fleischer, 2011; Goleman et al., 2012; Hampson, 2012; McBride et al., 2013; Orr, 1992, 2004; Stone, 2010; Stone & Barlow, 2005). The *American Heritage College Dictionary* (2002) defined ecology as, "the science of the relationships between organisms and their environments; the branch of sociology that studies the relationships between human groups and their physical and social environments; and the study of detrimental effects of modern civilization on the environment" (p. 443). Literate is defined as, "able to read and write; knowledgeable or educated in several fields or a particular field; and a well-informed educated person" (The American Heritage College Dictionary, 2002, p. 808). The synthesis of ecology and literate, have morphed into varying definitions, meanings, and contexts that include environmental literacy, ecological literacy, and ecoliteracy.

McBride et al. (2013) have provided a series of frameworks for the most commonly used terms that include environmental literacy, ecological literacy, and ecoliteracy as methodologies for defining, educating, and developing individual ecocentric versus anthropocentric worldviews. Ecocentric worldviews focus on the importance of understanding that life consists of vast living systems and the realization that all living beings are participating in interdependent ecological systems and communities (Capra & Luisi, 2014; Hampson, 2012). Anthropocentric worldviews are human-centered and focus on hierarchical human-first priorities in which ecosystems play a secondary role to the benefit of human existence (Capra & Luisi, 2014; Hampson, 2012). McBride et al. provided this series of frameworks as a tool for researchers and

educators to use towards the development of research, assessment, and educational pedagogy building strategies.

The McBride et al. (2013) frameworks contrast environmental literacy, ecological literacy, and ecoliteracy with multiple dimensions that include affect, knowledge (ecological, sociopolitical, and environmental), skills, and behavior. McBride et al. provided characteristics of environmental literacy, ecological literacy, and ecoliteracy aligned with the multiple dimensions by creating structural frameworks. The frameworks define and provide research sources regarding how each is applied in the fields of environmental education, ecology, and the humanities respectively (McBride et al., 2013). McBride et al. maintained that these categorical frameworks served to address the confusion inherent in the terminology for what each of the approaches to the study of ecology is seeking to achieve in student learning, processes, and outcomes. For the purposes of this dissertation ecoliteracy is the term that was used.

Scholarly criticism exists concerning the definitions of environmental literacy, ecological literacy, and ecoliteracy in broad or loosely based terms (McBride et al., 2013). McBride et al. (2013) contended that each term represents an historic moment, encompassing a vast body of theoretical, philosophical, and research-oriented foundations that establish the validity of fostering student ecocentric worldviews. McBride et al. maintained that efforts to ground ecological approaches within frameworks ultimately supports the building of pedagogical strategies suitable for building standards and assessments in the testing of academic, individual, and social achievement. Each of the frameworks for understanding ecology and relationships in the

world has progressed through their own evolutionary processes throughout their respective history (Hampson, 2012; Kineman & Poli, 2014; McBride et al., 2013; Semetsky, 2010).

The numerous iterations, definitions, and adaptations for the development of ecoliteracy have been evolving and emerging since the early 1970's (McBride et al., 2013). McCallum (2008) described ecoliteracy as, "The ability to read the ecological issues of our time, to interpret the connections in the web of life, and to recognize our evolutionary signatures within it" (p. 111). Orr (1992) described ecoliteracy as the ability to, "observe nature with insight, a merger of landscape and mindscape…the ability to think broadly, to know something of what is hitched to what…and ask what then" (pp. 85-87). Capra (1996) synthesized ecology and literate and coined the term "ecoliterate" (p. 297). Ecoliterate means "understanding the principles of organization of ecological communities (ecosystems) and using those principles for creating sustainable human communities" (p. 297). Capra (1996, 2002; Capra & Luisi, 2014) maintained that becoming ecoliterate requires a fundamental understanding of reciprocity which means give and take relationships, and interdependence, meaning that ultimately individuals exist as parts of interconnected, dependent, and interrelated systems. The ecoliterate worldview then requires a deep ecological and transdisciplinary approach to educating for the development of ecoliteracy (Capra, 1996, 2002; Capra & Luisi, 2014). These principles of ecoliteracy are further defined in the following sections. The next section describes the ecoliteracy framework that I used in defining ecoliteracy as the dependent

variable as presented by McBride et al. (2013) and built upon the work of Orr (1992, 2004) and Capra (1996, 2002).

Ecoliteracy: Defining the Dependent Variable

The McBride et al. (2013) frameworks included the dimensions of affect, knowledge (ecological, sociopolitical, and environmental systems), skills, and behavior as educational learning objectives. The use of the dimensions determined if environmental literacy, ecological literacy, and ecoliteracy covered any or all of the dimensional learning objectives (McBride et al., 2013). Capra (1996, 2002) and Orr (1992, 2004) are associated with the advancement of the term ecoliteracy in an effort to combine the fields of the sciences and humanities together towards the development of educating for sustainable planetary, social, and individual ecosystem living. Orr and Capra brought objective and subjective experiences of ecological learning together and challenged education to begin adapting learning strategies that educate for the whole-person/whole-earth in interdependent, holistic, and ecocentric terms (Capra, 1996, 2002; Fleischer, 2011; McBride et al., 2013; Mitchell & Mueller, 2011; Stone, 2010).

Ecoliteracy addressed all of the dimensional learning objectives in contrast to the strictly-science-only ecological literacy schools of thought found in the McBride et al. (2013) frameworks. Ecoliteracy introduced sustainability within systems and whole systems worldviews (Capra, 1996, 2002, 2016; Orr, 1992, 2004). In addition, ecoliteracy emphasized the importance of educating learners in holistic approaches to scientific, philosophical, and spiritual (secular and nonsecular) learning in the sciences and humanities in contrast to the sciences only dimensional learning objectives of

environmental and ecological literacy (Capra, 1996, 2002; Fleischer, 2011; Hampson, 2012; Kineman & Poli, 2014; McBride et al., 2013; Mitchell & Mueller, 2011; Orr, 1992, 2004; Stone, 2010). McBride et al. (2013) stated, "An ecoliterate person is prepared to be an effective member of sustainable society, with well-rounded abilities of head, heart, hands, and spirit, comprising an organic understanding of the world and participatory action within and with the environment" (p. 14). The following paragraphs will address how Orr (1992, 2004) and Capra (1996, 2002) developed and defined ecoliteracy.

Mitchell and Mueller (2011) stated that Orr introduced a pragmatic approach to ecoliteracy using contemporary examples of ecological crises that exist in the world. Orr (1992) argued that ecological crises has made its way into the postmodern era using, "energy, resource use, climate, waste management, technology, cities, agriculture, water, biological resilience, international security, politics, and human values" as examples (p. 4). Orr (1992) asserted that in human experience the ecological crisis is, "above all else it is a crisis of spirit and spiritual resources" (p. 4). The crisis of spirit leads to the creation of disconnected life experiences for human beings that has a trickle-down effect that negatively affects individual wellbeing and meaning making on personal, local, and global levels (Orr, 1992; 2004). Individuals then take the experience of adverse feeling and loss out into the natural and social world (Orr, 1992). The disconnect creates a sense of apathetic or deliberate detachment in which human beings are no longer closely linked to one another or the natural world in terms of contact, context, and direct experience (Fleischer, 2011; Kineman & Poli, 2014; Mitchell & Mueller, 2011; Orr, 1992, 2004). Scholars argued that the disconnect exists as a product of mass consumerism and

centuries of fostering anthropocentric and reductionist worldviews through the mediums of culture, science, religion, and education (Gidley, 2012; Hampson, 2012; Orr, 1992; Stanger, 2011; Zinser, 2012). Rainbow (2012) argued that western intellectualism since the 16th and 17th century have led to the current crisis by developing "mechanistic, reductionist, impersonal and dispassionate thinking" (p. 92). Orr maintained that without further examination of why we act the way we do in relationship to ourselves, others, and the world, this crisis will ensue and have dire future consequences.

Orr (1992) asserted that this contemporary crisis of relationships between earth, societies, and humans exists within five overarching possibilities. The five possibilities include but are not limited to the following:

- social traps that create negative and destructive outcomes;
- not understanding the interdependent relationship between economy and the environment;
- a hierarchical mentality that places humans in a dominant role over the natural world;
- a slip in evolution in which human understanding of complexity was lost;
- people simply are that self-destructive and might even take a degree of pleasure in self- and other-destructive processes (Orr, 1992, pp. 4-19).

Recognition of a crisis requires not only thinking about the aforementioned reasons why a crisis is occurring, it also requires that action needs to be taken (Mitchell & Mueller, 2011). Advancing action in experience, and as a part of learning how to engage with crisis, Orr developed a definition for ecoliteracy that thrusts learning and education past

being only established in objective knowledge and scientific terms, but towards subjective philosophical and experiential approaches as well.

Mitchell and Muller (2011) described Orr as an educator who is a, "holistic thinker-doer" (p. 200). The holistic approach forwarded by Orr (1992, 2004) integrates systems thinking, pragmatism, Deweyan models of experiential learning, and an attitude of care, compassion, and love towards the development of an ecoliterate disposition (Fleischer, 2011; Mitchell & Muller, 2011; Orr 1992, 2004; Semetsky, 2010). Semetsky (2010) and Orr (1992, 2004) argued that Dewey's reflective learning process recognizes that a tension or problem manifests when learning takes place. The tension and problems engage learners in dynamic processes of realizing that there is always more to learn in the experience of systems-oriented equilibrium and disequilibrium (Orr, 1992, 2004; Semetsky, 2010). The tension that occurs between learners' abilities to know, recognize, and respond to systems-oriented equilibrium and disequilibrium engages feedback loops that provide opportunities for learning about stability, sustainability, or change in personal, local, and global relationships (Capra, 1996, 1997b; Capra & Luisi, 2014; Orr, 1992; Semetsky, 2010). Orr (1992) argued that knowledge and experience will only go so far towards the alleviation of crises if it is not connected with fostering care, compassion, and love towards the development of a sense of wonder. Orr (1992) used "biophilia" as a foundational premise for ecoliteracy in an effort to integrate the sciences and humanities in educating for ecoliteracy (p. 86). Biophilia is defined as moments when the human connection with the natural world, on biologically inherent, innate, and intrinsic levels, experiences a unity in which instinct aligns with reason and a sense of wonder is

manifested (Wilson, 1984). Orr ultimately called for the development of pedagogical strategies that promote a sense of wonder and awe in sync with tying knowledge and experience together in order to promote ecoliteracy (McBride et al., 2013; Mitchell & Mueller, 2011).

Orr (1992) asserted that ecoliteracy works with educating for the integral application of substance, form, and experience as a part of gaining knowledge. Orr (1992, 2004) stated that ecoliteracy requires an individual to understand the following principles:

- the knowledge necessary to comprehend interrelatedness;
- attitude of care, stewardship, and a sense of wonder;
- competence required to act on the basis of knowledge and feeling;
- how people and societies relate to each other and natural systems;
- awareness of the interrelatedness of life and knowledge of how the world works as a physical system;
- ask the question, "What then?";
- to know health, well-being, and survival depend on working with, not against, natural forces (pp. 92-93).

Orr (1992, 2004) argued that not understanding these fundamental principles relevant to sustainable living on planet earth would result in continued ecological degradation while enhancing human capacity for self, other, and environmental destruction. Orr (1992) maintained that, "Knowing, caring, and practical competence constitute the basis of ecological literacy" (p. 92). Orr (1992, 2004) further asserted that adapting these

ecological principles into fostering ecoliteracy requires stepping back from the Cartesian, mechanistic sciences, and industrial complexes that have formed the basis of education during the last 300 years. Orr (2004) directly challenged traditional factory model forms of learning, knowing, and education to step past outdated methodologies that only consider knowledge as a learning factor. Orr (2004) maintained that, "there is no way to separate feeling from knowledge…object from subject…mind or body from its ecological and emotional context" (p. 31). Capra built on the work of Orr when he introduced the word ecoliterate to describe this new ecological learning framework for fostering a holistic approach towards the development of learners' ecological and eco-social systems ecoliteracy (Mitchell & Mueller, 2011; Semetsky, 2010; Stanger, 2011).

Capra (1996, 2002) synthesized the ecoliteracy principles defined by Orr (1992) with the web of life as a part of fostering sustainable ecoliteracy and continuity for the life-span of learners. The Center for Ecoliteracy (http://www.ecoliteracy.org/), of which Capra is a founding member, produced a set of four competencies for defining ecoliteracy that include:

- Head (Cognitive): A systems and living systems approach to learning that fosters ecological principles, critical thinking, creative problem solving, application of knowledge to new situations, the impacts and effects of technology and action; and envision long-term consequences of decisions (Mitchell & Mueller, 2011, p. 15; Stone, 2010, p. 44).
- Heart (Emotional): Feel concern, empathy, and respect for self, other people, and living things; understand multiple perspectives; cultivate equity, justice,

inclusivity, and respect for all people and living things (Mitchell & Mueller, 2011, p. 15; Stone, 2010, p. 44).

- Hands (Active): Create and use tools, objects, and procedures needed by sustainable communities; turn convictions into practical and effective action; apply ecological knowledge to the practice of ecological design; assess and adjust use of energy and resources (Mitchell & Mueller, 2011, p. 15; Stone, 2010, p. 44).
- Spirit "Connectional": Experience wonder and awe toward nature; revere the Earth and all living things; feel a strong connection and deep appreciation for place; feel kinship with the natural world and invoke that feeling in others (Mitchell & Mueller, 2011; Stone, 2010, p. 44).

Capra's synthesis of Orr's principles of ecoliteracy with the web of life provides a medium to engage crisis orientations as well as addressing continuity, resiliency, and sustainability of learning in education (Capra, 2004b; Capra, 2014; Capra & Luisi, 2014; Fleischer, 2011; Mitchell & Mueller, 2011). Mitchell and Mueller (2011) argued that Orr's ecoliteracy needed to extend beyond a focus on crisis as a means to educating for ecocentric worldviews. Mitchell and Mueller maintained that a crisis-focused approach leads to short term results, is exclusive to earth-based environmental crises only, is limiting to classroom pedagogy, suggests fear, education is not exclusively in crisis, as well as being able to dissolve the dualism existent between theory and practice in educating for sustainable learning outcomes (pp. 202-205). Capra (2014) maintained that a living systems theoretical framework provides the necessary foundation for fostering

ecoliteracy, sustainability, and crisis intervention in conjunction with Orr's principles of ecoliteracy.

Capra (2014, 2016) asserted that the development of ecoliteracy requires a multidisciplinary approach to eco-social relationships through the use of systems thinking. The systems thinking approach supports establishing deep change that moves beyond surface learning in order to engage personal, local, and global crises and work towards fostering equilibrium, sustainability, and growth (Capra, 2014, 2016). Capra (2014) argued that deep change needs networks of communication and feedback loops, openness to outside system influences, and disturbance in order to maintain equilibrium and work with factors that constitute emergence and change. Capra (Capra & Luisi, 2014) maintained that being ecoliterate consists of understanding the following roles and activities an individual plays within a system:

- systems consist of principles of interdependence in which individual(s) within an ecological community are interconnected and interrelated through intricate networks of relationships, "the web of life" (p. 353; Table 1);
- that ecological processes exist in a cyclical nature and feedback loops provide the necessary information and energy that drive sustainability in the natural, personal, and social environments of life (p. 354);
- partnership plays a key role in association, connection, and cooperation through networking (p. 355);
- flexibility in working with multiple feedback loops within an ecosystem provides the ability to balance dissonance and deviation while providing

adaptability based on environmental conditions—lack of flexibility will induce stress (p. 355);

- diversity consists of network structures and diverse ecosystems support continuity and resiliency based on capacity to work with interconnections, support, and differing approaches to problem solving (p. 356).

Understanding these roles and activities supports establishing ecoliteracy in the direct experience of learners and how they act interdependently within personal, local, and global world systems (Capra & Luisi, 2014).

As the dependent variable, ecoliteracy was defined as a systems view of life that connects ecological and human systems together (Barnes, 2013; Capra & Luisi, 2014). Ecoliteracy means understanding that ecological and human systems exist as open living systems that share in methods of organization, networking, dissipation, and autopoiesis (Capra & Luisi, 2014). Through dynamic processes of evolution and emergence ecological and human systems participate in forms of creativity and adaptation that lead to new systems (Capra, 1996, 2002; Capra & Luisi, 2014). Ultimately, an ecoliterate person develops a worldview that recognizes the creative and destructive capacities inherent within systems as it pertains to interdependence, relationships, cyclical movement, change, feedback, partnership, networking, flexibility, resilience, diversity, equity, compassion, empathy, multiple perspectives, wonder and awe for all living things, and problem solving capacity (Barnes, 2013; Capra, 2007, 2016; Capra & Luisi, 2014; Hampson, 2012; Orr, 1992; Stone, 2010; Widhalm, 2011a).

The aforementioned elements of ecoliteracy are found within the four constructs that constitute the head, heart, hands, and spirit of ecoliteracy and the web of life theoretical framework. The operation of the dependent variable of ecoliteracy is exhibited in recognizing the development of learner capacities to read systems in the world using their head, heart, hands, and spirit from an ecocentric standpoint (Capra & Luisi, 2014; Goleman et al., 2012; McBride et al., 2013; Orr, 1992, 2004; Stone, 2010). The use of the NEP Scale and SCS–SF provided the means to test and infer if students were responding to the independent variable of contemplative pedagogy from this ecoliterate standpoint.

Embedding this understanding in educating for ecoliteracy provides a, "systemic, participatory, and experiential approach" to the development of sustainability on the personal, local, and global ecocentric worldviews of learners (Capra & Luisi, 2014, p. 357). The ecocentric worldviews, from an ecoliterate standpoint, includes attending to the knowledge, social, and emotional spheres of learner educational outcomes (Capra & Luisi, 2014; Fleischer, 2011; Pappas, 2012; Puk & Stibbards, 2012; Semetsky, 2010). The following section addresses ecoliteracy and the use of ecoliteracy in contemporary education.

Ecoliteracy: Systems Thinking and College Learning

Ecoliteracy provides students the ability to recognize a living system approach to understanding the interdependent relationships between all the parts that constitute an open-system found in the personal, social, and natural world (Capra, 1997b; Goleman et al., 2012; Widhalm, 2011a, 2013). An open system moves beyond the sum of parts and whole-system thinking to include a holistic paradigm that encapsulates flow, adaptability,

and change (Capra, 1997b: Goleman, et al., 2012; Widhalm, 2011a, 2013). Bowers (2012) defined ecoliteracy as the ability to intelligently respond to changes in an environment. Intelligently responding to changes in the environment involves how individuals engage in the five senses, awareness of changes in personal, local, global contexts and cultural assumptions, and mutual causation involving direct contact with environmental living systems (Bloom, 2013; Bowers, 2012; Bronfenbrenner, 1977, 1994; Bronfenbrenner & Morris, 2006; Burns et al., 2015; Puk & Stibbards, 2012; Stanger, 2011; Widhalm, 2011a; Yang et al., 2016). Kineman and Poli (2014) described ecoliteracy as learner ability to recognize that they are participating in a living system. Participating in a living system incorporates a sense of wholeness, sustainability, and intrinsic awareness for how personal activities integrate with the complexities of biological, psychological, and social systems (Bronfenbrenner, 1994; Bronfenbrenner & Morris, 2006; Burns et al., 2015; Capra, 2014; Kineman & Poli, 2014; McCallum, 2008; Orr, 1992; Unsal, 2016). McCallum (2008) defined ecological awareness by relating ecoliterate thinking to ecological intelligence when describing human beings as, "bio-psycho-social beings" (p. 35). Bronfenbrenner (1977, 1994) described bioecological human development as requiring an awareness for the proximal processes that are at work within systems and act on an individual over time in given environments thus creating interactions and responses to personal, local, and global systems. In this context, it is argued that higher education needs to address ecoliteracy in order to graduate students that are intelligently prepared for engaging the rapid changes found in

contemporary individual, local, and global systems (Barnett, 2011; Bowers, 2012, Kineman & Poli, 2014; Pappas. 2012; Stanger, 2011).

Developing ecoliteracy requires that educators understand systems thinking. Ecoliteracy offers students the ability to contextualize learning through a holistic lens that includes personal, local, and global adaptability, growth, and change (Bloom, 2013; Bowers, 2012; Goleman et al., 2012; Stone & Barlow, 2005; Widhalm, 2011a). Widhalm (2011a) argued that problems in connecting students with ecoliteracy exist when there is a lack of establishing real-world relationships between learning content, structure, process, and the environment (p. 3). Widhalm's thought is echoed in the work of Bronfenbrenner and Morris (2006) when they maintained that making connections with "process, person, context, and time" require attention when considering the development of individuals as they are interacting in specific environments in an effort to see future outcomes arrive at fruition (p. 794). Kineman and Poli (2014) asserted that establishing learning connections requires educators to use abductive, open-systems, or big-picture knowledge building capacities versus deductive knowledge building capacities. Abductive knowledge building uses a whole open-system approach versus the deductive closed-system or bottom up approach common to contemporary learning (Kineman & Poli, 2014). Research by Hiller-Connell et al. (2012) showed that an abductive open-systems approach to learning had a significant influence on student abilities to think holistically and act sustainably after having been introduced to ecoliteracy thinking skills [$F(1,34) = 21.87$, $p = .000$, $n^2 = .391$] versus a group of students who did not. Hiller-Connell et al. concluded that a need exists for greater holistic integration and whole

systems thinking skills in higher education as a result of their study. The open-systems learning approaches centered in ecoliteracy provide educators with the ability to integrate learning material into students' life experience.

Systems' learning is a fundamental integrative principle of ecoliteracy in which the adaptation and development of epistemological and ontological learning experiences can occur for students simultaneously in the classroom (Bloom, 2013; Bowers, 2012; Kineman & Poli, 2014; Widhalm, 2011a). Kineman and Poli (2014) maintained that abductive pedagogical methods provides students with the capacity to recognize big-picture approaches to learning that connects objective and subjective learning together. Bloom (2013) described a three part model of teaching that included depth in understanding interrelationships, abstraction as methodology for developing representations and explanations, and the use of abductive learning approaches for students to understand basic course material concepts and how the material moves across disciplines. The fostering of ecoliteracy is an opportunity for students to ground their learning in academic rigor, while also paying attention to how their personal ideas, attitudes, and emotional responses play a role in how individual, social, and global living systems operate.

Ecoliteracy: Individual, Local, and Global Worldviews Across Disciplines

The use of ecoliteracy in directing learner attention to individual, local, and global worldviews strives to establish connections between student worldviews and their direct experience with natural and social environments (Barnes, 2013; Bloom, 2013; Moore et al., 2014; Semetsky, 2010; Stanger, 2011). Student learning becomes contextual in the

form of direct pragmatic experience (Mitchell & Mueller, 2011; Orr, 1992; Semetsky, 2010). Ecoliteracy directs learning towards the effects that humans have on nature and vice versa in living systems (Capra, 1996, 2002, Capra & Luisi, 2014; Orr, 2004; Pappas, 2012; Puk & Stibbards, 2012; Stone, 2010; Wapner, 2016). The direction of learning towards the effects of human potentiality with and within living systems yokes knowledge, experience, affect, and connection together in an interdependent fashion (Capra, 1996, 2002; Orr, 2004; Pappas, 2012; Puk & Stibbards, 2012). Orr (1992) argued that "all education is environmental education" (p. 90) and called for the development of a transdisciplinary learning approach within educational institutions. Transdisciplinary learning provides the opportunity to bridge academic disciplines and provide the learner an opportunity to become literate in how different academic disciplines affect one another on interdependent individual, local, and global levels (Bloom, 2013; Orr, 1992, 2004; Semetsky, 2010). The use of transdisciplinary learning then provides the ability to foster ecological consciousness and ecoliteracy (Bloom, 2013; Orr, 1992, 2004; Semetsky, 2010). Transdisciplinary learning delves below surface learning by engaging open system, versus whole system or closed system, approaches to learning within social and emotional responses to the objective and reflective-only approaches commonly found in interdisciplinary methodologies.

Orr (1992, 2004) maintained that transdisciplinary approaches to learning provide the ability to develop the ecological consciousness and ecoliteracy of individuals towards understanding the dynamic role that they play in constantly changing environmental and social systems. Human activity within environmental and social systems affects the world

as a whole in deeper ecological terms that go below surface-level learning in order to examine problem solving, dilemmas, and crisis (Barnes, 2013; Burns et al., 2015; Moore et al., 2014; Orr, 1992; Puk & Stibbards, 2012; Stanger, 2011; Unsal, 2016). Deeper ecological perspectives require understanding human capacities for creativity and destruction in relationship to place and space, and self and other, in terms of empathy and compassion, and the human and natural world (Barnes, 2013; Kineman & Poli, 2014; Orr, 1992; Puk, 2012; Tabara & Chabay, 2013). The outcome of gaining deeper ecological knowledge embeds social, emotional, and cognitive learning in objective and subjective holistic human approaches to experiencing and understanding individual, local, and global perceptions and experiences (Bloom, 2013; Capra & Luisi, 2014; Hampson, 2012; Kineman & Poli, 2014; Orr, 1992; Puk, 2012). The next section examines the development of ecoliteracy and ecological consciousness in the academic and life experiences of college students.

Ecoliteracy: College Student Ecological Consciousness

In the direct experience of deep ecological perspectives, knowledge is not only acquired, but felt, connected with, and contextualized within the multifaceted systems that constitute single or multiple ecological, individual, and academic niches (Bloom, 2013; Kineman & Poli, 2014; McBride et al., 2013; Puk 2012; Puk & Stibbards, 2012). Kineman and Poli (2014) described ecoliterate knowledge acquisition as going, “into the mind of nature” towards the development of deep ecological consciousness (p. 30). Kineman and Poli argued that mind and nature are then not seen, understood to be, or disconnected from one another, but exist as interrelated and interdependent. Ecological

consciousness consists of the individual ability to understand that the dynamics and interactions taking place on planet earth are directly similar and relate to how human beings respond to environmental stimuli internally and externally (Bloom, 2013; Kineman & Poli, 2014; Mitchell & Mueller, 2011; Puk 2012; Puk & Stibbards, 2012). Kineman and Poli argued, "What we need is a synthetic strategy that will result in integrated, interdisciplinary models that truly reflect the wholeness of nature" (p. 44). The development of educational approaches by educators and theorists alike are responding to the need called for by Kineman and Poli for fostering student ecoliteracy.

Bloom (2013) conducted a study in an undergraduate freshman seminar course using ecological systems thinking models towards understanding complexity and an ecology of mind. Student responses showed that student pattern and metapattern recognition occurred, student awareness of relationships and interrelationships was strengthened, and the development of student epistemological responses to learning took place (Bloom, 2013). Bloom used stories, context and meaning, complex systems thinking, pattern identification, and facilitated situational responses that challenged student assumptions. The study showed, "students saw the world differently" when reporting, "I've learned that not everything is what it seems to be. I am a judger and I think this class taught me to look at the big picture" (Bloom, 2013, p. 1352). Bloom argued that attending to ecology of mind requires a learning environment that provides, "safety, curiosity, rigor, and uncertainty" (p. 1352). Ecoliteracy as an ecology of mind entails the development of objective student ecological, emotional, and social intelligence in response to subjective, affective, and direct contact with academic and life

experiences. In this context, ecoliteracy addresses how classroom environments provide the ability for students to synthesize academic learning with real-world contextualization and application upon completing courses or graduating.

Ecoliteracy: Social Change From Inside the College Classroom to the World

The development of ecoliteracy requires educators to create the environment in a classroom for students to explore academic material and then contextualize and relate that academic material experientially in personal, social, and ecological worldviews (Barnes, 2013; Goleman et al., 2012; Pappas, 2012; Puk & Stibbards, 2012). Goleman et al. (2012) identified five practices of emotionally and socially engaged ecoliteracy for the classroom:

1. "Developing empathy for all forms of life" (p. 10) that involves developing student awareness for compassion and their relationship with the web of life;
2. "Embracing sustainability as a community practice" (p. 10) that recognizes interdependent relationships in individual and collaborative efforts towards cooperation within personal, ecological, and social systems;
3. "Making the invisible visible" (p. 11) in realizing how much humans affect personal, social, and ecological environments through attitudes, dispositions, and behaviors;
4. "Anticipating unintended consequences" (p. 11) in the recognition that trial and error, success and failure in support of developing quality of life, and resiliency in order to work with adverse systemic responses to changing negative feedback;

5. "Understanding how nature sustains life" (p. 11) in the development of an individual's personal, social and environmental worldviews that considers the future of all living life forms within the myriad living systems that constitute the personal, social, and natural environments of student existence (pp. 10-17).

Goleman et al. asserted that educator attention to these five practices leads to the integration of the emotional, social, and ecological intelligence of students and the development of an ecoliterate worldview. The ecoliterate worldview includes seeing the big picture within a systems view of life that recognizes that systems are not just a collection or the sum of their parts, but exist interdependently in the creation of what defines personal, local, and global perception and experience (Goleman et al., 2012). Ecoliterate awareness that is used by students in this capacity provides direction to work with adaptation and change through a knowledge and experiential-based lens for working with equilibrium, sustainability, and resiliency.

The application of ecoliterate knowledge requires elasticity or flexibility in order to maintain degrees of continuity, resiliency, and sustainability for what is learned in the classroom (Barnes, 2013; Moore et al., 2014; Tabara & Chabay, 2013). Barnes (2013) defined five phases of learning that include awareness and appreciation, knowledge and understanding, attitudes and values, problem solving skills, and personal responsibility and action towards the development of ecoliteracy. Barnes argued that the five phases represent a "cogent learning process" that students will experience continuously throughout their life time (p. 2). The ability for students to exercise elasticity and

flexibility provides the opportunity to apply new knowledge experientially on personal, social, local, and global levels (Barnes, 2013; Moore et al., 2014; Tabara & Chabay, 2013). Moore et al. (2014) and Tabara and Chabay (2013) asserted that tying ecological and social learning together provides the opportunity to work with transformation and change that is sustainable in personal, local, and global contexts.

Moore et al. (2014) identified three points where eco- and social transformation occur that include: direct change within a system, change affecting dominant views, and change further altering the structural parts of a system. The change is brought on by triggers that demand or force adaptation to occur in order to maintain equilibrium (Moore et al., 2014). Tabara and Chabay (2013) argued that contemporary personal, local, and global stressors are causing changes rapidly which are forcing and creating environments in which individuals, societies, and natural environments find themselves having to respond to transformation with new paradigmatic approaches to learning and application. Moore et al. argued that a framework for maintaining positive eco-social transformation within systems is necessary for seeing continuity and change that is lasting. The Moore et al. framework includes a three-step process:

1. The preparation for change with sense making, envisioning, and momentum in which engagement occurs;
2. selecting, learning, and adopting then play a role in seeing the transformation take root;
3. routinization, strengthening relationships, and stabilization in order to see the transformation become sustainable (Moore et al., 2014).

The engagement of deep learning practices are emerging for the development and use of ecoliteracy approaches in college classrooms that are responding to the contemporary forces of change effecting individual, social, and global ecological systems.

Ecoliteracy: Identifying a Pedagogy for the Development of Ecoliteracy in the College Classroom

Efforts in the classroom to foster student ecoliteracy are aimed at developing deep learning versus surface learning approaches to education. Wang et al. (2014) stated that deep learning approaches occur when students are "intrinsically interested" in what they are learning and therefore develop a "strategy that maximizes its meaning" (p. 3). Wang et al. argued that deep learning provides students the ability to adapt learning strategies that are relative to the environment and activity in the classroom. Deep learning involves grounding knowledge in contextual and multidimensional bases that supplement successful academic outcomes (Wang et al., 2014). Puk and Stibbards (2012) maintained that deep learning approaches involve the development of "conceptual maturity" (p. 354). Conceptual maturity is an embodied experience of learning that "demonstrates understanding and allows for an adaptive and meaning-making ability in the learner" (Puk & Stibbards, 2012, p. 357). Embodied learning experiences delve deeper than surface learning in which students only regurgitate what is learned through rote testing and classical textbook responses to what is learned (Puk & Stibbards, 2012). Wang et al. and Puk and Stibbards asserted that how teaching is done in a college classroom effects what students will learn and take away academically and experientially.

Wang et al. (2014) conducted a study that showed educators who exhibited an organized, engaged, and clear classroom environment did significantly affect three deep approaches to learning that included higher-order learning, reflective learning, and integrative learning. The Wang et al. study asserted students seek educators who express multidimensionality, reasonability, reliability, and valid content mastery supplemented with deep approaches to learning. The researchers argued that a clear classroom environment that engages deep learning approaches affect student growth in critical thinking and further needs for cognition (Wang et al., 2014). Wang et al. showed "41% of the total effect of clear and organized instruction on need for cognition was mediated through increased student use of deep approaches to learning" (p. 18). Significantly, the deep approach of reflective learning affected how students responded to the development of critical thinking skills the most (Wang et al., 2014). The deep learning approach of reflective pedagogical practices has been emerging as a means to answer research questions towards the development of college student ecoliteracy, but has yet to be tested in terms of ecoliteracy as outlined by the McBride et al. (2013) frameworks.

The development of conceptual frameworks and academic environments that are grounded in deep learning contexts, like that of reflective learning, support embodying conceptual maturity and the need for cognitive and metacognitive critical thinking skills (Puk & Stibbards, 2012; Wang et al, 2014). Puk and Stibbards (2012) argued efforts towards developing ecoliteracy require driving learning outcomes towards meaning-making, spirituality, morals, and values if what is learned in the classroom is to have sustainable effects. Puk and Stibbards conducted a study in which teacher education

students enrolled in a Bachelor of Education program course in ecological literacy did not respond well to defining and being adequately prepared to teach the conceptual frameworks of ecological literacy or ecoliteracy. The use of the Means of the Emergent Maturity Scale showed that after experiencing secondary and college classroom instruction, conducted in traditional lecture-only and surface learning formats, led to what Puk and Stibbards described as "ecological illiteracy" in future teacher preparedness (p. 365) . On a scale of 1-4, where 1 equals immature and 4 equals robust maturity, 20.7% of students did not provide any definitions for the learning found within the conceptual frameworks of ecological literacy or ecoliteracy (Puk & Stibbards, 2012). Seventy-three percent of participants scored only a level 1 immature response rate to how ecological literacy or ecoliteracy is being learned and transmitted (Puk & Stibbards, 2012). The Puk and Stibbards study illustrated where deep learning, meaning making, and reflective learning could play an integral role in connecting students with academic knowledge and contextual experience.

Reflective learning involves the development of student thinking towards personal and intellectual growth (Ryan & Ryan, 2013). Ryan and Ryan (2013) cited Dewey and Shon's work with reflection as it concerns "the nature of reflection and how it occurs" and "reflection-in-action and reflection-on-action" as being influential in how learning takes place in educational environments versus general reflections of a personal nature (pp. 244-245). The use of reflective learning provides students with the ability to engage complexity that changes passive responses of a descriptive and personal nature to responses that actively engage theoretical practice grounded in direct engagement and

experience (Ryan & Ryan, 2013). They maintained that deep learning experiences result in the production of a transformation that occurs involving student capacity to connect knowledge with experience in sociocognitive processes (Ryan & Ryan, 2013). Ryan and Ryan argued that reflection is, "a socio-cognitive process, which involves interrelated ways of knowing each of which can be developed by a teacher" (p. 246). Towards this end, students experience new ideas, contextualize these ideas while contemplating and structuring ideas in new "schemas" in personal, local, and global contexts, and then apply the new knowledge in direct experience with their environments (Ryan & Ryan, 2013). Ryan and Ryan provided numerous examples of using writing approaches to reflective learning as a strategy for fostering this deep learning approach in the development of successful student outcomes.

Research by Arnold (2012), Balgopal et al. (2012), and Cermak (2012) showed how educating for ecological literacy and ecoliteracy with the use of reflective learning and writing strategies is taking place. Arnold (2012) conducted research using online nature journaling as a course supplement that required students to spend time outdoors and then reply to a number of guided responses. Arnold measured if the journaling exercise connected students with a greater ecological worldview that is closer to the natural world. Results showed 74% of the students reported having increased ecocentric awareness, "somewhat or a great deal" (p. 139). Those who did not show an increase in ecocentric awareness responded with indifference or that they were already aware of nature (Arnold, 2012). Arnold identified cognitive changes that occurred as a result of the journaling activity that included impact, feeling loss of the natural spot if it disappeared,

that others also enjoyed nature, and that development of an affective infinity for their spot took place. However, students did not connect the assignment with course content, activities, or academic theory (Arnold, 2012). Arnold reported the use of the reflective journaling exercise may not have led to the development of long-term ecological or ecocentric connection to nature due to a lack of emphasis or inclusion of the journal assignment throughout classroom instruction.

Balgopal et al. (2012) employed the use of writing-to-learn strategies that required students to actively engage in environmental and social ecological systems inside and outside the classroom. The writing-to-learn strategies were designed to work with student affective and behavioral responses to studying science in the classroom and within an ecosystem (Balgopal et al., 2012). Unlike Arnold (2012), Balgopal et al. deliberately designed their assignments to include cognitive, affective, and behavioral responses to ecological awareness grounded in classroom problem solving and connected to outside the classroom experiential fieldwork. They measured student responses based on superficial, subjective, objective, or authentic qualities associated with the content of their writing (Balgopal et al., 2012). Students reported they felt a stronger understanding of ecological concepts after conducting the writing assignments. Balgopal et al. reported 33% of learners did develop some degrees of ecoliteracy relative to the in-class writing and field experience. However they did argue science education needs to pay more attention to the affective responses of students towards the development of working with problem solving capacities and engaged action orientations towards improving ecological contexts (Balgopal et al., 2012).

Cermak (2012) engaged a different approach to fostering ecoliteracy in the classroom by adapting what he called “critical ecological literacy” (p. 192). Critical ecological literacy is defined as, “the process of using reading and writing to create messages that question, confront, and reconfigure how environmental problems are constructed by one’s own overlapping racial, cultural, and economic power relations” (Cermak, 2012, p. 197). Cermak’s research methodology involved using the music genre of hip-hop to engage students in social justice ecological thinking from a critical standpoint. He encouraged students to create ecological messages using their own ideas concerning the meaning of ecology by constructing environmentally-oriented rap (Cermak, 2012). Results of the rap that was created showed students were able to step away from the third-person objective approach commonly found in science writing and towards an ecological understanding that included urgency, ethics, marginality, environmental degradation, and social justice (Cermak, 2012). Cermak remarked students displayed a Freireian approach to critical literacy that consists of, “promoting learners that know how to read the world, not just the word” (p.197). Students also displayed ecological understandings relative to meaning, interconnectedness, and empathy through the use of the hip-hop rap writing medium (Cermak, 2012). Cermak’s study is the most closely related to finding alignment with a working definition of ecoliteracy versus ecological literacy as outlined by the McBride et al. (2013) frameworks and work of Capra (Capra, 1996; Capra & Luisi, 2014; Mitchell & Mueller, 2011; Stone, 2010; Widhalm, 2011a, 2011b, 2013) and Orr (Mitchell & Mueller, 2011; Orr 1992, 2004).

Although the aforementioned work provided data and research concerning the development of ecological literacy and ecoliteracy, a central focus on research concerning college student ecoliteracy remains largely underdeveloped. The research cited here mainly addressed ecological literacy with slight nuances of ecoliteracy beginning to enter into measuring ecoliteracy in the college classroom. The research that is available for ecological literacy and ecoliteracy is also still found to be centered within the schools of science, environmental science, and ecological sciences with the schools of the humanities not included. The working definition of ecoliteracy as outlined in the McBride et al. (2013) frameworks and the core of Capra (Capra, 1996; Capra & Luisi, 2014; Mitchell & Mueller, 2011; Stone, 2010; Widhalm, 2011a, 2011b, 2013) and Orr's (Mitchell & Mueller, 2011; Orr 1992, 2004) work with the development of ecoliteracy, directly involves yoking science together with the humanities in a transdisciplinary fashion.

The work of Wang et al. (2014), Ryan and Ryan (2013), and Puk and Stibbards (2011) illustrated the importance of using deep learning approaches and reflective learning as a method for cultivating positive student academic outcomes, ecological literacy, and ecoliteracy. Ryan and Ryan argued the value of reflective learning practices is recognized in higher education yet continues to only be relatively applied in ways that are resulting in surface versus deep learning. Current research in higher education ecoliteracy has not delved deeper into how ecoliteracy potentially serves to connect the science of ecoliteracy with the humanism of ecoliteracy through academic, experiential, meaning making, and empathetic responses. These responses include combining the

social, emotional, and cognitive development on the part of students to what they are learning in their overall academic journey in terms of ecocentric and empathetic responses to personal, local, and global worldviews. Each of the authors addressed the importance and need for the further development of pedagogical approaches and research to further the development of ecoliterate college student learning.

Reflective learning provides a first step towards a deep learning approach to the development of ecoliteracy. Ryan and Ryan (2013) asserted "there is scant literature or theoretical guidance on a systematic, developmental approach to teaching reflective learning in higher education and requires specific pedagogic intervention to do well, a programme/course-wide approach is essential" (p. 255). Puk and Stibbards (2012) maintained "continuing research in higher learning is required regarding emergent and embodied learning, in order to explicitly delineate the parameters of such an approach that lead to the development of meaningful and mature understandings of key (ecologically literate) concepts in students" (p. 369). I sought to contribute to this limited research base within the field of ecoliteracy in higher education through the examination and testing of contemplative pedagogy as a deep learning tool for developing student ecoliteracy in college classrooms. The next sections of this literature review introduce contemplative pedagogy as the independent variable, contemplative pedagogy's history, use, and practice in higher education.

Contemplative Pedagogy: Background

The use of contemplative pedagogy in higher education has been emerging in the last several decades in response to a need for students to reflect, connect, and

contextualize what they are learning in academia with real life experiences while balancing the pressures of a rapidly paced and changing contemporary world (Barbezat & Bush, 2014; Duerr, 2011; K. Fisher, 2017; Fort & Komjathy, 2017; Franzese & Felton, 2017; Grace, 2011; Gunnlaugson et al., 2014; Kaufman, 2017; Morgan, 2014; Wapner, 2016; W-Wright, 2013; Zajonc, 2009, 2013). Student time for processing and reflecting on the amount of information they are expected to analytically digest and critically examine is extremely limited amidst heavily engaged academic and personal life schedules (Barbezat & Bush, 2014; Chano, 2012; Webster-Wright, 2013). Reflective learning has taken root to some degree in higher education, but reflective learning approaches continue to result in rapid short term surface learning responses to high speed academic and contemporary culture (Webster-Wright, 2013). Webster-Wright (2013) asserted that while students are expected to critically engage a large plethora of academics and life experiences simultaneously, little time is afforded for students to develop a "mindful contemplation" approach to integrating what is learned into direct engaged or embodied experience (p. 557). Webster-Wright described mindful contemplation as a form of, "mindful inquiry" that "incorporates active inquiry to probe problems, while holding open a receptive space for contemplation" (p. 557). Outcomes relative to the use of contemplative pedagogy provides students the ability to ground learning in objective and subjective knowledge while simultaneously developing their experiential resiliency mental, emotional, and physical equanimity (Barbezat & Bush, 2014; Chano, 2012; Duerr, 2011; Grace, 2011; Webster-Wright, 2013; Zajonc, 2009,

2013). Contemplative pedagogical approaches to learning and instruction are working to develop educational practices that address this student need in higher education.

Contemplative pedagogy is not new and has been used and practiced in secular (nonreligious) and nonsecular (religious) learning environments throughout human history (Albrecht et al., 2012; Barbezat & Bush, 2014; Duerr, 2011; Grace, 2011; Morgan, 2014; Zajonc, 2013). The earliest inceptions of contemplative pedagogy appear in eastern and western philosophical and religious traditions (Barbezat & Bush, 2014; Duerr, 2011; Morgan, 2014; Zajonc, 2009, 2013). Contemplative practices included meditation, movement, and ritual exercises that develop the awareness of individuals' third-person objective and first-person subjective understanding of mind, heart, and body in relationship to themselves and the world (Albrecht et al., 2012; Barbezat & Bush, 2014; Duerr 2011; Morgan, 2014; Napora, 2011; Roth, 2008; Zajonc, 2009, 2013). A question of the secular and nonsecular nature of contemplative pedagogy is raised in the use of contemplative pedagogy exercises in nonreligious higher educational institutions (Barbezat & Bush, 2014; Coburn, Grace, Klein, Komjathy, Roth, Simmer-Brown, 2011; Morgan, 2014; Roth, 2008; Zajonc, 2009, 2013). Barbezat and Bush (2014) argued, "No specific faith is required to conduct or follow these practices; all that is demanded is that the student enter with an engaged and open mind—the same orientation as in approaching any other intellectual endeavor" (p. 22). Barbezat and Bush also cited Roth (2008) in support of secular foundational approaches to contemplative pedagogy exercises in which he asserted, "Central to this approach is the understanding that contemplative experiences are not confined exclusively to religion" (p. 20). The

arguments surrounding secular and nonsecular contemplative pedagogy is beyond the scope of my literature review. For the purposes of my examination contemplative pedagogy exercises were presented as secular educational exercises in the classroom.

Contemplative pedagogy began to enter into higher education in the United States with the founding of Naropa University (http://www.naropa.edu) in Boulder, Colorado in 1974 and the founding of the California Institute of Integral Studies (http://www.ciis.edu/) in 1980 (Duerr, 2011; Morgan, 2014). Forwarding these efforts towards the development of contemplative pedagogy exercises in higher education the Center for Contemplative Mind in Society (CCMS; http://www.contemplativemind.org/) of which the Association for Contemplative Mind in Higher Education (ACMHE; http://www.contemplativemind.org/programs/acmhe) is also a part, currently play a strong role in building on the foundations created by Naropa University and the California Institute of Integral Studies (Duerr, 2011). Since this time, numerous other colleges, organizations, institutions, and educators continue to develop and use contemplative pedagogy in professional development and classroom settings throughout America (Albrecht et al., 2012; Barbezat & Bush, 2014; Duerr, 2011; Gunnlaugson et al., 2014; Morgan, 2014; Zajonc, 2013).

Contemplative pedagogy exercises continue to grow in contemporary higher education as a method for providing students the ability to connect the rigors of academic learning with the rapid pace and stressors of real life and world experiences. Morgan (2014) argued, “chronic stress, fragmented attention, time poverty, and quest for meaning are now finding that contemplative practices provide a means to navigate both the entry

and the exit of a passage back to wholeness that contemplation can provide" (p. 16). Contemplative pedagogy exercises support the development of engaged intellectual academic rigor and knowledge acquisition while providing students the support necessary to critically integrate learning while balancing their emotional, empathetic, compassionate, and altruistic connections with individual, local, and global worldviews (Chano, 2012; Coburn et al., 2011; Duerr, 2011; Grace, 2011; Mahani, 2012; Napora, 2011; Zajonc, 2013). Barbezat and Bush (2014) maintained that, "contemplative pedagogy practices place the students at the center of their own learning, shifting the balance of power in the classroom in a meaningful and engaged manner" (p. 8). Students are provided with the opportunity to pause, reflect, and embody material being learned in a classroom through methods of deep approaches to learning.

Contemplative Pedagogy: Defining the Independent Variable—Use and Practices in the Higher Education Classroom

Contemplative pedagogy exercises create the space for students to exercise "inner awareness through first person investigations" (Grace, 2011, p. 99). Grace (2011) maintained that contemplative processes are empirical as students have the opportunity to critically examine truth-claims through their own "inner research" and direct experience relative to outer knowledge acquisition (p. 99). Chano (2012) stated contemplation provides learners with the capacity to discover new thoughts, ideas, and knowledge that they might not have noticed through rote, surface, or only reflective approaches to learning. Chano described contemplative practices as, "fostering intuitive, non-conceptual and experiential forms of knowledge along paths of learning focused on the

moral aspects of wholeness, unity, and integration" (p. 107). Contemplative pedagogy offers elements of potential discovery and transformation accompanied by the development of student relationships that involve connecting what they are learning in the classroom with themselves, others, and the world as a whole (Barbezat & Bush, 2014; Chano, 2012; Grace, 2011; Napora, 2011; Zajonc, 2013).

Contemplative pedagogical approaches to learning create an environment where students have the ability to actively engage learning through deep critical reflection by providing a space for discriminatory and nondiscriminatory reactions to what is being learned. Research conducted in a college classroom for preservice teachers where contemplative pedagogy was used showed that students experienced:

- Improvement in knowledge acquisition (92.86%);
- Happiness in learning (96.43%);
- Reported feeling relaxed in learning (89.28%);
- Enhanced critical thinking (85.71%), and
- Considered contemplative practices a favorite approach to learning (96.43%; Chano, 2012, p. 109).

Chano maintained that the facilitation of contemplative practices involves attention to what he called the "7 C's Principles" that include contemplation, compassion, connectedness, confronting reality, continuation, commitment, and community of practice (p. 107). However, Zajonc (2013) also included mindfulness, concentration, open awareness, and sustaining contradictions as essential elements that supplement contemplative practices in the classroom. Zajonc argued. "…change growth, and

transformation of the human being are the hallmarks of genuine education" and that contemplative practices provide a medium to foster authentic integrative and transformative learning experiences (p. 91). Contemplative pedagogy then enriches educational goals and outcomes; yokes student knowledge acquisition together with meaning making; fosters compassionate and empathetic responses to everyday academic and life stressors; as well as deep listening and nonbiased critical reflection in transforming knowledge and embodying wisdom (Zajonc, 2013).

Barbezat and Bush (2014) argued contemplative practices foster self-compassionate responses on the part of the students towards the acquisition of learning, knowledge contexts, and embodying what they are learning in personal, local, and global contexts. Contemplative pedagogy provides, "a framework for students to begin to open to their own sense of meaning, first to the material being taught in the class and then to a broader and deeper sense of how their learning fits into their lives" (p. 17). Mahani (2012) maintained contemplative pedagogy exercises provide educators with the ability to use numerous exercises and practices that engage student learning in integrated, experiential, contemplative, and transformative learning approaches to individual classroom disciplines and interdisciplinary learning constructs. Albrecht et al. (2012) asserted contemplative pedagogy enriches classroom management, teacher-student relationships, and instructional strategies. The transformation of intellectual knowledge and embodiment of practical application into life-contexts in contemplative pedagogical approaches to learning are fostered through numerous classroom practices, activities, and exercises.

Practices include meditation exercises, journaling, written reflection papers, movement exercises, contemplative reading and writing, listening, music, art, yoga, guided meditations, self-inquiry exercises, and nature experiences (Barbezat & Bush, 2014; Chano, 2012; Grace, 2011; Napora, 2011; Zajonc, 2013) The CCMS (n.d.) created The Tree of Contemplative Practices (Figure 1) represents some of the numerous forms of contemplative pedagogical approaches to learning that have been developed for classroom engagement.

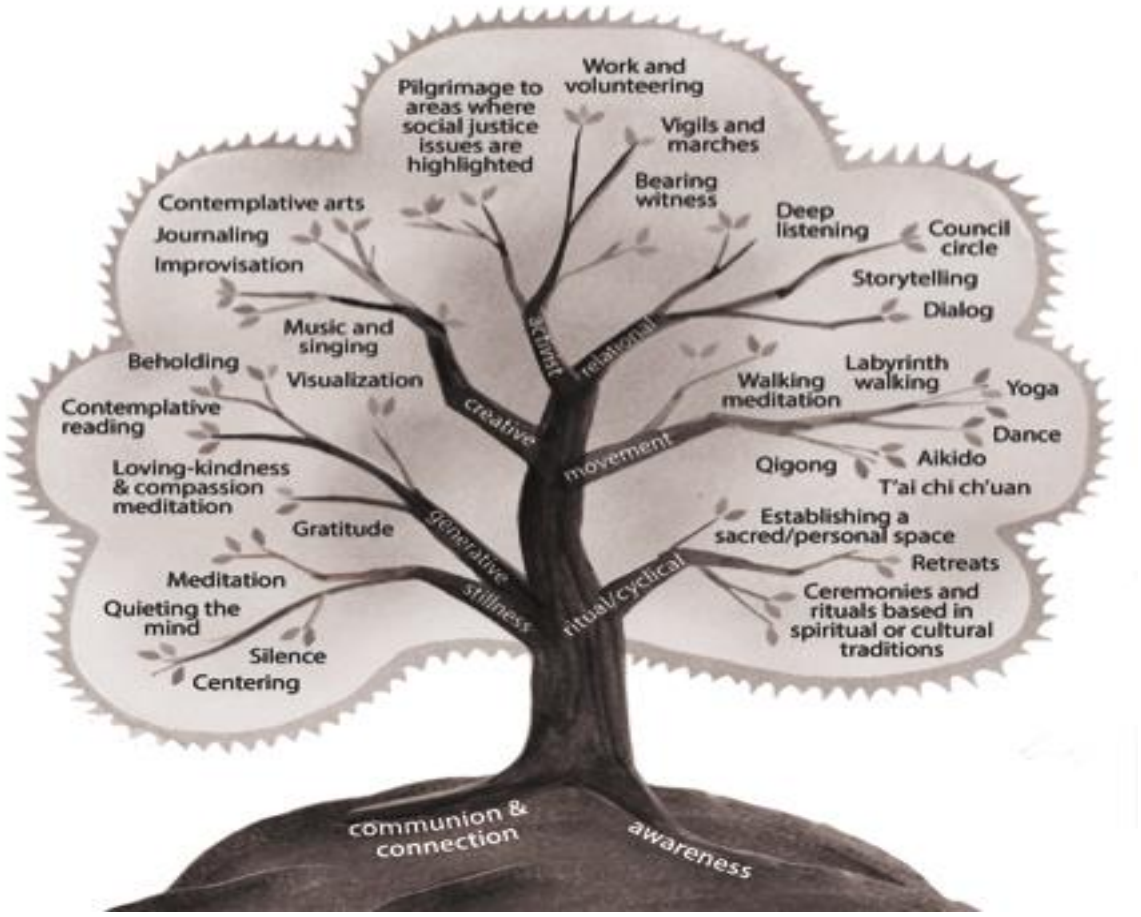


Figure 1. The Tree of Contemplative Practices. Created by The Center for Contemplative Mind in Society, n.d., retrieved from http://www.contemplativemind.org/practices/tree. Reprinted with permission.

The CCMS described the roots of the tree as representing the two foundations of contemplative practices. They maintain the two foundations of contemplative practices transcend differences found in nonsecular traditions and provide the ability to develop secular practices for the classroom. The branches of the tree represent different varying clusters of practices based on intended outcomes desired in the classroom relative to the material being taught. They emphasized neither the clusters, nor the tree as a whole, are absolute, indicative, or complete in representing contemplative practices, but offer a

foundation for which to start. They also provide a downloadable blank tree that educators or students can use to fill in their own ideas relative to their understanding of contemplative practices.

Contemplative pedagogy provides educators with a pedagogical tool that supplements already established classroom instruction with mindful learning practices. It is emphasized educators should have training, a background, and contemplative practices of their own in order to adequately facilitate contemplative pedagogical practices in the classroom (Albrecht et al., 2012; Barbezat & Bush, 2014). Conceptual frameworks of contemplative pedagogy involve directed experiences, deep listening, nonbiased approaches to the absorption of learning, contemplation, present-moment awareness, meta-awareness, interdependent awareness, and local and global wisdom (Chano, 2012; Greeson et al., 2014; Zeidan et al., 2010). Contemplative pedagogy practices include moments of being still, movement, creativity, activism, meditation, relational understanding, adaptability, metacognition, and holistic awareness (Chano, 2012; Greeson et al., 2014; Napora, 2011; Rogers, 2013; Zeidan et al., 2010). Chano (2012) stated contemplative pedagogy is based on two meta-goals that include, "fundamental self-transformation and social consciousness…the underlying philosophy or concepts guiding this kind of transformative facilitation are rooted in the belief in human potential and a holistic worldview" (p. 107). With contemplative pedagogy, educators have the ability to work with student learning capacities that foster an interdependent awareness between course material, personal, and social-world relationships in grounded contexts.

The development of contemplative practices for the classroom continue to emerge as greater numbers of educators adapt the contemplative pedagogy exercises into their classrooms (Albrecht et al., 2012; Barbezat & Bush, 2014; Coburn et al., 2011; Dounas-Frazer & Reinholz, 2015; Grace, 2011; Greeson et al., 2014; Grossenbacher & Rossi, 2014; Helber et al., 2012; Medin & Lindberg, 2013; Morgan, 2014; Mrazek et al., 2013; Napora, 2011; Rogers, 2013; Shapiro et al., 2011; Wapner, 2016; Webster-Wright, 2013; Zajonc, 2013; Zeidan et al., 2010). A central aspect of contemplative pedagogy exercises involves the development of awareness (Barbezat & Bush, 2014; Coburn et al., 2011; Grace, 2011, Webster-Wright, 2013, Zajonc, 2013). Webster-Wright (2013) asserted, "awareness implies insightful thought" (p. 556). The focus on awareness in contemplative pedagogical practices has led to the emergence of mindfulness and connectivity as the two central paradigms for developing student learning (Figure 1).

The operation of the independent variable of contemplative pedagogy in the classroom means instructors used engaged instructional exercises that provided the students with the time, space, and place to objectively and critically reflect on learning. This was done through mindful learning and experiential contemplative practices (Figure 1) that relate to meaning making, purpose, and compassion relative to how students objectively view their subjective responses to self, other, and the world (Barbezat & Bush, 2014; Bush, 2011; Grace, 2011; Zajonc, 2009, 2013). The next section addresses how mindfulness and connectivity is found in contemplative pedagogy, how contemplative pedagogy is defined as the independent variable, and a review of current research pertaining to contemplative pedagogy in higher education.

Contemplative Pedagogy: Mindfulness and Connectivity for Undergraduate Students

Mindfulness and connectivity are the two central roots of contemplative pedagogy exercises (Figure 1). Contemplative pedagogy is defined as mindfully and actively engaging the present moment towards developing a holistic objective awareness for the numerous variables existent inside or outside a living system, or multifaceted living systems, relative to how these variables affect individual objective and subjective responses to intrinsic and extrinsic stimuli (Albrecht et al., 2012; Barbezat & Bush, 2014; Busch, 2014; Bush, 2011; Dounas-Frazer & Reinholz, 2015; Gause & Coholic, 2010; Greeson et al., 2014; Helber et al., 2012; Hölzel et al., 2011; McCallum, 2008; Medin & Lindberg, 2013; Mrazek et al., 2013; Shapiro et al., 2011; Smalley & Winston, 2010; Vago & Silbersweig, 2012; Zeidan et al., 2010). Gause and Coholic (2010) maintained present-moment holistic awareness is critical in the development of mindfulness as it, "takes into account the whole person including physical, mental/psychological, emotional and spiritual/transpersonal/existential dimensions of life experience" (p.2). This provides students with the ability to develop a holistic view of what they are learning relative to their personal and global worldviews.

The holistic approach of mindfulness provides students the opportunity to engage in a first person view that fosters meaning making, while supplementing the analytical objectivity of third-person critical thinking skills (Albrecht et al., 2012; Barbezat & Bush, 2014; Busch, 2014; Bush, 2011; Hart, Ivtzan, & Hart, 2013; Roeser, 2012; Rogers, 2013). Mindful learning provides the necessary capacity for students to "examine the stream of

experiential phenomena with an attitude of acceptance and clarity" (Gause & Coholic, 2010, p. 9). The development of student consciousness with mindful awareness supports "varying forms of consciousness" related to ecological intelligence (McCallum, 2008, p. 49). McCallum (2008) described ecological intelligence as being in an "awakened state" in step with the functioning of the unconscious mind in a hierarchical fashion (p. 49). McCallum's description of the awakened state includes being alert, being aware, being self-aware, and being aware that we are aware (p. 49). Smalley and Winston (2010) described mindfulness as, "the art of observing your physical, emotional, and mental experiences with deliberate, open, and curious attention" (p. 11). Contemporary undergraduate students engage in numerous academic and personal life experiences that affect their cognitive and affective responses inside educational systems like that of higher education.

Undergraduate students are in a life-changing phase of development that is called emerging adulthood (Greeson et al., 2014; Mahmoud et al., 2012; Peer & McAuslan, 2015; Rogers, 2013; Roeser, 2012). Rogers (2013) described this stage of development as a, "period of excitement and change" while simultaneously asserting that many emerging adults also experience high degrees of pressure and stress (p. 74). Emerging adulthood involves change; fluctuating dynamics of wants and desires; identity, experimentation, and choices; direct challenges involving confidences; career choices; subjects of interest; romantic, individual, friendships, and interpersonal relationships; curiosity; self-doubt; and fear of the unknown (Greeson et al., 2014; Mahmoud et al., 2012; Peer & McAuslan, 2015; Rockenbach et al., 2012; Rogers, 2013; Roeser, 2012). Rogers maintained that

emerging adulthood involves not knowing what comes next in life. Roeser (2012) described the emerging adult experience as being a space "in-between" childhood-adolescence and adulthood (p. 11). The in-between space involves levels of existential experiences in which emerging adults are seeking to define themselves relative to adult responsibilities in an ever-expanding and engaged world and worldview (Roeser, 2012). Roeser further maintained the existential experience of the in-between space at once evokes, "a sense of optimism and possibility, but also uncertainty, fear, anxiety and depression" that can lead to maladaptive responses on the part of emerging adults in how they engage and cope with such dramatic life changes (p. 11). Peer and McAuslan (2015) argued emerging adults are experiencing a continuous process of becoming that creates innumerable potentialities and possibilities in their direct experience of life. The emerging adult process has the ability to generate, "apprehension and/or skepticism about one's identity and one's future" that potentially leads to self-doubt and negative associations with personal, social, and global worldviews and influences (Peer & McAuslan, 2015, p. 1). The use of contemplative pedagogy via mindfulness and connectivity continues to advance attending to the issues of emerging adulthood in affecting cognitive development and the neuroplasticity that undergraduate students are experiencing.

The developmental phase of emerging adulthood is a powerful time in the life of emerging adults as their physical bodies, thinking minds, and feeling hearts respond to objective and subjective experiences of themselves in relationship to the world (Greeson et al., 2014; Mahmoud et al., 2012; Peer & McAuslan, 2015; Rockenbach et al., 2012;

Roeser, 2012; Rogers, 2014). Roeser (2012) asserted the mind's functions relative to "the higher mental functions such as impulse control, planning, perspective taking, and problem-solving associated with the prefrontal cortex, are still developing in profound ways" during emerging adulthood (p. 11). Peer and McAuslan (2015) stated mindfulness provides emerging adult minds' with awareness and attention as it relates to a disposition found in the natural functions of being a human biological organism. Emerging adults are working with five dimensional processes that are subject to change at any given moment that include identity, possibilities, instability, self-focus, and the in-between (Peer & McAuslan, 2015). Peer and McAuslan (2015) showed stressors associated with the five dimensions were significantly reduced when mindfulness mediation was present ($F[6,1253] = 39.58$, $p < .001$; $R = .3992$ $R^2 = .1593$; p. 5). Hölzel et al. (2011) maintained the development of mindfulness affects attention regulation, body awareness, emotion regulation, and change in perspectives on the self that lead to the emergence of psychological well-being, self-compassion, meta-awareness, and enhanced self-regulation (pp. 539-549). Attention to emerging adult cognitive functions and the fostering of neuroplasticity provides emerging adults the ability to develop healthy system(s)/systemic biological functions, cognitive functions, and psychological wellbeing (Greeson et al., 2014; MLERN, 2012; Peer & McAuslan, 2015; Rogers, 2013).

Vago and Silbersweig (2012) established a theoretical framework for the effects of mindfulness on cognitive function and neuroplasticity. The theoretical framework included self-awareness, self-regulation, and self-transcendence as a method for investigating the "neurobiological mechanisms of mindfulness" (Vago & Silbersweig,

2012, p. 1). Vago and Silbersweig argued that mindfulness provides and supports the development of "a multidimensional skillset that ultimately leads to a reduction in self-processing biases and creates a sustainable healthy mind" and, "a continuous discriminative attentional capacity" ultimately described as, "mindful awareness" (p. 24). The discriminative capacity of the mind's cognitive function, relative to the direct experience of phenomena that exist in the lived experience of individuals, now exercises embodied cognitive (enaction) responses to stimuli that affect emotional dispositions, self and other compassion, attention, creativity, pro-sociality, emotion regulation, and interdependence from a place of metacognitive (self)-awareness (Hölzel et al., 2011; MLERN, 2012; Varela et al., 1991; Vago & Silbersweig, 2012). Embodied cognitive enaction emphasizes experiential cognition as dependent on sensory experiences that are nested in biological, psychological, and cultural contexts in which mind (self) and matter (world/living systems) do not exist separately but interdependently (Capra & Luisi, 2014; Hölzel et al., 2011; Varela, 1999; Varela et al., 1991; Vago & Silbersweig, 2012). Metacognitive awareness represents individual awareness for the processes of cognition, minus bias and attachment through the act of being a neutral observer to personal responses concerning sensory experiences, feelings, and activities (Efklides, 2011; Hölzel et al., 2011; MLERN, 2012; Smalley & Winston, 2010; Vago & Silbersweig, 2012). Current research showed contemplative pedagogy exercises did have a significant influence on the mindful development of executive function, cognitive, embodied cognitive (enaction), and metacognitive awareness concerning the neuroplasticity of emerging adult undergraduate students. Research showed programs that taught students

how to use specific contemplative practices in seminar and workshop scenarios as well as educators using contemplative pedagogy in their classrooms as a teaching tool is having a significant effect on student learning and learning outcomes.

Greeson et al. (2014) presented research on a program entitled *Koru* that was instituted on a college campus that provided students with the opportunity to learn contemplative pedagogy exercises during the college semester as way to supplement their academic learning experiences. The program was designed to address contemporary student problems that include stress, anxiety, depression, suicidal or self-harm behavior, and sleep disturbance (Greeson et al., 2014; Rogers, 2013). Data collected by Greeson et al. showed there was an improvement in students through the following:

- perceived stress (F [1,76.40] = 4.50, p = .037, d = .45);
- sleep problems (F [1,79.49] = 4.71, p = .033, d = .52);
- mindfulness (F [1, 79.09] = 26.80, p < .001, d = .95);
- self-compassion (F [1,74.77] = 18.08, p < .001, d = .75).

Zeidan et al. (2010) showed a brief contemplative pedagogy program had a significant influence on reducing student:

- student fatigue (F[1,47] = 5.26, p = .03, n^2 = .10);
- depression (F[1,47] = 13.31, p = .001, n^2 = .22);
- tension (F[27.79] = 5.26, p < .001, n^2 = .37);
- anger (F[1,47] = 10.61, p = .002, n^2 = .18);
- confusion (F[1,47] = 7.35, p = .009, n^2 = .14);
- improvement in cognitive tasks (F[6,42] = 2.28, p = .05, n^2 = .25).

Helber et al. (2012) showed the use of mindfulness meditation in a sociology course significantly correlated with increasing students' cognitive executive functions. Cognitive executive functions involve the mind's ability to work with planning, self-monitoring, goal setting, strategic behavior, and flexibility (Helber et al., 2012, p. 3). Helber et al. stated, "Executive functions are critical for effectively navigating one's everyday environment" (p. 3). Their study showed a brief introduction to contemplative practices significantly influenced:

- higher level cognitive abilities (executive functions) [$r(16) = .82$, $p < .01$]
- time spent meditating predicted 68% of the variance of the executive function [$R^2 = .68$, SE = .48; $F(1,16) = 31.22$, $p < .01$)].

Mrazek et al. (2013) showed the use of contemplative mindfulness training significantly affected student:

- improvement on GRE scores ($F[1,46] = 5.609$, $p = .02$);
- higher working memory capacity ($F[1,46] = 3.954$, $p = .05$);
- probe-caught mind wandering ($F[1,46] = 8.241$, $p = .006$);
- self-caught mind wandering ($F[1,46] = 3.956$, $p = .05$);
- retrospectively self-reported mind wandering during testing ($F[1,46] = 5.337$, $p = .03$).

Medin and Lindberg (2013) showed the use of mindfulness and compassion-based interventions did significantly affect student:

- reduced levels of stress (Mann-Whitney U-test indicated ($Mdn = 4$) and was significant at ($p < .01$);

- increased satisfaction with life (Mann-Whitney U-test indicated (*Mdn* = 8) and was significant at ($p < .05$);
- students did not show an increase in self-compassion (Mann-Whitney U-test indicated (*Mdn* = 19) which was not significant at the 0.05-level.

Medin and Lindberg reported although the tests did show that there was a wide range of positive and negative changes in self-compassion, lack of significance is due perhaps to their population sample being too small (*N* = 16). They argued more research studies concerning the use of mindfulness and compassion-based interventions are required to test self-compassion further.

A review of quantitative research by Shapiro et al. (2011) showed contemplative pedagogy and meditation is significantly influencing student information processing, academic achievement, mental/psychological wellbeing, development of the whole-person, empathy, creativity, interpersonal relationships, and self-compassion. Shapiro et al. argued more quantitative research is needed as regards testing the effectiveness of using contemplative practices in educational settings and especially in higher education. They called for theory-based investigations; development of methodology for testing; expanding the scope concerning outcomes; studies concerning the processes of contemplative exercises; and the study of best practices for implementing teaching and research of these practices in educational environments (pp. 510-520). The facilitation of mindfulness and connectivity through contemplative pedagogy employs mindful learning as a tool for educators to develop practices suitable for emerging adult college students in academic and classroom environments.

Bush (2011) asserted developing mindfulness provides students the ability to engage in learning processes that alleviate academic stressors and foster patience for the amount of personal and academic learning that students are required to absorb. Bush further argued the development of mindful learning provides students with the capacity to begin connecting what they are learning with their personal and global experiences of the world. Bush and Albrecht et al. (2012) cited the work of Langer (1997) as a supportive branch to the development of contemplative pedagogy in the classroom via Langer's work with initiating mindful learning approaches to the classroom environment.

Langer's (1997) mindful learning is a "sideways learning" approach to the use of mindfulness development and instruction in the classroom (p. 23). Sideways learning maintains that mindful learning allows for students to remain open to the fluidity of learning processes versus traditional bottom-up or top-down approaches to classroom instruction (Langer, 1997). The mindful form of openness allows students to be receptive to adaptation, change, and an authentic awareness for multiple perspectives that exist within the development of their personal, local, and global worldviews relative to their academic and personal life-learning experiences (Bush, 2011; Langer, 1989; 1997, Napora, 2011; Roeser, 2012; Rogers, 2013). Langer (1997) argued mindful learning provides an "implicit or explicit" multiple perspective view; the ability to see information as novel in given environments; work with the context in how one perceives information; and the identification of the processes involved in creating new categories for how that information comes to be understood (p. 111). Langer's sideways mindful learning

approach parallels the systems and processes-oriented approaches to learning as outlined in the development of ecoliteracy.

Langer (1989, 1997) argued the use of mindfulness in the classroom shifts the focus from only considering learning outcomes to that of redirecting student attention to the processes that take place in the moment. Langer (1989, 1997) asserted mindful attention to the processes of learning contextualizes and creates the intended and desired learning outcomes. Langer (1997) maintained "mindfulness creates a rich awareness of discriminatory detail" (p. 23). A study conducted by Grossenbacher and Rossi (2014) showed a mindful contemplative approach to learning provided emerging adults with an engaged and experiential paradigmatic learning environment. The learning environment supported students in their capacity to step back and objectively participate in their own meta-narrative and meaning making construction (Grossenbacher & Rossi, 2014). The findings of Grossenbacher and Rossi's study supports Langer's assertions concerning the contextualization of learning outcomes relative to the "rich awareness of discriminatory detail" that contemplative pedagogy seeks to develop in the personal and global life experience of emerging adults in higher education (Langer, 1997, p. 23). Dounas-Frazer and Reinholz (2015) maintained the ability for students to develop reflective practices in the classroom provides students with the necessary skills to attend to lifelong learning practices if the space for mindful reflection is provided.

The review of research in this section showed undergraduate student capacity to mindfully recognize the processes taking place in their academic and personal life provided the opportunity for them to connect with what they are experiencing and

learning. The use of mindful learning through contemplative pedagogy in the classroom did significantly affect student awareness and connectivity to the domains of their biological, social, and emotional academic experiences. However there is an absence of literature pertaining to how contemplative pedagogy may or may not affect the holistic development of student ecological responses to contemplative pedagogy in the form of ecoliteracy. Therefore, I wanted to provide further quantitative research to the fields of contemplative pedagogy and ecoliteracy in the academic and life experiences of higher education undergraduate students.

Ecoliteracy, Contemplative Pedagogy, and Social Change

The creation of time and space for establishing mindful awareness and connections (contemplation) to what is being learned with students' direct engagement in their personal lives, academics, and the world (ecoliteracy), needs to be further addressed in higher education. Busch (2014) maintained contemplative pedagogy creates this particular kind of needed time and space as it provides a "liberatory space" that "is not based on contradiction as much as union" (p. 128). He expanded on this idea noting "contemplative space is often described in terms of harmony and wholeness" (Busch, 2014, p.128). The opportunity for students to experience contemplative time and space in the classroom supplements the critically engaged aspects associated with the rigors of academic learning (Barbezat & Bush, 2014; Busch, 2014). Ericson et al. (2014) maintained mindful awareness in this context supports establishing an intrinsic ecological foundation that promotes elements of ecoliteracy that include subjective wellbeing, values, empathy, and sustainability. Ericson et al. argued "mindfulness and increased

awareness of one's mental life can reduce emotional and cognitive habits, hence promoting a non-habitual/non-automatic mode of being that is more flexible and objectively informed" (2014, p. 76). This intrinsic and extrinsic subjectivity and objectivity is addressed in both contemplative pedagogy and ecoliteracy and potentially plays a strong role in addressing the needs of contemporary undergraduate students relative to current personal, local, and global conditions and climates.

Contemporary undergraduate students are inundated with a large amount of personal, local, and global information as the forces of globalization, communication, and the transfer of knowledge continues to become ever more available (Brooks & Normore, 2010; Gidley, 2012; Hovland & Schneider, 2011; Stolz et al., 2017; Zinser, 2012). Zinser (2012) argued education needs to begin addressing an approach to education that transcends subject discipline and institutional boundaries by taking on a global perspective. Zinser further maintained process skills, systems thinking, and the development of ecoliteracy provides students with the necessary tools by asserting "it helps young people become comfortable with paradox and uncertainty; it helps them see the whole instead of parts, patterns instead of single events" (p. 68). Gidley (2012) stated all aspects of future educational trends are affected by new patterns in thinking and knowledge that run concurrently with changes in human consciousness and global change. Gidley argued contemporary education requires attending to higher order systemic learning and reasoning skills that attend to personal and global learning by providing "21st Century Evolutionary Pedagogies" (2012, p. 48). The 21st Century Evolutionary Pedagogies Gidley proposed involve attending to "complexity, creativity,

dialectics, dialogue, futures awareness, holism, imagination, paradox, planetary consciousness, pluralism, reflexivity, spirituality, values, and wisdom" towards preparing students for the contemporary world during this stage of planetary development (2012, p. 48). Brooks and Normore (2010) called for synthesizing contemporary education and learning in the form of glocal learning or "glocalization" in an effort to positively affect student growth, educational leadership, and learning (p. 53). They argued glocalization involves an integral approach to learning that yokes the personal, local, and global dynamics of learning together in an effort to promote affective positive social change (Brooks & Normore, 2010). Brooks and Normore (2010) maintained a glocal perspective in education is an ecological approach to learning that "includes not only physical aspects of existence such as the environment and sustainable resources but also the interconnected and interrelated nature of societies, ideas, the future and past" p.73). Preparing undergraduate students with the requisite knowledge, meaning making, and experiential know-how requires that education provide methods for grounding learning in a holistic context.

Hovland and Schneider (2011) showed that a study conducted by the Association of American Colleges and Universities (AAC&U) entitled "Shared Futures: Global Learning and Social Responsibility Initiative" reported 48% percent of employers felt that students are not adequately equipped with the necessary knowledge to engage in the contemporary global world (p. 3). Hovland and Schneider argued that deepening learning connections are required to address learner knowledge of human cultures, the physical and natural world, intellectual and practical skills, and personal and social responsibility

to address the shortcomings identified by the AAC&U study. Hampson (2012) argued ecological education needs to play a role in developing learning that graduates students with the knowledge and know-how that is necessary for addressing the numerous ecological, social, and personal problems contemporary peoples are facing. In citing Orr's work with ecoliteracy, Hampson stated "the ecologically literate person will appreciate something of how social structures, religion, science, politics, technology, patriarchy, culture, agriculture, and human cussedness combine as cause of our predicament" (2012, p. 74). Barnett (2011) asserted in order to address problems identified in contemporary student learning that universities would do well to begin adapting an "ecological university" perspective (p. 451). An ecological university is one that fosters "authenticity and responsibility" towards the development of the whole student in terms of taking "seriously both the world's interconnectedness and the university's interconnectedness with the world" (Barnett, 2011, p. 451). Barnett argued the emergence of ecoliterate awareness on the part of universities is beginning to show itself in attending to seeing students as global citizens. Barnett described this view of students as global citizens in that "students have come to have a care or concern for the world and to understand their own possibilities in the world and towards the world" (2011, p. 451). Affording the time and space for this critical aspect of an ecoliterate approach to the learning processes taking place in a university environment for emerging adults, is necessary to avoid students feeling overloaded, stressed out, or burned out by how much information they are required to digest.

Mahmoud et al. (2012) conducted a study relative to young adult college students and their relationship between adaptive and maladaptive coping strategies in college campus life concerning depression, anxiety, stress, life satisfaction, and coping styles. The Mahmoud et al. study showed emerging adult college students (N = 508) were experiencing elevated levels of depression (29%), anxious (27%), stressed (24%), and that 67% of students who exhibited anxiousness were also depressed and 61% of the anxious students were also stressed (2012, p. 151). Mahmoud et al. argued their study showed "one in four respondents reported experiencing symptoms of depression, anxiety, or stress" (2012, p. 154). The researchers argued more often than not, students will then use maladaptive coping strategies (self-blame, withdraw from stressful situations, escape-avoidance, substance abuse) versus adaptive coping strategies (seeking out help, defining the stress, reflecting on solutions, and taking action towards resolve) to alleviate, cope, or deal with the pressures they are experiencing (Mahmoud et al., 2012, p. 150). Mahmoud et al. maintained furthering the development of on campus methodologies for addressing these issues that undergraduate students experience is necessary in order to stave off maladaptive student coping strategies.

Rockenbach et al. (2012) argued a college students' personal and academic life will be challenged as they engage in new worldviews and find themselves having to develop new ways to work with struggles, doubts, meaning making, problem solving strategies, and issues of self-, other-, and world identity. Rockenbach et al. contended that when given the opportunity to reflect on, and make meaning of particular challenges in their experiences of personal and academic life, students gained the opportunity to realize

that stressors, struggles, and difficulties can ultimately reveal a way to work through their experiences with the challenges, difficulties, and problems that academic, personal, and global life generates. Greenberg and Turksma (2015) maintained further attention to compassion and empathy in schooling provide the ability to address many of the difficult issues facing self, other, societal, and natural ecological world reforms. They contend "awareness, empathy, and compassion contribute to personal wellbeing and interpersonal experiences that nurture secure authentic and life-enhancing relationships" (Greenberg & Turksma, 2015, p. 280). Greenberg and Turksma argued this requires the creation of further educational models, research, and assessment relative to the development of ecological perspectives that promote the compassion, empathy, and wellbeing of those who are participating in the numerous world-systems as they are found in contemporary times.

Set in this context, fostering the ecoliterate awareness of undergraduate students provides them with a way to begin understanding personal, academic, and global problems. The ecoliterate awareness then offers a means for students to engage in experiential means of working towards problem solving in university learning environments. Fostering ecoliterate awareness in higher education requires that students have the opportunity to be able to contextualize their learning in both knowledge and experience. The creation of the time and space for the development of undergraduate student ecoliteracy requires that educators create programs or adapt classroom practices that allow for the emergence of student ecoliteracy. Contemplative pedagogy is a supplemental tool available to educators as a means to create the time and space for

students to contextualize their learning. Contemplative pedagogical practices, in terms of personal, local, and global worldviews, exists in an effort to create the opportunity for students to engage in meaning making, the cultivation of compassion, and an awareness for the interrelated nature of self, other, and world views. This provides the opportunity for students to work with adaptation, change, and the interrelationships that constitute the multifaceted dynamics involved in recognizing problem solving.

Conclusion

I wanted to offer further research in the fields of ecoliteracy and contemplative pedagogy that supplements the development of undergraduate student ecoliteracy relative to their academic and life experiences. Langer's (1997) mindful learning resonates with Kineman and Poli's (2014), Barnes's (2013), Goleman et al.'s (2012), Stone's (2010), Orr's (1992, 2005) and Capra's (2004b) approaches to educating for ecoliteracy as described in this literature review. Kineman and Poli argued for an abductive open systems approach that does not overly emphasize an objective and reductionist only learning modus-operandi. The researchers maintained that learning environments need to account for the dynamic processes taking place within students' experiences (Kineman & Poli, 2014). Accounting for student experiences of learning supports establishing student capacity towards making personal and global connections to what they are learning (Kineman & Poli, 2014).

Barnes (2013) provided the five phases progressive learning approach framed in the awareness to action continuum that included awareness and appreciation, knowledge and understanding, attitudes and values, problem solving skills, and personal

responsibility, and action (p. 3). Goleman et al.'s (2012) five practices of emotionally and socially engaged ecoliteracy in the classroom supports the promotion of student cognitive and affective learning in the holistic development of their social, emotional, and ecological intelligence. Stone (2010) defined educating for ecoliteracy as attending to the head, heart, hands, and spirit of student learning in the classroom. Orr (1992, 2004) called for a transdisciplinary approach to educating for ecoliteracy that transcends disciplines, establishes lines of communication between the sciences and humanities, and provides students with the opportunity to engage problem solving through a holistic personal and worldview living systems lens.

Capra (2004b) provided the web of life as a theoretical foundation for ecoliteracy that promotes open-system learning environments through the creation of curriculum designs that shift student attention to cyclical patterns and networks; the importance of context in the analysis of classroom material; that what is learned in the classroom exists in relationship to greater systems; the cessation of hierarchical learning to one of networks; and the recognition that structure and process are ultimately connected and not separate factors of learning. Capra argued that education is, "not talking about a process where learning is the goal" but that, "learning *is* the process" (2004b, p. 8). Gause and Coholic (2010) maintained, "Spirituality and ecology emphasize alternative worldviews based upon an expanded understanding of person-in-environment, which assume interdependence, relatedness with each other and the Earth, the essentialness of place, and the importance of the sacred in our lives" (p. 12). The shift of educator attention to fostering an ecoliterate worldview that includes interdependence, ecological worldviews,

and living system processes of student learning, versus the outcomes of student learning, is central to developing mindful awareness, connectivity, ecoliteracy, and the use of contemplative pedagogy in the classroom (Barbezat & Bush, 2014, Bush, 2011; Capra, 2004b, 2015; Capra & Luisi, 2014; Langer, 1997; Widhalm, 2011a).

Contemplative pedagogy provides a first person objective view that supplements the importance of objectivity when it concerns individual subjective experiences of the world in an effort to connect context and meaning with critical analysis and learning in education. Contemplative practices provide students with the opportunity to contextualize and critically reflect on learning while adapting to constantly changing stressors that affect their personal and global worldviews throughout their undergraduate studies. Hathaway and Boff (2009) stated "systems maintain their identity—their subjectivity—through the process of *homeostasis*, which can be understood as a kind of stillness in motion, or stability in the midst of flux and change" in describing how living systems operate (p. 202). Harding (2013) argued "explanation is the essential and vitally important work of the rational mind, but we must not lose sight of an equally important need for *understanding*, for contact with the realm of meaning, where we seek intimacy and connection with what has been explained" (p. 19). Emerging adult undergraduate students are constantly striving to attain a sense of semblance and calm while personal, academic, and global pressures exist all around them (Greeson et al., 2014; Mahmoud et al., 2012; Peer & McAuslan, 2015; Rockenbach et al., 2012; Rogers, 2013; Roeser, 2012). Current research in ecoliteracy and contemplative pedagogy showed numerous identifiable aspects of ecoliteracy and contemplative pedagogy have been studied.

However, research concerning the holistic learning propositions of both what ecoliteracy and contemplative pedagogy offer, has not been extensively examined.

I aimed to examine and explore the use of contemplative pedagogy as a pedagogical tool for fostering undergraduate students' ecoliteracy. That is, to study the pedagogy itself as a tool that influences the development of students' ecoliterate awareness for the connections found in academic and life-learning experiences that affect their personal and worldviews. The development of student ecoliteracy skills provides students with the opportunity to adapt, connect, and contextualize what they learn objectively in the college classroom with their personal, academic, and global life experiences. I contended that contemplative pedagogy provides an educator with a learning tool that can foster the development of undergraduate student ecoliteracy. To wit, a student that graduates with the ability to work with difficulties, problem solving, and mindful-awareness is equipped with the necessary life-skills for making the connections that support developing the wellbeing of their individual, societal, and natural world relationships in an ecoliterate context.

The next chapter addresses the research method and design for my study.

Chapter 3: Research Method

Introduction

The purpose of this quantitative causal-comparative survey study was to measure the use of contemplative pedagogical exercises with undergraduate student ecoliteracy. I sought to define, examine, analyze, and demonstrate whether students exhibited a higher level of ecoliteracy in college classrooms where instructors had been using contemplative pedagogy versus undergraduate students in college classrooms where instructors had not been using contemplative pedagogy. If a significant effect relationship could be inferred between contemplative pedagogy and ecoliteracy, then this study would yield a metric for critical characteristics that foster ecoliteracy among undergraduate students. I would then be able to provide the groundwork for further research in the fields of ecoliteracy and contemplative pedagogy.

The following sections of Chapter 3 describe the research design, rationale, research question and hypotheses, population, sampling procedure, recruitment, data collection, instrumentation, data analysis, threats to validity, and ethical procedures for my research study.

Research Design and Rationale

The research design I used was a causal-comparative quantitative study with a two-group posttest only with a nonequivalent control group. The research design was exploratory in seeking to provide further empirical research for the fields of ecoliteracy and contemplative pedagogy relative to the dependent variable of ecoliteracy and the independent variable of contemplative pedagogy. The causal-comparative research

design provided the ability to compare two groups of intact undergraduate students and the impact of the independent variable on the dependent variable (Bronfenbrenner, 1977; Johnson, 2001; McMillan, 2012; Schenker & Rumrill, 2004). The preliminary findings of this study provide the opportunity to expand research in the fields of ecoliteracy and contemplative pedagogy. Two self-report instruments, the NEP Scale (Cronbach α coefficient level is .83; Dunlap, 2008; Dunlap et al., 2000) and the SCS–SF; Cronbach α coefficient level is .86; Raes et al., 2011) were used to collect the primary data for this study. How the two surveys were used to measure ecoliteracy is further detailed in the Instrumentation section of this chapter.

The nature of this research design was exploratory, or what Bronfenbrenner (1977) described as being for "heuristic purposes—namely, to analyze systematically the nature of the existing accommodation between the person and the surrounding milieu" (p. 517). McMillan (2012) called the causal-comparative research design a "natural experiment in the sense that something occurs differently for one group of participants compared to others" (pp. 193-194). Bronfenbrenner further stated a natural experiment "provides a more critical contrast, insures greater objectivity, and permits more precise and theoretically significant inferences—in short, is more elegant and constitutes 'harder' science—than the best possible contrived experiment addressed to the same research question" (p. 517). The causal-comparative research design provided me with the opportunity to examine and infer if there was a significant difference between the two groups.

The causal-comparative conditions for this research design were already existent and undergraduate students were not randomly assigned to the instructors that did and did not use contemplative pedagogy in their classroom. Trochim (2006) maintained that it is possible to not include random selection or random assignment in a "nonequivalent group design in education" (para. 3). That the causal-comparative conditions already existed allowed me to test and provide causal inferences as to whether a significant difference was present between students who were and were not engaged in contemplative pedagogy relative to the development of their ecoliteracy (Bronfenbrenner, 1977; Johnson, 2001, McMillan, 2012; Schenker & Rumrill, 2004). Further information regarding the undergraduate student population, sample, and sampling procedure are found below.

Because I could not control for the independent variable, extraneous, or confounding variables as a limitation to a causal-comparative research design, the selection and defining of instructors who did use contemplative pedagogy and instructors who did not use contemplative pedagogy was critical to the validity of my research. I approached-Group 1 and Group 2 instructors to obtain permissions to survey undergraduate students at the end of the semester and to establish that Group 1 instructors were using contemplative pedagogy exercises and Group 2 instructors were not. Group 1 instructors did use contemplative pedagogy in their classrooms and are members of a professional contemplative pedagogy group of educators on campus. These instructors have been formerly schooled and trained in contemplative pedagogical approaches to education under the auspices of professional association groups, schooling, and personal

practice relative to the use of contemplative pedagogy in the classroom. Posttest only short interviews (see Appendix C) were conducted with Group 1 instructors who did use contemplative pedagogy exercises specifically to ascertain what exercises they used with their students. The short interviews were conducted posttest only to maintain the validity and integrity of the causal-comparative research design. Group 1 instructors used the contemplative pedagogical exercise of meditation and meditation instruction in their classrooms with students. Other directed contemplative pedagogical practices included guided reflective writing, guided meditation, and guided critical reflection exercises congruent with contemplative pedagogy's approach to learning (see Chapter 4). Group 2 instructors did not use contemplative pedagogy in their classrooms and were not members of the contemplative pedagogy group on campus or other affiliated contemplative pedagogy professional groups. Group 2 instructors did not use meditation in their classrooms or other forms of practices relative to the facilitation of contemplative pedagogy as it was defined in my study. Group 2 instructors were not familiar with the terminology, nomenclature, practice, or culture of contemplative pedagogy as it is found to be used by instructors in higher education.

I used a causal-comparative research design and facilitated a posttest-only independent-samples *t* test that measured if there was a significant difference between two groups of undergraduate students. The use of the independent-samples *t* test provided the ability to examine the differences in the means between both groups and is used when there are two causal-comparison conditions (McMillan, 2012). The independent-samples *t* test required that scores on two variables, the grouping and test variable, must be

present (Green & Salkind, 2012). Green and Salkind (2012) stated "The grouping variable divides cases into two mutually exclusive groups…while the test variable describes each case on some quantitative dimension" in determining if the test variable differed between the two groups (p. 175). Field (2013) maintained that the use of independent-samples *t* tests can determine if there is a larger "observed difference between the sample means, then we gain confidence that the two sample means differ because of the different experimental manipulation imposed on each sample" (p. 365). The *t*-test results are given for both groups, both surveys, and were then compared and contrasted to determine if a significant difference existed between them (as discussed in Chapter 4). The additional use of the Levene's test for the equality of variances and the kurtosis and skew analysis allowed for further testing of the research data's validity (Field, 2013).

My research question involved determining if there was a difference between two groups of college students who did and did not participate in contemplative pedagogy relative to the development of their ecoliteracy. The use of a pretest did not serve the study well as it would have made students aware of contemplative pedagogy use in the classroom as well as potentially biasing the survey questions. The pretest could have adversely affected posttest outcomes by sensitizing students to the survey questions and what teaching styles their instructors are using (Campbell & Stanley, 1963; Frankfort-Nachmias & Nachmias, 2000). Further information regarding the use of posttest only verses a pre- and posttest approach in this research study is found in the Threats to Validity section below.

The causal-comparative research design provided the ability to examine and infer if the two groups were significantly different as it related to a higher level of student ecoliteracy being present for undergraduate students based on the use of contemplative pedagogy in higher education classrooms. If there was a significant difference as it related to undergraduate student ecoliteracy in the group that did encounter contemplative pedagogy, it provided the rationale for further investigation and research in both ecoliteracy, and the use of contemplative pedagogy in college classrooms and vice versa. In this context, the causal-comparative research design tested the differences between the means using the independent *t* tests as a best-method approach towards addressing the research question.

Research Question and Hypothesis

Research Question: To what extent do undergraduate students exhibit a higher level of undergraduate student ecoliteracy with instructors that use contemplative pedagogy versus the undergraduate students of instructors that do not use contemplative pedagogy?

$H_0$1*:* A higher level of undergraduate student ecoliteracy is not found in classrooms with instructors that use contemplative pedagogy versus the students of instructors that do not use contemplative pedagogy.

$H_1$1: A higher level of undergraduate student ecoliteracy does exist in classrooms with instructors that use contemplative pedagogy versus the students of instructors that do not use contemplative pedagogy.

The independent variable for this study was contemplative pedagogy. The dependent variable for this study was ecoliteracy. The operation of the variables is described in further detail in the Operation of the Variables section below.

Population

The population for this research study consisted of undergraduate students attending a medium-sized university located in a northeastern state. The university offered 54 majors, 60 concentrations, 61 minors, and teacher certification programs in undergraduate studies. Current enrollment of undergraduate students was 16, 336, of which 88% were full-time and 12% were part-time. The gender breakdown was 62% women and 38% men. Ethnicity included nonresident alien 2%, Hispanic/Latino 28%, American Indian/Alaska Native 0.1%, Asian 6%, Black/African American 12%, Native Hawaiian/Other Pacific Islander 2%, White 49%, and two or more races 4%. The top five majors included business administration, psychology, biology, family and child studies, and justice studies.

Sampling and Sampling Procedure

The population was represented by a nonprobability convenience sample of undergraduate students who were taking undergraduate college courses. Frankfort-Nachmias and Nachmias (2000) stated that a nonprobability sample represents not being able to fully specify the probability of each participant and that each are included in the study. Nonprobability sampling procedures in quantitative studies include convenience sampling, quota sampling, and purposeful sampling (Frankfort-Nachmias & Nachmias, 2000; McMillan, 2012). Nonprobability samples in the social sciences works with

exploratory research, convenience, and economy (Frankfort-Nachmias & Nachmias, 2000). These three descriptors of a nonprobability sample fit with the nature and design of this research study much better than the use of probability samples.

Probability samples provided the ability to specify that all aspects of a population would be included in the participant pool for a study (Frankfort-Nachmias & Nachmias, 2000). Probability sampling procedures include simple random sampling, stratified sampling, systematic, proportional and disproportional stratified sampling, and cluster sampling (Frankfort-Nachmias & Nachmias, 2000; McMillan, 2012). Because I was examining the effects of a particular type of pedagogy in the classroom for undergraduate students, a nonprobability sample provided the ability to examine the relationship between the independent and dependent variables (McMillan, 2012). McMillan (2012) stated, "The decision is not to dismiss the findings but to limit them to the type of subjects in the sample" (p. 104). I was not seeking to examine a particular type of college student (i.e., ethnicity, religion, demographics) but a pedagogical practice with undergraduate students in general. Conclusions could be inferred that the results are valid and indicate that contemplative pedagogy did or did not affect undergraduate student ecoliteracy for similar populations of undergraduate students.

Trochim (2006) and Cunningham and McCrum-Gardner (2007) identified four components for determining a sound statistical test: sample size, effect size, alpha level, and power. The following is a statistical power analysis that I conducted using G-Power (Faul, Erdhelder, Buchner, & Lang, 2009) for the determination of the appropriate sample size.

A statistical power analysis was conducted for the estimation of an appropriate sample size. The G-Power output indicated that I would need a population of at least N = 64 in each of my sample size groups for a total of N = 128 (G*Power 3.1). The effect size is based on Cohen's d (as cited in Cunningham & McCrum-Gardner, 2007; Field, 2013) for t tests and set at the medium effect size of 0.50. Field (2013) stated that effect size measures the effect of an experimental manipulation or the strength of relationships between variables. The alpha level is .05, and the power level is 80%. The test family was set to t tests, the statistical test was means: difference between two independent means (two groups). The type of power analysis was a priori: compute required sample-size, given alpha, power, and effect size. Participants (N = 128) for this study were undergraduate students who attended a medium-sized northeastern university. Participants consisted of a nonprobability, nonrandomized convenience sample of all undergraduate students attending undergraduate courses.

Procedures for Recruitment, Participation, and Data Collection

Institutional Review Board (IRB) approval was granted by both Walden University and the northeastern university where the study took place prior to conducting my research. Participants for my study were recruited in college classrooms at the end of a college semester. College instructors from both groups had given me permission to conduct the surveys in their classrooms at the end of the college semester. Students were informed that I was conducting a survey and given the option to either participate or not participate in the surveys. Students were given consent forms based on a template constructed and designed by the northeastern university's IRB. After completing the

consent forms students were then given the option to take the surveys on their own time. The dissemination of the surveys and consent forms took 10 minutes to conduct and were provided to the students during the last week of the college semester. The surveys were collected and catalogued in locked boxes located outside the classroom according to the particular instructors in terms of those who did and did not use contemplative pedagogy in their classroom.

Instrumentation

An examination of available instruments to measure the effects of contemplative pedagogy on the development of undergraduate student ecoliteracy was conducted. Numerous instruments pertaining to measuring the effects of contemplative pedagogy on undergraduate students' experiences in higher education (e.g., stress, anxiety, depression, mindfulness, self-regulation, self-transcendence, and meta-cognition) were available. Other instruments considered for adoption included the Adaptive Expertise Survey, the Self-Compassion Scale in long-form, Compassion for Others Scale, and the New Environmental Paradigm Scale (Dunlap et al., 2000; F. Fisher & Peterson, 2001; Neff, 2003; Pommier, 2011). However, these scales did not serve to adequately measure student ecoliteracy in response to encountering contemplative pedagogy.

Contemplative pedagogy includes the development of the whole person objectively and subjectively relative to physical, compassionate, process, mental, psychological, emotional, environmental, and ecological domains of experience (Barbezat & Bush, 2014; Busch, 2014; Ericson et al., 2014; Gause & Coholic, 2010; Greenberg & Turksma, 2015; Gunnlaugson et al., 2014; Langer, 1989; Rechtschaffen,

2014; Alley & Winston, 2010; Zajonc, 2009). It was necessary to further narrow the scope and search parameters involving contemplative pedagogy relative to the four head, heart, hands, and spirit constructs of ecoliteracy. After extensive research, deliberation, and careful consideration my search showed that the creation of a posttest Short Interview for Contemplative Pedagogy Instructors to specifically ascertain what contemplative pedagogy exercises were used over the duration of a college semester (Appendix C), the NEP Scale (Cronbach α coefficient is .83; Dunlap et al., 2000), the SCS–SF; Cronbach α coefficient is .86; Raes et al., 2011) served as best-fit instruments for the examination of my research question. The NEP (Appendix D) and SCS–SF (Appendix F) are discussed in further detail below. Requisite permissions to use the NEP and SCS-SF are found in Appendix E and Appendix G.

NEP Scale

The NEP Scale is designed to measure if respondents show a disposition for either an ecocentric (environmentally-centered) or anthropocentric (person-centered) worldview (Anderson, 2012; Dunlap, 2008; Dunlap et al., 2000; Harraway, Broughton-Ansin, Deaker, Jowett, & Shephard, 2012; Jowett et al., 2014). The NEP Scale consists of 15 items designed to assess "primitive beliefs" and whether an individual is "seeing the world ecologically" (Dunlap et al., 2000, p. 427). Dunlap et al. (2000) defined primitive beliefs as those that "form the inner core of a person's belief system and represent his basic truths about physical reality, social reality and the nature of self" relative to ecological environments (pp. 427-428). The NEP Scale provides an overall measure of ecological worldviews that examine how individuals' perceive themselves in the

relationships that exist between humans and the natural world (Dunlap, 2008; Dunlap et al., 2000). The NEP Scale can also be broken down into domains relative to how individual environmental attitudes, beliefs, and behaviors affect the natural world's ecology from a systems point of view (Dunlap, 2008; Dunlap et. al., 2000; Harraway et al. 2012; Jowett et al., 2014). Dunlap et al. stated that the NEP Scale "should prove useful in tracking possible increases in endorsement of an ecological worldview, as well as in examining the effect of specific experiences and types of information in generating changes in this worldview" (2000, p. 439). The principle constructs of the NEP Scale supported using this survey in the examination and analysis of undergraduate student ecoliteracy relative to the use of contemplative pedagogy in the classroom.

Scoring. The NEP uses a 5-point Likert scale that ranges from strongly agrees, mildly agree, unsure; mildly disagree, to strongly disagree (Dunlap et al., 2000). The items are marked where 1 equals strongly disagree and 5 equals strongly agree (Dunlap et al., 2000). Agreement with the eight odd-numbered items and disagreement with the seven even-numbered items is indicative of proecological and ecocentric paradigmatic responses on the part of individuals (Dunlap et al., 2000). A high score on the NEP Scale is indicative of a proecological orientation (Dunlap et al., 2000).

Reliability. The NEP Scale is a revised and renamed version of the earlier 1978 New Environmental Paradigm Scale as developed by Dunlap and Van Liere (Anderson, 2012; Dunlap 2008; Dunlap et al., 2000; Harraway et al., 2012; Jowett et al., 2014). The revision addressed a more inclusive range of an ecological worldview, balancing pro- and anti-NEP items, and outdated terminology (Dunlap et al., 2000). The Cronbach alpha

coefficient for the revised NEP Scale is .83 and showed that the NEP Scale works for measuring a single construct concerning "belief system or worldview" (Dunlap et al., 2000, p. 435). The Cronbach alpha score of .83 is also indicative of strong internal consistency and reliability as regards the newly revised and renamed NEP Scale (Dunlap et al., 2000). Further testing of the revised NEP Scale by Harraway et al. (2012) with a sample of 360 first-year undergraduate students showed that the Cronbach's alpha score at the beginning of the courses was .82 and at the end of the courses were .83, .81, and .83 respectively (Harraway et al., 2012). These findings remained consistent with the Dunlap et al. (2000) testing, revision, and predictive validity of the NEP Scale (Harraway et al., 2012). The NEP Scale was tested and used nationally and internationally (Dunlap, 2008; Dunlap et al., 2000).

SCS–SF

The SCS–SF is designed to measure self-compassion (Raes et al., 2011). Neff (2003) defined self-compassion as including elements of compassion for others. Neff maintained that compassion for others involves being "open to and moved by the suffering of others…recognizing that all humans are imperfect and make mistakes" (p. 224). Self-compassion included "being open to and moved by one's own suffering…nonjudgmental attitude toward one's inadequacies and failures, and recognizing that one's own experience is part of the common human experience" (p. 224). The SCS–SF is constructed of 12 items that assess six self-compassion attributes that include self-kindness, self-judgement, common humanity, isolation, mindfulness, and over-identification (Raes et al., 2011). Neff (2003) maintained that attention to self-

compassion, that includes addressing these six attributes, supports individual capacity to mindfully practice nonjudgment related to the development of emotional and social intelligence, equanimity, and wellbeing. The fostering of nonjudgmental wellbeing involves exercising equanimity in relationship to how individuals objectively and subjectively experience the world (Neff, 2003). The use of SCS–SF provided the ability to test the effects of contemplative pedagogy on undergraduate student ecoliteracy relative to how students perceived and experienced themselves in relationship to the world and the head, heart, hands, and spirit constructs of ecoliteracy.

Scoring. The SCS–SF uses a 5-point Likert scale that ranges from 1 being almost never to 5 being almost always (Raes et al., 2011). The six attributes of self-kindness, self-judgment, common humanity, isolation, mindfulness, and over-identification are addressed with 2 items each. To obtain the total self-compassion score on the SCS–SF the negative subscale items of self-judgment, isolation, and over-identification are reverse scored (Raes et al., 2011).

Reliability. The SCS–SF is a 12-item short-form version of the 26 item Self-Compassion Scale originally constructed by Neff (Raes et al., 2011). Testing the SCS–SF in three independent samples showed a "near-perfect" correlation with the SCS-SF($r \geq 0.97$) with the original long-form SCS (Raes et al., 2011, p. 254). The Cronbach's alpha total score for the SCS–SF in a Dutch version of the scale was 0.87 and the English version 0.86 (Raes et al., 2011). The Cronbach's alpha total score for the long-form SCS in a Dutch version was 0.90 and the English version 0.93 (Raes et al., 2011). The near-perfect match indicates that the SCS–SF does show strong internal consistency and

reliability as a scale for measuring self-compassion. The SCS–SF has been tested and used nationally (English version Cronbach's alpha 0.85) and internationally (Dutch version Cronbach's alpha 0.90, Spanish version Cronbach's alpha 0.85) as a valid and reliable measure of self-compassion (Garcia-Campyao et al., 2014; Raes et al., 2011).

The NEP Scale (Cronbach α coefficient is .83) measures individual worldviews in terms of anthropocentric (person-centered) or ecocentric (world-centered) attitudes, values, and beliefs towards the ecological world in relationship to human individual and social construct contact with the natural world (Dunlap et al., 2000). The NEP Scale was used to measure the objective view of the head, heart, hands, and spirit of undergraduate student ecoliteracy. The SCS–SF (Cronbach α coefficient is .86) measures individual objective responses to the inward subjective relationship individuals experience relative to how they respond to environmental factors affecting them in terms of self-kindness, common humanity, and mindfulness (Raes et al., 2011). The SCS–SF was used to measure the objective responses to the inward subjective relationships of the head, heart, hands, and spirit of undergraduate student ecoliteracy. Two independent *t* tests were run for each of the surveys and groups. If both *t* tests showed statistical significance for the undergraduate students who had experienced contemplative pedagogy then a significant relationship between the use of contemplative pedagogy and the development of undergraduate student ecoliteracy could be inferred.

Operational Variables in the Study

The dependent variable was ecoliteracy and the independent variable was contemplative pedagogy. The operation of the dependent variable of ecoliteracy would be

exhibited in the development of learner capacities to read systems in the world using their head (cognitive), heart (social, emotional, and ecological intelligence), hands (embodied and experiential learning), and spirit (development of purpose, feeling, and empathy within the world) from an ecocentric point of view (Capra & Luisi, 2014; Goleman et al., 2012; McBride et al., 2013; Orr, 1992, 2004; Stone, 2010). The ecoliteracy student responses were self-reported by the undergraduate students taking the NEP Scale and SCS–SF in this sample.

Students' responses as having exhibited ecoliteracy meant they reported an objective awareness for how they relate to their personal, social, and natural worldviews via the head, heart, hands, and spirit. The NEP Scale measured the head, heart, and hands constructs of ecoliteracy in terms of anthropocentric versus ecocentric, environmental attitudes, beliefs, values, and worldview (Dunlap et al., 2000). The SCS–SF measured the head, heart, hands, and spirit constructs of ecoliteracy in terms of self-compassion, self-kindness, common humanity, and mindfulness (Raes et al., 2011).

The operation of the independent variable of contemplative pedagogy in the classroom meant that instructors used engaged instructional exercises that provided the students with the time, space, and place to objectively and critically reflect on learning. This was done through mindful learning and experiential contemplative practices that relate to meaning making, purpose, and compassion relative to how students view their subjective responses to self, other, and the world (Barbezat & Bush, 2014; Bush, 2011; Grace, 2011; Zajonc, 2009, 2013).

Data Analysis

There are a number of items that required attention in accounting for data analysis concerning posttest only independent *t* tests. These included the use of two groups in the design, posttest only measure, two distributions each with an average and variation, and to statistically assess the treatment effect (Green & Salkind, 2012; Trochim, 2006). The distribution between the two groups illustrates if there was a difference between the two groups and would be represented by histograms. The mean values and the difference between the means indicated where there is low, medium, or high variability in the data (Trochim, 2006). The *t*-value in the independent *t* tests described the statistical differences that existed between the two groups in relationship to the variability that existed in the scores (Trochim, 2006). The alpha level in computing the *t*-test statistics needed to be at .05 and the degrees of freedom (df) needed to be the sum of the two groups minus 2 (Trochim, 2006). With the alpha level, the df, and the *t*-value, referencing a *t*-value index would show if statistical significance had been detected in the study (Trochim, 2006). The further use of kurtosis and skew analysis in SPSS also checked that the sample was normally distributed (Field, 2013). The Levene's test for equality of variances was conducted to test that the error variance of undergraduate student ecoliteracy across the groups was not violated (Field, 2013). This test accounted for the homogeneity of variance assumption and made sure this assumption was not violated (Field, 2013). I used SPSS in order to compute and analyze the data. I reported the statistical results in APA format using tables and figures as appropriate for this research design (see Chapter 4).

Threats to Validity

Accounting for internal and external validity is important in any research design. Campbell and Stanley (1963) maintained that the posttest only control group design's internal validity concerning history, maturation, testing, instrumentation, regression, selection, mortality, and interaction of selection and maturation are controlled. External validity in terms of interaction of testing and X was controlled, but further attention to interaction of selection and X and reactive arrangement required further attention. In the case of my research design however, these two external validity concerns extended beyond a classroom setting and the scope of this research study. The internal and external validity concerns relative to my research being conducted in a classroom were accounted for in terms of controlling participant ecoliterate responses to the use of contemplative pedagogy. I did not have any contact with the students until facilitating the surveys at the end of the semester.

I disseminated posttest surveys with students in the classrooms of instructors who did use contemplative pedagogy and instructors that did not use contemplative pedagogy. Due to the nature of ecoliteracy and contemplative pedagogy, a pretest-posttest research design would have adversely affected the external validity concerning interactions with the independent variable and dependent variable (Campbell & Stanley, 1963). Campbell and Stanley (1963) stated that this particular threat to external validity included persuasion, influence, and a sensitization of the groups in responding to a posttest after having taken a pretest. To control for the interaction of selection and X, the two groups consisted of undergraduate students that were taking courses with instructors that did, and

did not use, contemplative pedagogy. When accounting for reactive external validity, Campbell and Stanley argued that, “there is no need for students to know that an experiment is going on” (p. 21). Frankfort-Nachmias and Nachmias (2000) maintained, “A significant difference will indicate that the educational session had an effect on changing attitudes” (p. 107). This aspect of need-to-know played a crucial role in working with generalizability and student responses to contemplative pedagogy and why the posttest-only causal-comparative research design worked to address my research question.

Ethical Procedures and Informed Consent

I conducted this research according to the Walden University IRB and the subsequent northeastern university’s IRB parameters and requirements (IRB#10-11-16-0362348; IRB#IRB-FY16-17-411). I am certified in both The National Institutes of Health (NIH) and Collaborative Institutional Training Initiative (CITI) as required by Walden University and the northeastern university where the study was conducted. All necessary steps were taken to ensure the privacy and to protect the rights of students and instructors involved. Consent forms created and approved by the northeastern university and Walden University were disseminated to the students and were completed along with the surveys. Students had the option to take or not take the survey on their own time. A nonprobability convenience sample of at least 128 undergraduate students attending the university was surveyed for this study. Consent forms were disseminated and completed by the contemplative pedagogyinstructors who participated in the short interview questions. The survey data collected, data analysis, and statistical analysis were entered

into a password-secured file in IBM-SPSS where only I would be able to access the files. Any backup files created were also secured and accessible only by me. The consent forms completed by students and instructors, surveys, and short interview responses were collected and locked in a secure file cabinet. As per Walden University and the northeastern university IRB requirements, the data will be kept for a period of 5 years and then destroyed.

Summary

I conducted a quantitative causal-comparative study using a two-group posttest only research design. The independent variable was contemplative pedagogy and the dependent variable was ecoliteracy. My purpose was to examine if undergraduate students who did encounter instructors that are using contemplative pedagogy in their classrooms exhibited a higher level of ecoliteracy versus undergraduate students who did not encounter contemplative pedagogy in the classroom. I used two self-report instruments that included the NEP) Scale and the SCS–SF in order to collect the data. I did not have any contact with the students until the end of the semester in order to facilitate the consent forms and surveys. Data analyses were conducted using SPSS and included independent samples *t* tests, Levene's test, kurtosis and skew analysis, and histograms in determining the statistical differences between the two groups (see Chapter 4).

I conducted this study according to Walden University and the northeastern university IRB guidelines in order to protect the ethical rights of the undergraduate student participants and instructors. I ensured that undergraduate student and instructor

rights are protected and consent forms were used. Students had the option to take or not take the surveys at the end of the college semester. Instructors had the option to participate or not participate in the short interviews at the end of the college semester. The undergraduate student identities are kept confidential. The undergraduate students for my study consisted of a nonprobability convenience sample of at least N= 128 in order to account for appropriate effect size. The undergraduate students were attending a medium sized northeastern university. The instructor identities are kept confidential. The data was collected, analyzed, and secured in a password protected computer file and locked filing cabinet. The data will be kept for a period of at least 5 years as required by Walden University and the northeastern university IRB and then destroyed.

Contemplative pedagogy is a supplemental instructional learning tool aimed at developing students' objective, unbiased, and critical thinking skills relative to what they are learning in the classroom, academic, and life experiences. Particularly, how they see, understand, and feel themselves when in direct contact with their experiences of living in the world. Ecoliteracy involves developing the ability to read the world when the head, heart, hands, and spirt come into contact with individual, social, and ecological systems. The NEP and SCS–SF provided instruments for measuring if contemplative pedagogy was developing undergraduate student ecoliteracy. Especially as it pertains to undergraduate student ecoliteracy as regards ecoliteracy's defining parameters involving the head, heart, hands, and spirit of a whole-person (Stone, 2010).

Gause and Coholic (2010) maintained that a contemplative approach to learning provides students with the capacity to "free themselves from mental constructs…see the

world as we really are…deeply and authentically…to attend to what is happening right now, and through that process, seeing things without the distortive lens of judgment" (p.3). Gause and Coholic further asserted that contemplative learning emphasizes the development of an objective ecological worldview that is based on "an expanded understanding of person-in-environment, which assume interdependence, relatedness with each other and the Earth" (2010, p. 12). If contemplative pedagogy developed these kinds of responses on the part of undergraduate students, then contemplative pedagogy is supporting the development of undergraduate student ecoliteracy, as ecoliteracy is defined for this study. In turn, this supports addressing the problem statement of my dissertation study concerning higher education providing more time for students to contextualize and develop ecoliteracy in the learning environment.

Chapter 3 has detailed the research design, choice, rationale, and appropriateness for this study. The research question and hypothesis, population, sampling and sampling procedure, recruitment, consent and participation, data collection, instrumentation, variables, data analysis plan, sampling procedures, threats to validity, ethical procedures, and a summary have been discussed.

Chapter 4: Results

Introduction

The purpose of my quantitative study and focus of the surveys was to measure the effect of using contemplative pedagogy exercises in undergraduate classrooms and the development of undergraduate student ecoliteracy. The research examined two groups of undergraduate students: one experiencing contemplative pedagogy exercises and the other not. For the study, I looked at each group's exhibited ecoliteracy following their experiences.

I defined the operational dependent variable of ecoliteracy as students exhibiting an objective awareness for how they related to their personal, social, and natural worldviews via the head, heart, hands, and spirit. The operational independent variable of contemplative pedagogy meant that instructors used instructional exercises that provided students with the time, space, and place to objectively and critically reflect on learning. The population sample was drawn from undergraduate students taking undergraduate college courses during a semester at a university in the northeastern United States. I collected the survey data via paper surveys that I distributed to students in the classroom at the end of a college semester.

I used the following research question in my study:

To what extent do undergraduate students exhibit a higher level of undergraduate student ecoliteracy with instructors that use contemplative pedagogy versus the undergraduate students of instructors that do not use contemplative pedagogy?

I used the following hypotheses:

$H_0$1: A higher level of undergraduate student ecoliteracy is not found in classrooms with instructors that use contemplative pedagogy versus the students of instructors that do not use contemplative pedagogy.

$H_1$1: A higher level of undergraduate student ecoliteracy does exist in classrooms with instructors that use contemplative pedagogy versus the students of instructors that do not use contemplative pedagogy.

In order to reject my null hypothesis, students who did have instructors that used contemplative pedagogy in their classrooms would need to score significantly higher on the NEP Scale and SCS–SF. The following chapter provides an overview of the data collection, descriptive statistics, independent samples *t*-test results, and summary for my research question.

Data Collection

Data collection occurred at a state university in the northeastern United States. IRB permissions to conduct the surveys with undergraduate students and short interviews with contemplative pedagogy instructors were obtained from Walden University and the northeast state university. The two surveys included the NEP Scale (Cronbach α coefficient is .83; Dunlap et al., 2000) and the SCS–SF; Cronbach α coefficient is .86; Raes et al., 2011; see Appendix D and Appendix F). The posttest only Short Interview for Contemplative Pedagogy Instructors was used after the surveys had been collected with instructors who engaged undergraduate students with contemplative pedagogy exercises (see Appendix C).

I met with the college instructors prior to visiting their classrooms to gain permission to arrive at the end of their classes during the last 2 weeks of the college semester. I presented my research study and the surveys to the students and informed them that taking the surveys was optional. Students who decided to take the surveys were required to sign consent forms as per the Walden University and the northeast state university IRBs. The consent forms were collected in a lockbox at the front of the classroom. Students were then told that they could complete the surveys on their own time and submit them to a lockbox outside the classroom, my office location, or use a self-addressed stamped envelope that I had provided. The consent forms and surveys were collected separately in order to protect student anonymity concerning the survey responses.

I was able to secure a total of four instructors and their classrooms to conduct the surveys. Of the four instructors, two instructors did use contemplative pedagogy exercises and two instructors did not use contemplative pedagogy exercises in their classrooms. Posttest short interviews were conducted and consent forms collected with the contemplative pedagogy instructors after class and during regularly scheduled office hours. The two instructors who did use contemplative pedagogy exercises took part in the short interview and signed consent forms as per the requirements of both IRBs. The group of students who experienced the instructors that did use contemplative pedagogy was identified as *CP* (for contemplative pedagogy). The group of students who experienced the instructors that did not use contemplative pedagogy was identified as

NCP (for noncontemplative pedagogy) for the group statistics and independent samples *t*-test results section of Chapter 4.

I conducted a statistical power analysis and it had been determined that I needed a population of at least $N = 64$ in each of my sample size groups for a total of $N=128$ (G*Power 3.1). The nonprobability convenience sample consisted of undergraduate students taking undergraduate courses. I was able to collect a total of $N = 153$ surveys. The CP group was $N = 77$ and the NCP group was $N = 76$. After preparing and cleaning the data during data entry, I had to eliminate two surveys from the CP group and one survey from the NCP group, due to incomplete or unreadable survey responses. The total population surveyed was $N = 150$ with the CP group and the NCP group each consisting of $N = 75$ undergraduate students respectively. At the time of data collection, the population for this research study consisted of undergraduate students attending a medium-sized university located in a northeastern state. The university offered 54 majors, 60 concentrations, 61 minors, and teacher certification programs in undergraduate studies. Current enrollment of undergraduate students was 16, 336, of which 88% were full-time and 12% were part-time. The gender breakdown was 62% women and 38% men. Ethnicity included nonresident alien 2%, Hispanic/Latino 28%, American Indian/Alaska Native 0.1%, Asian 6%, Black/African American 12%, Native Hawaiian/Other Pacific Islander 2%, White 49%, and two or more races 4%. The top five majors included business administration, psychology, biology, family and child studies, and justice studies. The next section presents the data analysis including descriptive statistics and the results of the independent-samples test.

Descriptive Statistics

This section reports on the descriptive statistics and independent samples *t*-test results. The population (N = 150) was represented by a nonprobability convenience sample of undergraduate students taking undergraduate college courses. The population sample consisted of undergraduate students attending a medium-sized northeast state university. Table 2 provides the descriptive statistics for the NEP Scale (Cronbach α coefficient is .83).

Table 2

Descriptive Statistics for NEP Scale

								95% CI	
	N	*M (SD)*	*Mdn*	Skewness	*SE*	Kurtosis	*SE*	LL	UL
NEP	150	51.05 (5.49)	51.00	.276	.198	1.21	.394	50.17	51.94

Note. CI = confidence interval; LL = lower limit, UL = upper limit.

A total of N = 150 undergraduate students participated in the NEP Scale (M = 51.05, SD = 5.49; See Table 2). The histogram (see Figure 2) illustrates the descriptive statistics for undergraduate students having participated in the NEP Scale. Scores were nonnormally distributed, with skewness of .276 (SE = .198) and kurtosis of 1.21 (SE = .394), but fell within acceptable parameters for conducting the independent samples *t* test (Byrne, 2010; DeCarlo, 1997; Field, 2013). The student NEP Scale responses showed that the M = 51.05 fell between the requisite ± 95% CI [50.17, 51.94] and supported the use of the independent samples t test in addressing my research question. The Levene's test found that the assumption of homogeneity variance was met, p = .89; therefore, an independent samples *t* test based on equal variances was carried out.

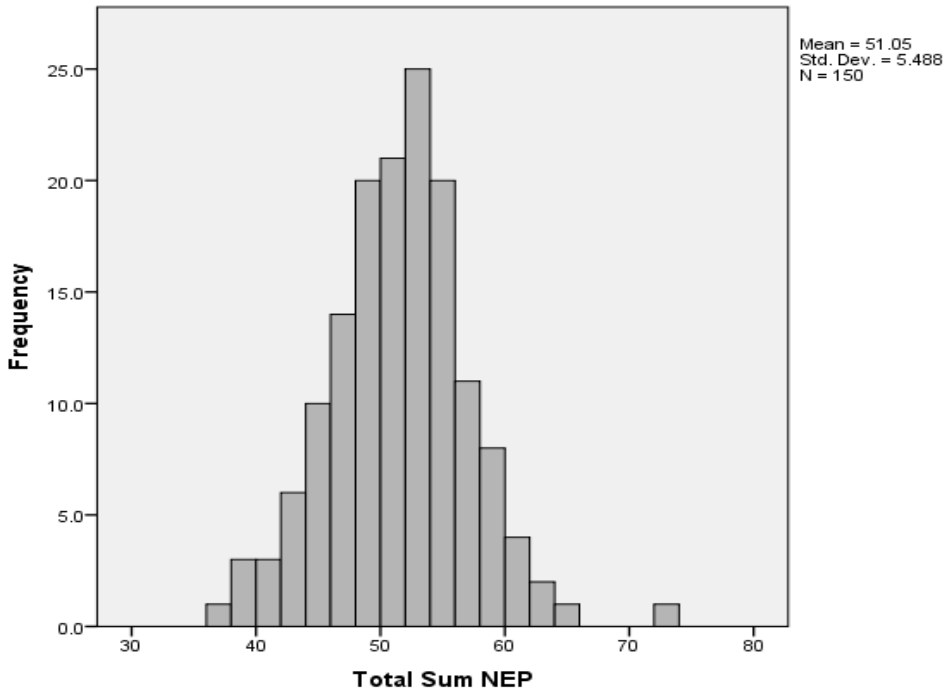


Figure 2. Histogram results for the NEP Scale.

Table 3 provides the descriptive statistics for the SCS–SF; Cronbach's alpha 0.86).

Table 3

Descriptive Statistics for SCS–SF

								95% CI	
	N	*M (SD)*	*Mdn*	Skewness	*SE*	Kurtosis	*SE*	LL	UL
SCS-SF	150	36.47 (7.33)	37.00	-.003	.198	.107	.394	35.28	37.65

Note. CI = confidence interval; LL = lower limit, UL = upper limit.

A total of *N* = 150 undergraduate students participated in the SCS-SF(*M* = 36.47, *SD* = 7.33; See Table 3). The histogram (see Figure 3) illustrates the descriptive statistics for undergraduate students having participated in SCS–SF. Scores were nonnormally distributed, with skewness of -.003 (*SE* = .198) and kurtosis of .107 (*SE* = .394), but fell

within acceptable parameters for conducting the independent samples *t* test (Byrne, 2010; DeCarlo, 1997; Field, 2013). The student SCS–SF responses showed that the *M* = 36.47 fell between the requisite ± 95% CI [35.28, 37.65} and supported the use of the independent samples *t* test in addressing my research question. The Levene's test found that the assumption of homogeneity variance was met, *p* = .08; therefore, an independent samples *t* test based on equal variances was carried out.

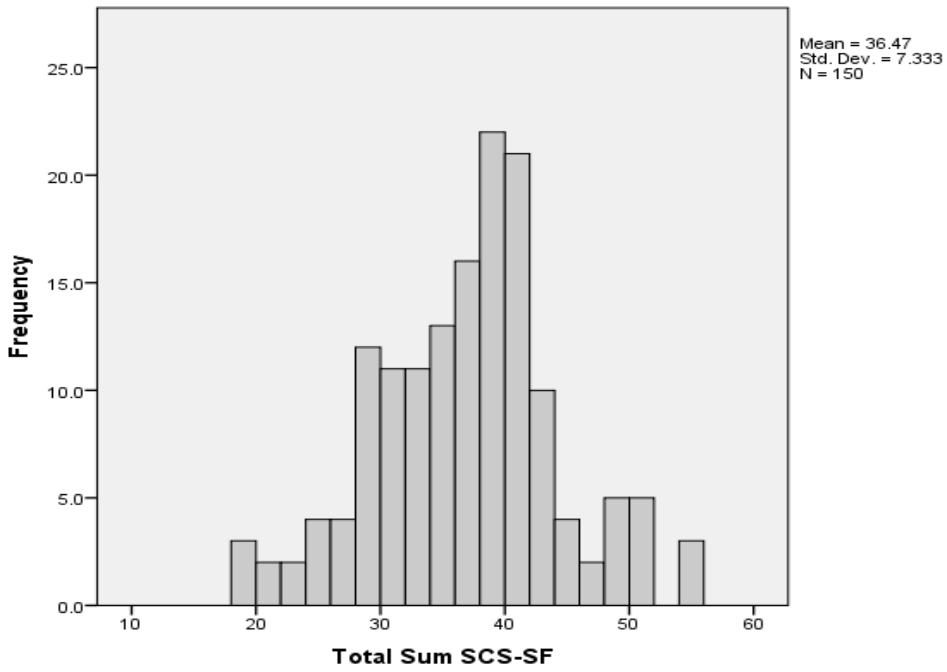


Figure 3. Histogram results for the SCS–SF.

An appropriate nonprobability convenience sample of undergraduate students was drawn for the required effect size. The descriptive data results concerning skewness, kurtosis, 95% confidence levels, and Levene's test for homogeneity of variances supported the use of the independence samples *t* test in addressing my research question. The next section includes the results of the independent samples *t*-test results for the NEP

Scale, SCS–SF, and the posttest short-interview responses from educators who did use contemplative pedagogy exercises in their classrooms with undergraduate students.

Independent Samples *t*-Test Results

Independent samples *t* tests were conducted to test my research question and hypotheses. Table 4 consists of the scores for the undergraduate students who participated in the NEP Scale. The results include the group that did participate in contemplative pedagogy exercises (CP) and the group that did not participate in contemplative pedagogy exercises (NCP).

Table 4

Independent Samples t-*Test Results for NEP Scale*

	Undergraduate Student NEP Scores with Contemplative Pedagogy and Without Contemplative Pedagogy								
	NEP-CP			NEP-NCP					
	M	*SD*	*N*	*M*	*SD*	*N*	*t*	*df*	*P*
Undergraduate Student NEP Scores	50.17	5.56	75	51.93	5.30	75	1.98	148	.049*

Note. NEP-CP is undergraduate students who had contemplative pedagogy instructors. NEP-NCP is undergraduate students who did not have contemplative pedagogy instructors in their classrooms.
*$p < .05$.

An independent samples *t* test was conducted using SPSS to evaluate if there was a statistically significant difference between the mean of undergraduate students who participated in contemplative pedagogy exercises versus students who did not participate in contemplative pedagogy exercises in the classroom relative to the NEP Scale and student ecoliteracy. The mean NEP scores showed that students whose instructors did not

use contemplative pedagogy exercises in the classroom were numerically higher than students whose instructors did use contemplative pedagogy in the classroom. The results of the independent samples *t* test showed that the mean NEP scores for NCP students (*M* = 51.93, *SD* = 5.30, *N* = 75) was statistically different and greater [*t*(148) = 1.98, *df* = 148, $p < .05$*] than the mean NEP score for CP students (*M* = 50.17, *SD* = 5.56, *N* = 75). Thus, undergraduate students whose instructors did not use contemplative pedagogy exercises scored significantly higher on the NEP Scale than undergraduate students whose instructors did use contemplative pedagogy exercises. Therefore, the null hypothesis cannot be rejected. Rejecting the null hypothesis required that students whose instructors did use contemplative pedagogy exercises score significantly higher on the NEP Scale than students whose instructors did not use contemplative pedagogy exercises. As the findings showed the opposite, causality regarding higher level of ecoliteracy cannot be inferred.

Table 5 consists of the scores for the undergraduate students who participated in the SCS–SF. The results include the group that did participate in contemplative pedagogy exercises (CP) and the group that did not participate in contemplative pedagogy exercises (NCP).

Table 5

Independent Samples t-*Test Results for SCS–SF*

	Undergraduate Student SCS-SF Scores with Contemplative Pedagogy and Without Contemplative Pedagogy								
	SCS-SF-CP			SCS-SF-NCP					
	M	*SD*	*N*	*M*	*SD*	*N*	*t*	*df*	*p*
Undergraduate Student SCS-SF Scores	36.93	6.36	75	36.00	8.21	75	-.79	139.24	.438

Note. SCS-SF-CP is undergraduate students who had contemplative pedagogy instructors. SCS-SF-NCP is undergraduate students who did not have contemplative pedagogy instructors in their classrooms.

An independent samples *t* test was conducted using SPSS to evaluate if there was a statistically significant difference between the mean of undergraduate students who participated in contemplative pedagogy exercises in the classroom versus students who did not participate in contemplative pedagogy exercises in the classroom relative to the SCS–SF and student ecoliteracy. The results of the independent samples *t* test showed that the mean SCS–SF scores between the SCS-SF-CP students (M = 36.93, SD = 6.36, N = 75) and SCS-SF-NCP students (M = 36.00, SD = 8.21, N = 75) was not statistically significant [$t(139.24) = -.79$, $df = -.79$, $p > .05$]. Thus, undergraduate students whose instructors did use contemplative pedagogy exercises were approximately the same on the SCS–SF as undergraduate students whose instructors did not use contemplative pedagogy exercises. Therefore, the null hypothesis cannot be rejected. Rejecting the null hypothesis required that students whose instructors did use contemplative pedagogy exercises would have scored significantly higher on the SCS–SF than students whose

instructors did not use contemplative pedagogy exercises to infer causality as regards higher levels of ecoliteracy.

The short surveys were conducted at the end of the semester and after undergraduate students had taken the surveys to examine what specific contemplative pedagogy exercises had been used by CP educators throughout the college semester. Contemplative pedagogy instructors participated in the posttest survey short interviews (Appendix C) and provided the following details pertinent to the facilitation of contemplative pedagogy exercises in the classroom:

- Both instructors used meditative, journaling/written, and reflective contemplative pedagogy exercises in the classroom.
- One instructor used a meditative exercise that involved having students sit for the first 5 minutes of every class throughout the duration of the college semester. Instruction included focus, paying attention, and experience.
- One instructor described using meditation exercises during the first two classes with teachings on mindfulness, overcoming anxiety, and present moment awareness.
- One instructor had a trained meditation instructor visit the class to instruct students on meditation practice and facilitate a meditation session.
- Both instructors used journaling and reflective writing exercises that had students reflect on their in-class learning experiences relative to their own lives throughout the course of the semester.

- One instructor used journaling and reflective writing exercises that had students reflect on their in-class learning experiences. These were not checked or graded as students were provided the time at the end of every class to freely sit, think on, and write about a reflective question.

The purpose of the posttest short interviews was to ascertain what specific contemplative pedagogy exercises were used in the classroom and that the exercises were being facilitated by the contemplative pedagogy instructors throughout the duration of the college semester. That these specific contemplative pedagogy exercises were conducted in the classrooms, minus the use of ecoliterate-based contemplative pedagogy exercises, supports a potential inference that led to not rejecting the null hypothesis relative to the use of contemplative pedagogy and undergraduate student ecoliteracy.

Summary

This chapter reported the survey results taken by undergraduate students who experienced instructors that did and did not use contemplative pedagogy exercises in college classrooms. The answers to the short interview questions (Appendix C) by instructors who did use contemplative pedagogy exercises in their classroom were also reported. The answers to the short interview questions support validity concerning the use of contemplative pedagogy exercises in the college classroom for my research question. My research question required that undergraduate students who did experience contemplative pedagogy exercises in the classroom would exhibit higher levels of ecoliteracy based on statistically significant scores on the NEP Scale and the SCS–SF in order to reject the null hypothesis.

Results indicated that an inference can be drawn concerning undergraduate students who experienced, and did not experience contemplative pedagogy exercises in the classroom, relative to exhibiting higher levels of ecoliteracy. Undergraduate students who experienced contemplative pedagogy exercises in the classroom did not exhibit higher levels of ecoliteracy. A statistically significant difference ([$t(148) = 1.98$, $df = 148$, $p < .05$*]) was found with students who did not experience contemplative pedagogy on the NEP Scale scores versus those students who did experience contemplative pedagogy exercises in the classroom. Results showed that there was not a statistically significant difference between students who did and did not experience contemplative pedagogy exercises in the classroom on the SCS–SF ([$t(139.24) = -.79$, $df = -.79$, $p > .05$]). Therefore the null hypothesis cannot be rejected.

Chapter 5 includes a brief review of my research work and an interpretation of the findings, conclusions, recommendations for further research, implications for social change, recommendations for practice, and concluding comments.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this quantitative survey study was to measure the effect of using contemplative pedagogy in undergraduate college classrooms as a method for the development of undergraduate student ecoliteracy. I conducted a posttest-only causal-comparative nonequivalent control group design to collect the necessary data to address the research question. I chose this research design for its probative value and ability to collect and provide raw data in a natural experimental setting. Findings provide the rationale for future studies concerning the design, implementation, and testing of contemplative pedagogy exercises that incorporate ecoliteracy and the development of undergraduate student ecoliteracy skills as a part of the pedagogy, particularly when important questions are being asked in the contemplative pedagogy professional development community concerning contemplative pedagogy exercises and the fostering of student self-centered views, versus contemplative pedagogy exercises fostering student self-, other-, and world-views.

Key findings of the data analysis indicated students who did not experience contemplative pedagogy exercises in the classroom were more likely to self-report higher ecoliteracy skills. No statistically significant differences were found relative to contemplative pedagogy exercises fostering undergraduate student ecoliteracy. One statistically significant difference was shown in undergraduate students' perceptions concerning an anthropocentric (person-centered) versus ecocentric (world or environmental-centered) worldview. Undergraduate students who did not participate in

contemplative pedagogy exercises scored significantly higher than students who did participate in contemplative pedagogy exercises in this regard.

This chapter includes my interpretation of the findings, recommendations for action and further research, implications for social change, and concluding thoughts.

Interpretation of the Findings

I used a posttest-only causal-comparative nonequivalent control group design and two surveys to measure the dependent variable of undergraduate student ecoliteracy to address the research question. The theoretical framework of ecoliteracy was founded upon Capra's (1996) web of life living systems theory. Embedded in the head, heart, hands, and spirit of ecoliteracy, the web of life represents an organic process view of learning in an educational environmental setting. The principles of the web of life included pattern (form), structure (matter), process (cognition), meaning (social construction), and felt sensation and state of awareness (Capra, 1996; Capra & Luisi, 2014; Widhalm, 2011a). The web of life is a living systems theory that represents the reactions and needs of active and living participants within ecological systems. The reactions and needs on the part of individuals to ecological systems, like that of a college classroom, necessitate individual responses to their experiences and relationships within their environments, thus creating the potential for the development of ecoliteracy skills.

Set in this context, the undergraduate students in the classroom represented their participation in the web of life. Ecoliteracy uses the web of life theory by engaging, developing, and educating individuals to become intelligently aware of the web of life's living systems, of which they are an active part. My findings showed undergraduate

student participation and ecoliteracy development in the web of life may go unnoticed within ecological systems unless attention and awareness is drawn to what are seemingly just everyday experiences of self in relationship to the world.

The SCS–SF, NEP Scale, and posttest-only *t* tests were used to measure the effect of contemplative pedagogy exercises on undergraduate student ecoliteracy. The SCS–SF measured individual capacity to mindfully engage nonjudgmental relationships with emotional and social intelligence and equanimity and wellbeing (Neff, 2003). Students who participated in contemplative pedagogy exercises scored numerically higher in their perceptions of self-compassion but there was no statistical significance [$t(139.24) = -.79$, $df = -.79$, $p > .05$]. Although there was no statistical significance, the higher numeric score on the part of students who did experience contemplative pedagogy exercises is consistent with findings associated with results on other research tests as described in my literature review. Research results cited in the literature review showed that there are positive significant effects of contemplative pedagogy exercises on undergraduate student self-compassion, wellbeing, mindfulness, reduced anxiety and stress, self-reliance, and resiliency (Dounas-Frazer & Reinholz, 2015; Greeson et al., 2014; Grossenbacher & Rossi, 2014; Helber et al., 2012; Medin & Lindberg, 2013; MLERN, 2012; et al., 2013; Rogers, 2013; Shapiro et al., 2011; Zeidan et al., 2010). Students who participated in contemplative pedagogy exercises did not score significantly higher on the SCS–SF. This finding does not allow me to infer that contemplative pedagogy exercises affected the development of undergraduate student ecoliteracy.

A significant difference was found with the group of students who did not participate in contemplative pedagogy exercises on the NEP Scale [$t(148) = 1.98$, $df = 148$, $p < .05$*]. The NEP Scale measured if student perceptions showed a greater proclivity for an anthropocentric (person-centered) or ecocentric (world-centered) worldview (Dunlap, 2008). The finding suggested students who are not participating in contemplative pedagogy exercises may have expressed a greater ecocentric worldview while students who participated in contemplative pedagogy exercises might have found themselves overly focused on an anthropocentric point of view. There are two possibilities for this appearing in the findings. The first is that ecocentric or ecological systems based elements like that of the web of life or ecoliteracy may have not been a part of contemplative pedagogy exercise instruction. Secondly, students' attention may have been directed more inwardly as a result of contemplative pedagogy exercises versus students' attention having been directed more outwardly as a result of not having participated in contemplative pedagogy exercises.

I had the opportunity to discuss my research question with Fritjof Capra (personal communication, March 1, 2016) and we had agreed that it would be interesting to see if students did develop ecoliteracy skills as a result of engaging in contemplative pedagogy exercises, particularly if ecological or systems-based thinking that included the web of life or elements of ecoliteracy was not an overly large part of contemplative pedagogy exercise instruction (F. Capra, personal communication, March 1, 2016). Research literature in ecoliteracy has shown when elements of ecologically based teachings exist in instructional practice, students have developed ecoliteracy skills. Conducting the short

interviews with instructors who did use contemplative pedagogy exercises in their classroom provided the ability to ascertain how the contemplative pedagogy exercises were being conducted in the classroom. In response to the short interview questions, instructors indicated that the contemplative pedagogy exercises entailed focus, paying attention, experience, mindfulness, overcoming anxiety, reflection, and present moment awareness. These contemplative pedagogy elements that were identified are congruent with many of the exercises currently found in the field of contemplative pedagogy research literature. Furthermore, these elements of contemplative pedagogy exercise instruction do potentially support the numerically higher score for undergraduate students' self-compassion, the effectiveness of deep learning, and reflection in instruction as outlined in the field of contemplative pedagogy (Barbezat & Bush, 2014; Puk & Stibbards, 2012; Ryan & Ryan, 2013; Wang et al., 2014). However, the significant NEP Scale results addressed a reason why students who did not participate in contemplative pedagogy exercises may have exhibited a greater proclivity for ecocentric awareness. Namely, there was an absence of ecological, systems-based, web of life, or ecoliteracy elements in the contemplative pedagogy exercise instruction towards directing students' attention outward as well as inward.

The NEP Scale scores address an emerging concern in the field of contemplative pedagogy. K. Fisher (2017) asked, "So how does concern for our own welfare become compassion instead of self-absorption, connection rather than isolation, care for others and not simply care for self? How does turning inward enable one to turn outward?" (p. 2). Fort and Komjathy (2017) further maintained, "We do need more good quantitative

studies on whether self-knowledge fosters empathy or self-contemplation fosters narcissism" (p. 2). Kaufman (2017) stated, "Contemplative pedagogy is often posited as an inner-directed practice of helping students find balance and wholeness in their lives" (p. 1). The significant finding on the NEP Scale provides a probative rationale for the further examination of contemplative pedagogy and the facilitation of contemplative pedagogy exercises in the college classroom, particularly as it concerns undergraduate student experiences with contemplative pedagogy exercises relative to anthropocentric, or ecocentric worldviews, and the development of ecoliteracy skills.

The NEP Scale findings were congruent with concerns that are being expressed in the field of contemplative pedagogy and contemplative pedagogy exercises relative to students' focus on self, versus self, other, and world (K. Fisher, 2017; Fort & Komjathy, 2017; Kaufman, 2017). More specifically, an ecoliterate systems-based perspective relative to instruction or practice in contemplative pedagogy was not overly addressed or found in the contemplative pedagogy exercises used in the classrooms. The lack of significance on the SCS–SF compounded by a statistically significant score for students who did not participate in contemplative pedagogy exercises on the NEP Scale, may be indicative of contemplative pedagogy exercises not fully supporting an interdependent systems-based approach to the development of undergraduate student ecoliteracy skills. The next sections address the limitations, recommendations for action, and further research.

Limitations

The use of SCS–SF and NEP Scale were to test my research question relative to the use of contemplative pedagogy exercises and the development of undergraduate student ecoliteracy skills. The surveys were used to measure the head, heart, hands, and spirit aspects of undergraduate student ecoliteracy relative to experiencing or not experiencing contemplative pedagogy exercises. Limitations did include using a nonprobability convenience sample, and selection was limited to students of this particular northeastern university. Future researchers may seek to include the examination of age and year in college. In addition, other limitations included the use of surveys in the variation of student responses to the posttest only survey questions, the responses were self-reported, and the SCS-SF NEP Scale were sensitive to what was being taught. Variations in response to the surveys included being impacted by age, experience, motivation, effort, and survey completion practices that included guessing at answers the researcher was looking for and filling in the blanks to just complete the survey. My research design was exploratory in nature and designed using only a posttest-only causal-comparative nonequivalent control group design, the independent variable was not manipulated, and student ecoliteracy levels were not measured at the beginning of the semester, so these findings are inferred. Continued research at this university and other universities as well as the use of other research designs would further add to the probative value of my research findings concerning these study limitations.

Recommendations for Action and Further Research

Current research in the field has demonstrated a growing concern surrounding the implementation and effects of contemplative pedagogy in the classroom (K. Fisher, 2017; Fort & Komjathy, 2017; Franzese & Felten, 2017; Kaufman, 2017). Specifically, researchers and instructors have asked how educators might conduct contemplative pedagogy exercises that support the development of undergraduate student personal, social, and global worldviews, without the student developing an overly self-centered worldview (K. Fisher, 2017; Fort & Komjathy, 2017; Franzese & Felten, 2017; Kaufman, 2017). The importance of my findings address these contemplative pedagogical concerns in terms of student responses to contemplative pedagogy exercises as potentially being overly self-centered (anthropocentric) versus self-, other-, and world-centered (ecocentric) based on the NEP Scale and SCS-SF results. Findings also suggested that further attention to the development of undergraduate student ecoliteracy skills could support addressing the contemplative pedagogical concerns as students did not exhibit higher levels of ecoliteracy in response to contemplative pedagogy exercises. The design and use of contemplative pedagogy exercises that include ecoliterate-based attributes, that is, the head, heart, hands, and spirit, may provide the wherewithal in the further development of undergraduate student ecoliteracy skills.

Based on the findings of this exploratory posttest-only causal-comparative nonequivalent control group design, I recommend efforts to further educate instructors in contemplative pedagogy and the use of contemplative pedagogy exercises that attend to the development of undergraduate student ecoliteracy skills by making further research

available to them. Franzese and Felten (2017) have created a voluntary research cohort specifically designed to examine contemplative pedagogy in higher education using the Scholarship of Teaching and Learning (SOTL) as a method to develop further research designs to evaluate contemplative pedagogy exercises in college classrooms. They stated the premise of the research cohort is founded on faculty not having enough "evidence-based choices about the use of different contemplative pedagogies in particular disciplinary or course contexts" (Franzese & Felten, 2017, p.1). The SOTL research tool works with five common principles and may prove helpful in furthering contemplative pedagogy and ecoliteracy research aims. The five common principles of SOTL include the following:

1. Inquiry focused on student learning;
2. Grounded in context;
3. Methodologically sound;
4. Conducted in partnership with students;
5. Appropriately public (Franzese & Felten, 2017, pp. 2-6).

The five common principles provide the opportunity for educators to work with, test, and publically offer further research to the contemplative pedagogy field via the contemplative pedagogy cohort that has been established by Franzese and Felten. According to the SOTL research tool, research needs to be methodologically sound. The findings of this research design provide the opportunity for the development of further testing and research in forwarding this exploratory study concerning contemplative pedagogy exercises and undergraduate student ecoliteracy skills.

Recommendations for future research designs include using the posttest only causal comparative nonequivalent control group design as outlined in Chapter 3 of my study. The posttest-only causal-comparative nonequivalent control group research design provides instructors with a method that could advance, test, and measure if statistical significance is present when ecoliterate specific constructs are included as an additional part of contemplative pedagogy exercise instruction without students being aware that a natural experiment is taking place. Another recommendation for future research would be to use an analysis of variance (ANOVA) or analysis of covariance (ANCOVA) in which a pre- and posttest research design can further test the development of undergraduate student ecoliteracy skills relative to the use of contemplative pedagogy exercises. In the context of these research designs, students will know that they are participating in an experiment congruent with the SOTL research tool in that these designs are conducted in partnership with the students. The ANOVA and ANCOVA provide the ability to measure undergraduate student ecoliteracy skill responses to contemplative pedagogy exercises by providing before and after results to having participated in contemplative pedagogy exercises over the duration of a college semester.

Implications for Social Change

The findings of the present study contribute to social change by providing feedback to college educators and professionals that are currently creating and using contemplative pedagogy exercises in the college classroom. The findings may also provide college educators and professionals with information regarding the development of student ecoliteracy in the college classroom as a method to address the mounting

personal, local, and global concerns of undergraduate students. Particularly, how students connect what they are learning in the college classroom with their own personal experiences and relationships with the world at large. Research showed that mounting personal, local, and global problems are a part of undergraduate students' present participation in higher education. Personal, social, ecological, and political climates challenge undergraduate students' experiences with learning in the classroom. Ecoliteracy skills provide students with a means to objectively understand their connection to the world with a sense of equanimity and balance. Herein, student ecoliteracy skills, provides them with the capacity to work with solving problems via critical thinking skills, action, purpose and compassion.

Contemplative pedagogy is beginning to rapidly establish itself as a supplemental pedagogical tool in higher education. Zajonc (2009) maintained that contemplative pedagogy instruction and exercises develop a student's understanding that, "nature's marvelous processes of transformation, occurring constantly in the physical world, are now invited into our mind and heart" and that these processes exist interdependently (p. 112). My findings infer that researchers and educators involved in contemplative pedagogy and the development of contemplative pedagogy instruction need to further examine the addition of exercises that aid undergraduate students in understanding a systems-based ecoliterate perspective. In turn, this provides researchers and instructors with the opportunity to further test if contemplative pedagogy exercises foster the systems-based, ecoliterate perspective that integrates undergraduate students' interdependent sense of participation in personal, local, and global paradigms as Zajonc

has suggested. Ecoliteracy is grounded in a living systems-based theory called the web of life and addresses learner development of the head, heart, hands, and spirit. The foundations of ecoliteracy provide students with the opportunity to develop a deeper understanding for the interdependent connections existent within their personal, social and global worldviews.

Professional development for educators interested in the use of contemplative pedagogy in the classroom needs to include the development of workshops, seminars, and conferences that directly address ecoliterate-based approaches to learning. Provided with a background to ecoliteracy, educators then have the opportunity to develop, work with, and test contemplative pedagogy exercises that combine contemplative pedagogy and ecoliteracy approaches to student learning. Graduating students with the requisite ecoliteracy skills affords them the opportunity to healthily compete in high-demand work environments, engage in societal and social constructs, work with adaptation and ecological change, politics and warfare, and the rapid pace and growth of technology and media.

Conclusion

The effects of contemplative pedagogy and contemplative pedagogy exercises have demonstrated in prior research that there is a significant effect on undergraduate students in terms of student self-compassion, health and wellbeing, acquisition of knowledge, and person-centered development. Questions surrounding contemplative pedagogy and undergraduate students making the connections to self, other, and worldviews are being asked by researchers and educators. The researchers and educators

are asking whether undergraduate students are developing self-compassion in alignment with self- and other-compassion, as well as making the connections with personal, local, and global environments. The researcher and educator concerns' include undergraduate students taking their worldviews and projecting them outward. In essence, is contemplative pedagogy supporting the undergraduate students in the development of learning skills that integrate systems levels of thinking? Here, undergraduate students' systems levels of thinking means not only in terms of knowledge acquisition and information processing, but the development of their ability to transfer knowledge and information processing, and connect it with direct application, experience, and action on personal, local, and global levels.

My study's findings provide the rationale for further research and the development of contemplative pedagogy exercises that specifically address undergraduate student ecoliteracy skills in order to aid students in realizing their interdependent relationships on personal, local, and global levels. That my research study findings showed nonsignificance relative to using contemplative pedagogy exercises as a pedagogical tool for the development of undergraduate student ecoliteracy suggests that contemplative pedagogy may further benefit from creating pedagogical exercises that include ecoliterate-based attributes. The posttest short interviews with the instructors showed instructors already using established contemplative pedagogy exercises. The contemplative pedagogy exercises that were used by instructors in the classroom have shown significant results in the use of contemplative pedagogy for students on a personal level as outlined in the literature review. However, the use of the NEP Scale and SCS-SF

and the nonsignificant results, suggests there is an underdeveloped aspect of contemplative pedagogy research that needs to further address students' self-.other-, and world-views as it relates to the development of student ecoliteracy skills.

Research has shown ecoliteracy provides students with a skillset that supports their understanding of deeper systems-thinking dynamics connecting learning with real world experiences. Since contemplative pedagogy exercises are effective in fostering student self-reliance and resiliency, it demonstrates that a potential does exist to expand the self-same personal reliance and resiliency into how students connect their classroom learning experiences and themselves, with the world at large from an ecoliterate perspective. Further research concerning the implementation and use of ecoliterate-based knowledge with current contemplative pedagogy exercises, provides the opportunity to examine whether the efficacy that has been shown in undergraduate student person-centered development, as a result of contemplative pedagogy exercises, can evolve further. The results will be a contemplative pedagogical tool that can assist educators in providing undergraduate students with a deeper understanding between educational knowledge and their relationships with the world.

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Appendix A: Permission for Living Systems Principles Table

RE: Permission to Use Table In Dissertation Work

Inbox x

Mike Lees Nov 11 (6 days ago)

to truffula

November 11, 2015

Dr. Widhalm,

Hello and I hope that all finds you doing well. My name is Michael Lees and I am currently working on my dissertation in global and comparative education. The theoretical framework for my dissertation is deeply steeped in the work of Capra, living systems, and tying this together with education. The work you have done with this is inspirational and integral to the work I am doing to say the least.

I was writing to see if I might have your permission to use the table entitled "Table 1: *Living Systems Principles*" as it appears in the "Educators as architects of living systems: Designing vibrant learning experiences beyond sustainability and systems thinking (2011)" article that you wrote.

If this works for you, could you please send me a copy of this table as the PDF version does not allow for the cut and paste option in order to include the graphics that appear therein.

I thank you for your time and considerations.

Sincerely,

Michael Lees

truffula Nov 13 (4 days ago)

to me

Dear Mike,

Thank you for contacting me! I am so glad my work has been helpful to you. I would love to learn more about your dissertation topic. Would you be willing to share more? And which university are you doing your research at?

I'd be glad to share the table with you. I am on a deadline right now and need to search for the original file in Word. By when do you need it? Did you also have a chance to look at my dissertation which is available online also? It goes into a lot more detail.

All the best,

Barbara

On Nov 11 2015 8:12 PM, Mike Lees wrote:

November 11, 2015

Dr. Widhalm,

Hello and I hope that all finds you doing well. My name is Michael Lees and I am currently working on my dissertation in global and comparative education. The theoretical framework for my dissertation is deeply steeped in the work of Capra, living systems, and tying this together with education. The work you have done with this is inspirational and integral to the work I am doing to say the least.

I was writing to see if I might have your permission to use the table entitled “Table 1: _Living Systems Principles_” as it appears in the

Mike Lees Nov 13 (4 days ago)

to truffula

Dr. Widhalm,

Thank you for your time and the response. I have seen your dissertation and read through the work you did there. Needless to say, I am a big fan of the tables that you have created and the work you have done. I came across your work a couple of years ago as I was going through my core coursework and what you have compiled as it relates to the work of Capra's livings systems theory, ecoliteracy, and education has been inspirational.

I am doing my PhD in Education with a concentration in Global and Comparative Education at Walden University. The program has been excellent as far as the coursework and the relationship I have with my Mentor/Chair. I am an Adjunct Professor, so working on my degree in a program that is mainly online has allowed me to continue with my teaching assignments so that I can keep working and support our family at the same time. I have been, and continue to enjoy the work I am doing with Walden a lot.

I have just about 20 years of college teaching experience in World Wisdom Traditions, Ecology and Religion, Creativity, Indigenous Traditions, and Eastern Philosophy. I did my BA and MA at Naropa University in Boulder, CO. Naropa is a school that uses contemplative education as one of its main pedagogical approaches to learning. Since Naropa I have used contemplative pedagogy practices in my classroom for the last 15 years.

I also have a strong background in ecology from philosophical, scientific, systems thinking, deep ecology, and world wisdom/spiritual traditions. I have been combining contemplative pedagogy and ecological/living systems/ecoliteracy approaches into the way I teach and this is where I have been taking my research study for my doctorate. I am essentially measuring if contemplative pedagogy practices in the college classroom influence the development of undergraduate student ecoliteracy. The theoretical framework for my dissertation involves Capra's work with living systems combined with a lot of the work you have done as it relates to bringing this to the classroom.

I am currently constructing my literature review so the ability to be able to use your table from that article is exciting to say the least. If there is any chance that you can send the table at your soonest convenience that would be great.

I would also like to send you a copy of my dissertation when it is done. Your work has definitely played a large part in the work I am doing over this way so it would be an honor to have you read it.

I thank you again for your time, consideration, and ability to include your work in my dissertation.

In good thoughts,
Mike Lees

truffula 7:33 PM (17 minutes ago)

to me

Hi Mike,

I apologize for the delay. I am so glad to hear about your work and that my framework has been so helpful. What is the title of your dissertation?

I am attaching the table in Word and PDF.

I am in the process of applying for a tenure track position, and the fact that my work has been so helpful to you would be useful for me to mention. Do you have any publications out yet where you reference my work? Or would it be ok for me to reference your draft dissertation, and if yes, would you be willing to share the citation information?

And I truly look forward to reading your work! I originally retrieved those icons from the Center for Ecoliteracy website, but that previous link is no longer active. I am not sure if they have moved it elsewhere.

All the best,

Barbara

2 Attachments

Preview attachment living systems table Widhalm.docx

living systems table Widhalm.docx

Preview attachment living systems table Widhalm.pdf

living systems table Widhalm.pdf

Appendix B: Permission to Use Tree of Contemplative Practices

RE: Permission to Use Tree of Contemplative Practices in Dissertation Work

Inbox x

Mike Lees 10:46 PM (14 hours ago)

to Carrie

November 11, 2015

Carrie,

Greetings and I hope that all finds you doing well. This is Michael Lees and I do not know if you remember me or not, but I was at the conference at Smith College last summer and did the Tibetan teaching transcription work for Rinpoche and sang the Native songs on the evening of our performances.

I was writing to see if I could have permission to use the "*Tree of Contemplative Practices*" as a figure in my dissertation work. If I can, could you please respond with permission in this email? My school requires that I have proof of permission for my dissertation work. This figure will be a wonderful addition as a part of Chapter 2 in my work.

Again I hope that all finds you doing well and I thank you for your time.

Sincerely,
Michael Lees

Carrie Bergman 10:21 AM (2 hours ago)

to me

Good morning, Michael!

Great to hear from you--yes, I absolutely remember you through your presence at generosity at and following the 2014 Summer Session. I hope things are going well! Things are good here--we just had a great conference at Howard University and are getting ready for a board meeting this weekend.

Yes, we grant permission for you to reproduce the Tree of Contemplative Practices image in your dissertation. If you require any different format or size of the image than what is available on the website or attached here, just let me know.

Blessings,
Carrie

Attachments area
Preview attachment 2014_tree_6x6_color.jpg

2014_tree_6x6_color.jpg

Mike Lees 12:55 PM (12 minutes ago)

to Carrie

Carrie,

Wonderful and thank you! I really missed not being able to attend the conference this year. I really do hope to be back again in the future. It would be great to perhaps even present one of these times!

I was wondering if there was any chance that you might have a black and white or grey-scale version of this. I cannot seem to edit the image to change it to black and white.

Thanks again for your time with this!

In good thoughts always,
Mike Lees

Carrie Bergman 12:57 PM (10 minutes ago)

to me

Sure thing--here ya go!

Best,

Carrie

Attachments area

Preview attachment 2014_tree_6x6_bw.jpg

2014_tree_6x6_bw.jpg

Mike Lees 1:06 PM (1 minute ago)

to Carrie

Fantastic and thank you so much!

In good thoughts,
Mike

Appendix C: Short Interview for Contemplative Pedagogy Instructors

Short Interview Questions for Contemplative Pedagogy Instructors

1. As an instructor using contemplative pedagogy in the classroom, which of the following categories of exercises or approaches to learning do you use: a) meditative b) journaling/written c) active/kinesthetic exercises d) reflective and/or e) other (please explain)?
2. For each category of exercises/approaches you use with students in your class, can you please describe how you use them?
    a. Meditative: Please describe what meditative exercises you use with your students.
    b. Journaling/Written: Please describe what reflective journaling/written exercises you use with your students.
    c. Active/Kinesthetic Exercises: Please describe what active/kinesthetic exercises you use with your students.
    d. Reflective: Please describe what reflective exercises you use with your students.
    e. Other: Is there a type of contemplative pedagogy exercise that you may be using that we have not discussed here today and if so please describe how you use it with your students.
3. How frequently do you use contemplative exercises/activities?
4. What is the spacing of contemplative exercises/activities across the duration of your courses?

5. What day and time may I come to your classroom in order to disseminate and facilitate the surveys with your students?

Appendix D: NEP Scale

New Ecological Paradigm (NEP) Scale

Directions: On a scale from 1 (strongly disagree) to 5 (strongly agree), please indicate how much you disagree or agree with the following statements.

1	2	3	4	5
Strongly Disagree				Strongly Agree

Read each statement, and place a checkmark in the column that best matches your agreement or disagreement.	1	2	3	4	5
1. We are approaching the limit of the number of people the earth can support.					
2. Humans have the right to modify the natural environment to suit their needs.					
3. When humans interfere with nature it often produces disastrous consequences.					
4. Human ingenuity will insure that we do NOT make the earth unlivable.					
5. Humans are severely abusing the environment.					
6. The earth has plenty of natural resources if we just learn how to develop them.					
7. Plants and animals have as much right as humans to exist.					
8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.					
9. Despite our special abilities humans are still subject to the laws of nature.					
10. The so-called ‘‘ecological crisis’’ facing humankind has been greatly exaggerated.					
11. The earth is like a spaceship with very limited room and resources.					
12. Humans were meant to rule over the rest of nature.					

13. The balance of nature is very delicate and easily upset.					
14. Humans will eventually learn enough about how nature works to be able to control it.					
15. If things continue on their present course, we will soon experience a major ecological catastrophe.					

Appendix E: Permission to Use NEP Scale

Mike Lees 11:54 PM (13 hours ago)

to riley.dunlap

Dear Dr. Dunlap,

My name is Michael Lees and I was writing in order to seek permission to use the New Ecological Paradigm (NEP) scale you have created for my doctoral dissertation work. My college requires that the permission of a survey scale be included as an appendix in my dissertation.

I am really excited to have found the NEP scale as it provides a really nice fit for my research topic and study. If you can provide permission and any other information concerning general and statistical information it would be highly valued and appreciated.

I thank you for your time and considerations and look forward to hearing from you.

Sincerely,

Michael Lees

Dunlap, Riley 12:04 AM (12 hours ago)

to me

Michael,

The NEP Scale, published in JSI, is in the public domain and anyone is free to use it. But you have my permission anyway.

Here's a related article helping put the scale into context that you might find useful.

Good luck with your research.

Riley Dunlap

Riley E. Dunlap
Regents Professor of Sociology and

Laurence L. and Georgia Ina Dresser Professor
Department of Sociology
Oklahoma State University
Stillwater, OK 74078

Co-Editor, *Climate Change and Society: Sociological Perspectives*
Oxford University Press, 2015 (Report of the American Sociological Association's Task Force on Sociology and Global Climate Change)

Appendix F: SCS-SF

SELF-COMPASSION SCALE–Short Form (SCS–SF)

HOW I TYPICALLY ACT TOWARDS MYSELF IN DIFFICULT TIMES

Please read each statement carefully before answering. Indicate how often you behave in the stated manner, using the following scale:

Almost Never				**Almost Always**
1	**2**	**3**	**4**	**5**

Read each statement, and place a checkmark in the column that best matches how often you behave in the stated manner.	1	2	3	4	5
1. When I fail at something important to me I become consumed by feelings of inadequacy.					
2. I try to be understanding and patient towards those aspects of my personality I don't like.					
3. When something painful happens I try to take a balanced view of the situation.					
4. When I'm feeling down, I tend to feel like most other people are probably happier than I am.					
5. I try to see my failings as part of the human condition.					
6. When I'm going through a very hard time, I give myself the caring and tenderness I need.					
7. When something upsets me I try to keep my emotions in balance.					
8. When I fail at something that's important to me, I tend to feel alone in my failure.					
9. When I'm feeling down I tend to obsess and fixate on everything that's wrong.					
10. When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.					
11. I'm disapproving and judgmental about my own flaws and inadequacies.					

12. I'm intolerant and impatient towards those aspects of my personality I don't like.					

Appendix G: Permission to Use SCS-SF

SELF-COMPASSION SCALE–Short Form (SCS–SF)

To all interested, please feel free to use the Self-Compassion Scale (SCS) for research or any other use. Masters and dissertation students also have my permission to use and publish the Self-Compassion Scale in their theses. The SCS is appropriate for ages 14 and up (as long as individuals have at least an 8th grade reading level). If you aren't that interested in using the subscales, you might also want to consider using the Short SCS (12 items), which has a near perfect correlation with the long scale.

Kristin Neff, Ph. D.

Associate Professor Educational Psychology Dept.

University of Texas at Austin

1 University Station, D5800

Austin, TX 78712

e-mail: kristin.neff@mail.utexas.edu

Reference: Neff, K. D. (2003). Development and validation of a scale to measure self-compassion. Self and Identity, 2, 223-250.

To Whom it May Concern:

Please feel free to use the Self-Compassion Scale–Short Form in your research (12 items instead of 26 items). The short scale has a near perfect correlation with the long scale when examining total scores. We do not recommend using the short form if you are

interested in subscale scores, since they're less reliable with the short form. You can e-mail me with any questions you may have. The appropriate reference is listed below.

Best wishes, Kristin Neff, Ph. D.

e-mail: kristin.neff@mail.utexas.edu

Reference:

Raes, F., Pommier, E., Neff, K. D., & Van Gucht, D. (2011). Construction and factorial validation of a short form of the Self-Compassion Scale. Clinical Psychology & Psychotherapy. 18, 250-255.

SCS-SF Retrieved from http://self-compassion.org/self-compassion-scales-for-researchers/

Appendix H: Permission to Use Dissertation Discussion With Fritjof Capra

Mike Lees 4:12 PM (23 hours ago)

to Fritjof

Dr. Capra,

Greetings and I hope that all finds you doing well. I just wanted to take a moment to offer a heartfelt thank you for your time yesterday concerning our phone conversation and my dissertation work. It was extremely helpful and valuable to have your perspective on all of the work that I am doing and it means a lot to me.

I was also wondering if it would be okay, and to have your permission, to cite and use some of what we discussed throughout our conversation in my dissertation writing.

Again, thank you so much for your time as it was a tremendous opportunity for me to able to talk with you about your work and the integral role that it plays in the fulfillment of my PhD and research study.

Sincerely,

Michael Lees

Fritjof Capra 3:27 PM (19 minutes ago)

to me

Hi Michael,

Please feel free to quote anything I said during our conversation.

All the best,
Fritjof Capra

> On Mar 2, 2016, at 1:12 PM, Mike Lees > wrote:
>
> Dr. Capra,
>
> Greetings and I hope that all finds you doing well. I just wanted to take a moment to offer a heartfelt thank you for your time yesterday concerning our phone conversation and my dissertation work. It was extremely helpful and valuable to have your perspective on all of the work that I am doing and it means a lot to me.
>
> I was also wondering if it would be okay, and to have your permission, to cite and use some of what we discussed throughout our conversation in my dissertation writing.
>
> Again, thank you so much for your time as it was a tremendous opportunity for me to able to talk with you about your work and the integral role that it plays in the fulfillment of my PhD and research study.
>
> Sincerely,
>
> Michael Lees
>
> On Mon, Feb 22, 2016 at 3:35 PM, Mike Lees > wrote:
> Dr. Capra,
>
> That sounds great. Thank you very much for this opportunity and I highly look forward to talking with you about this

work.
>
> In good thoughts,

> Mike Lees
>
> On Mon, Feb 22, 2016 at 2:29 PM, Fritjof Capra < > wrote:
> Hi Michael,
>
> How about Tuesday, March 1, at 2:00 pm California time? My phone number is
>
> Talk to you soon,
> Fritjof Capra
> > On Feb 19, 2016, at 12:36 PM, Mike Lees > wrote:
> >
> > Dr. Capra,

> > Greetings and I hope that all finds you doing well and that you had a good trip for your lecture tour. I was wondering if it would still be okay to contact you concerning my dissertation work. Your work with living systems thinking and ecoliteracy plays an integral role in the study I am going to be conducting. The opportunity to discuss this with you would be valued tremendously.

> > Would it be possible to set up a phone call with you concerning my research? I currently teach two courses. My classes run on Monday and Wednesday this semester so a Tuesday, Thursday, or Friday (anytime) would be great.

> > I have also attached a copy of my CV with this email if you wanted to review what some of my background is all about. I look forward to hearing from you and again hope all is well.

> > Sincerely,
> > Michael Lees
> >
> > On Wed, Jan 13, 2016 at 2:53 PM, Mike Lees > wrote:
> > Dr. Capra,
> >
> > Thank you very much for your response. I really look forward to having the opportunity to talk with you in February.
> > Have safe travels and thank you again.
> > Sincerely,
> > Michael Lees
> > On Jan 13, 2016 1:25 PM, "Fritjof Capra" <t> wrote:
> > Hi Michael,
> >
> > I am just about to leave for a European lecture tour and will be glad to talk to you when I return to Berkeley in February. Please be so kind and get in touch with me again in mid-February. >
> All the best,
> > Fritjof Capra