Being, Belonging, and Becoming in Immersive Complexity: A Post-Intentional Phenomenological Analysis of Connectedness in Doctoral Students' Personal Learning Networks

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Dedication

This work is dedicated with love and gratitude to Vince.

Abstract

The purpose of this post-intentional phenomenological research study was to better understand connectedness in personal learning networks. The study was situated within the context of the field of learning design and technologies, and more specifically in distance learning. Literature from online, mobile, and networked learning, as well as formal and informal learning, personal learning networks and environments, and interaction and interactivity supported the research. The conceptual framework comprised of complexity theory, motivation theories (Keller, 1987; Malone & Lepper, 1987; Maslow, 1943), learning theories (Bandura, 1986; Dewey, 1938/1997; Duffy & Cunningham, 1996; Lave & Wenger, 1991; Siemens, 2005), and theories of identity (Rogers, 1959; Wenger, 1998). The philosophical commitments of this study adhered to a phenomenological philosophy of technology (Ihde, 1979) and a post-intentional phenomenological philosophy and methodology (Vagle, 2014). A review of phenomenological research and postmodern/poststructural thought in the learning design and technologies field further supported the design of this research study. The aim of this interpretivist inquiry was to explore the question: how might connectedness take shape in personal learning networks? Six doctoral students from a public, four-year institution in the Midwest participated in three waves of data gathering that included written lived experience descriptions, think-aloud observations, and in-depth interviews conducted via synchronous video. A post-intentional methodology (Vagle, 2014) that included a whole-part-whole process, a post-reflexive journal, and a post-intentional data analysis technique of chasing lines of flight (Deleuze & Guattari, 1987; Vagle, 2014) was used to

analyze and synthesize the data, as well as interrogate the tentative manifestations. The findings consisted of four tentative manifestations: connectedness in context, connectedness as motivation, connectedness as learning, and connectedness as identity. In the tentative manifestation of connectedness in context, lived experiences included immersiveness and characteristics of complex adaptive systems: emergence, self-organization, adaptive co-evolution, self-similarity, dynamic non-linearity, and systemic interconnectedness. In the tentative manifestation of connectedness as motivation, the findings encompassed the needs for safety and freedom, esteem through belonging, self-actualization, and the desire for being-in-the-know. Connectedness as learning was experienced through agency, forming goals, observing and modeling, reciprocating, seeking and finding multiple perspectives, discovering serendipitous surprises, and generating syntheses. Connectedness as identity was experienced as an evolving self-concept and identity through practice.

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Chapter 1: Introduction to the Research Study

> "Always follow the rhizome by rupture; lengthen, prolong, and relay the line of flight; make it vary, until you produced the most abstract and tortuous of lines of *n* dimensions and broken directions." Gilles Deleuze and Felix Guattari, *A Thousand Plateaus* (1987)

Much like an early choose-your-own adventure book or an interactive narrative in which the reader follows diverging plotlines, the web affords a multi-dimensional, rhizomatic experience. Agents on the web follow their curiosity in a never-ending labyrinth of information, communication, and entertainment. Unlike the infinite, non-linear regress of looking something up on Wikipedia, this text is linear. It begins with an introduction to this phenomenological research study, which explored connectedness in personal learning networks. This introductory chapter consists of four sections: the confluence of emerging technologies and trends for personal learning; an overview of the review of literature with definitions of key terms; a statement of the research questions; and the organization of the chapters.

Confluence of Emerging Technologies and Trends for Personal Learning

Several significant trends were converging that pointed in the direction of growth for connected and networked learning in higher education. These trends included (1) the growing ubiquity of social media; (2) the integration of online, hybrid, and collaborative learning; (3) the shift from students as consumers to students as creators; and (4) the evolution of online learning (Johnson, Adams Becker, Estrada, & Freeman, 2014). Online, networked, and connected learning signified the possibility of a bridge between formal and informal learning (Anderson, 2010, 2012), which could impact higher

education in classrooms, as well as online, blended, and distance learning. Characteristic of an emerging trend, the definitions of constructs related to networked learning were evolving. Transfer of knowledge and skills for workplace performance and lifelong learning were some of the potential outcomes of integrating connected and networked learning into higher education, in which learners maintained access to people, resources, and environments after graduation.

Mobile learning, integral to connected and networked learning, was a growing trend that garnered interest from scholars in the learning design and technologies field (Berge & Muilenburg, 2014; Miller & Doering, 2014). In considering the potential of connected mobile learning, Mundie and Hooper (2014) foregrounded the affordances and capabilities of mobile technologies for expanding knowledge and networks in a way that was personalized for the learner. With the potential to transform both formal and informal learning experiences, Dennen and Hao (2014) described how mobile learning apps could foster authentic, contextualized learning experiences. From a constructivist standpoint, "iPods, iPhones, and iPads, due to their portability, lend themselves to use in an authentic or situated context, or they can provide tools that would help students solve situated problems" (Dennen & Hao, 2014, p. 27). The opportunities for peer interactions fostered through mobile technologies made it suitable for cooperative and collaborative learning activities from a social constructivist standpoint (Dennen & Hao, 2014). Mobile apps afforded the potential for enhancing connections between media and between ideas for rich, remote learning and cognition (Hokanson, 2014).

Overview of the Literature Review and Definition of Key Terms

This study was positioned within the context of distance education in the field of learning design and technologies. The phenomenon explored was connectedness in personal learning networks (e.g., connections with people, ideas, and information through technology, in which the lived experiences of connectedness might be afforded or facilitated through social networking sites, conferencing, communities, classes, etc.). The use of the term *connectedness* fell within common usage. Thus, it was useful to begin with Merriam-Webster's definition: "The state of being closely joined or linked especially in an emotional way." In the context of a personal learning network, the joining or linking of connectedness could encompass: (1) online environments, technologies, or media; (2) online networks of people including classmates, teachers, experts, or peers; and (3) online content, ideas, or information. The theories that framed this study were grounded in complexity theory, learning theories, motivation theories, and theories of identity. From an ontological and epistemological viewpoint, the philosophical and methodological commitments cohered with a post-intentional phenomenological perspective on the nature of reality and ways of knowing. The naturalist paradigm assumes realities are multiple, constructed, and holistic; and that the relationship of the knower and the known are interactive and inseparable (Lincoln & Guba, 1985). The post-structural philosophical commitments that ran through this research viewed knowledge as "partial, situated, endlessly deferred, and circulating through relations" (Vagle, 2014, pp. 111-112). In phenomenology, intentionality is "the way in which humans are connected meaningfully in the world" (Vagle, 2014, p. 112). Therefore, "posting" intentionality—i.e., the way humans are meaningfully connected in

the world—was interpreted as unstable, fleeting, and partial because an individual was believed to be "both agent and acted upon: what is available for that subject is both a manifestation of the social and is made possible by that subject's intending" (Vagle, 2014, p. 113). The post-intentional methodological approach honored and cohered with these philosophical commitments.

The learning design and technologies field has had a long history. The kinds of learning activities experienced today in higher education have evolved from earlier forms of institutionalized instruction as far back as Socratic dialogue (Saettler, 1968). The major movements in the field were influenced by technologies such as silent films, radio, and television (Reiser, 2001a; Saettler, 1968). Methods and media came together in instructional systems design most prominently around the time of World War II in the development of military war training films (Reiser, 2001a, 2001b; Saettler, 1968). Distance education, which began through mail correspondence, now integrated multimedia, Internet, web, and mobile technologies for learning.

The exploration into connectedness began with a review of literature about online learning. This exploration was extended to literature that specifically considered the bridge between formal and informal learning. This research began with an understanding of a personal learning network as "the sum of all social capital and connections that result in the development and facilitation of a personal learning environment" (Couros, 2010, p. 139). A personal learning environment was defined as "a combination of devices, applications, and services within what may be thought of as the practice of personal learning using technology" (Martindale & Dowdy, 2010, p. 180). Given the limited

research on connectedness as a construct in distance education, the literature review also drew on research related to interaction and interactivity.

The conceptual framework section of the literature review included complexity theory, motivation theories, learning theories, and theories of identity. According to Imenda (2014), "the conceptual or theoretical framework is the soul of every research project" (p. 185). He opined that generative-inductive research—as opposed to hypotheses-testing deductive research—called for a conceptual framework, rather than a theoretical framework, given that the "research problem cannot meaningfully be researched in reference to only one theory, or concepts resident within one theory" (Imenda, 2014, p. 189). Thus, syntheses of theories were integrated in a conceptual framework or model in order to understand the phenomenon. Specifically, this conceptual framework drew on theories of complexity (Gleick, 2011), motivation (Keller, 1987; Malone & Lepper, 1987; Maslow, 1943), learning (Bandura, 1986; Dewey, 1938/1997, Duffy & Cunningham, 1996; Lave & Wenger, 1991; Siemens, 2005), and identity (Rogers, 1959; Wenger, 1998).

The next section of the literature review highlighted the philosophical commitments of the research study including a commitment to Ihde's (1979, 1993) phenomenological philosophy of technology and postphenomenology, as well as Vagle's (2014) post-intentional phenomenological philosophy and methodology, with influence from Deleuze and Guattari (1987). Vagle's (2014) post-intentional phenomenological approach adhered to the traditional whole-part-whole analytical process, but honored the multiple, partial, and varied contexts of tentative manifestations by emphasizing the

importance of chasing lines of flight (Deleuze & Guattari, 1987)—a significant departure from previous phenomenological philosophies and methodologies, as well as a major contribution to the field of phenomenological research practice. As Vagle (2014) proclaimed, "Post-intentional phenomenology assumes that phenomena, too, are always already exploding through relations, and that the post-intentional phenomenologist's primary job is to not shy away from these potential explosions" (p. 118). Ihde's (1979) philosophy of technology provided context for philosophizing about the impact of technology on humanity and learning. The final part of this section reviewed the growing trend of phenomenological research in the field of learning design and technologies, as well as postmodern and poststructural thought in the field.

The final section of the literature review summarized the context, phenomenon, conceptual framework, and philosophical commitments. Explicit connections were drawn between the literature and the relevance for an exploration into connectedness in personal learning networks. This final synthesis illustrated the coherence and alignment between the context, phenomenon, conceptual framework, and philosophical commitments, while also creating a funnel from the literature review to the research questions and through the methodological approach.

Statement of the Problem

The review of literature and research indicated a significant lacuna in the corpus of learning design and technologies related to connectedness in the lived experiences of doctoral students' personal learning networks. The literature pointed to three major trends. First, online, networked, and connected learning was growing (Ito et al., 2013;

Johnson et al., 2014). Second, the scholarship in the learning design and technologies field was maturing, which was evident in the growth of a greater variety of research methodologies, particularly qualitative approaches (Saba, 2014), and phenomenology specifically. Since the great media debate when scholars advocated for qualitative approaches (Jonassen, Campbell, & Davidson, 1994; Kozma, 1994; Warnick & Burbules, 2007), more scholars have been embracing the interpretivist paradigm and naturalistic inquiry. Phenomenology in particular has become a growing trend in the learning design and technologies field (Cilesiz & Spector, 2014; Saba, 2000, 2003, 2014). Third, a trend towards postmodern and poststructural thought was evolving in the field (Hlynka, 2004; Hlynka & Yeaman, 1992; Solomon, 2000; Yeaman, Hlynka, Anderson, Damarin, & Muffoletto, 1996). However, there was a dearth of research that investigated lived experiences of connectedness in personal learning networks from a poststructural perspective with philosophical and methodological commitments in phenomenology. Therefore, the purpose of this research was to add to the corpus of the learning design and technologies field towards a better understanding of connectedness in personal learning networks from a qualitative perspective, particularly a post-intentional phenomenological viewpoint.

Statement of the Research Questions

The purpose of this study was to explore connectedness in personal learning networks through the lived experiences of doctoral students. Specifically, this research sought to address the following primary question: *How might connectedness take shape in personal learning networks?* The secondary research questions help to further focus

the inquiry:

- What is it like to experience connectedness with people, ideas, information, and technologies in a personal learning network?
- In what ways might a learner experience connectedness between formal and informal learning?
- What are the processes and products of meaning-making through connectedness in personal learning networks?

Organization of Chapters

Chapter 1 has presented the introduction, overview of the literature and definition of terms, statement of the problem, and the statement of the research questions. Chapter 2 encompasses the review of literature and research related to the context and the phenomenon of this study, the conceptual framework, and the philosophical commitments of this research study. The post-intentional methodological approach, which included three waves of data gathering, and the post-intentional data analysis technique of whole-part-whole and chasing lines of flight (Vagle, 2014) are presented in Chapter 3. The findings from data gathering, analysis, and synthesis are reported, interpreted, and discussed in Chapter 4. Chapter 5 presents a summary and conclusions of the research study in which the research questions are answered. This final chapter concludes with the implications, limitations of the study, and recommendations for future research.

Chapter 2: Review of Literature and Research

"Cease conceiving of education as mere preparation for later life, and make of it the full meaning of the present life." John Dewey, *Self-Realization as the Moral Ideal* (1893)

The purpose of this research was to contribute to the fundamental knowledge base of the learning design and technologies field towards a better understanding of connectedness in personal learning networks. First, this review begins with relevant literature and research related to the context and phenomenon, starting broadly by situating the study in distance education in the field of learning design and technologies, and then more narrowly focusing specifically in literature and research related to online, networked, and connected learning. Second, literature related to the bridge between formal and informal learning, along with interaction and interactivity is reviewed. Third, an overview of theories in the conceptual framework is presented including complexity theory, motivation theories, learning theories, and theories of identity. Fourth, the philosophical commitments of this research are explicated, which encompass Ihde's (1979) phenomenological philosophy of technology and Vagle's (2014) post-intentional phenomenological philosophy and methodology. The research design and methodological approach are supported by an extensive review of research of phenomenological studies within the learning design and technologies field, as well as literature related to postmodern and poststructural thought in the field. The final section summarizes the review of literature and draws explicit connections between the literature and how it is relevant for this research study.

Context and Phenomenon

This study was situated within the context of distance education in the field of learning design and technologies. Specifically, it draws on literature from online, networked, and connected learning; literature related to the link between formal and informal learning; as well as interaction and interactivity. This context provided support for the theoretical foundations within the conceptual framework in the next section.

Distance education in the learning design and technologies field. Learning design and technologies is an interdisciplinary field that draws on psychology, cognitive science, learning theory, research, technologies, and design. Scholars in the field apply what is known about how people learn to the practice of design and facilitation using contemporary communication and multimedia technologies. The field has a long history and the definition of the field has shifted over time. In 2012, Reiser defined the field as "the analysis of learning and performance problems, and the design, development, implementation, evaluation, and management of instructional and non-instructional processes and resources intended to improve learning and performance in a variety of settings, particularly educational institutions and the workplace" (p. 5). In short, while the field is ever evolving, it maintains a focus and interest in how people learn and how to best support learning. This study was positioned in the context of distance education in the learning design and technologies field.

Schlosser and Simonson (2003) defined distance education as "institution-based, formal education where the learning group is separated, and where interactive telecommunications systems are used to connect learners, resources, and instructors" (p. 1). According to Simonson, Smaldino, Albright, and Zvacek (2012), in the late 19th

century, distance education began as correspondence study through the postal service in which the students were primarily adults who had family and work commitments. Distance education evolved from postal service to radio in the 1920s to television in the 1950s to computer-mediated Internet in the mid-1980s (Simonson et al., 2012).

A few of the seminal theories that have informed distance education include Moore's theory of transactional distance, Knowles' theory of adult learning, and Holmberg's theory of interaction and communication (Simonson et al., 2012). Moore's (1993) theory of transactional distance explained that the relative experience of distance was influenced by three variables, which he identified as dialogue, structure, and learner autonomy. He defined dialogue as a positive interaction of two-way communication between the teacher and student or among students. Structure was expressed as "the rigidity or flexibility of the programme's educational objectives, teaching strategies, and evaluation methods. It describes the extent to which an education programme can accommodate or be responsive to each learner's individual needs" (Moore, 1993, p. 26). Learner autonomy was defined as the extent to which the learner set the goals, activities, and evaluation of the learning experience, which according to adult learning theory (Knowles, Holton, & Swanson, 2005) occurred naturally for an adult with a self-concept of being self-directed.

Holmberg's (1999) theory of conversation focused on interaction and communication. The extent to which communication had a conversational character rather than an "impersonal textbook character" (p. 59) would influence student motivation and success in a distance education course. The contribution of Holmberg's

theory to a deeper understanding of distance education stemmed from his position that teaching effectiveness impacted "feelings of belonging and cooperation" (Simonson et al., 2012, p. 48). Core to teaching was the student-teacher interaction that encompassed a human connection with emotional involvement and empathy for the learner. This positive interaction accompanied by a friendly, personal tone and easy access to content was said to increase learning pleasure, motivation, and thus facilitate learning.

The adult learning theory of andragogy had six core principles. (1) The learner's need to know the context and particulars of the learning including the reason why it is important, what will be learned, and how it will be learned. (2) The adult learner had a self-concept as an autonomous, self-directed individual. (3) The adult learner came to the learning event with prior knowledge and experiences that were a resource for the learner and influenced the structure of their schema and mental models when learning new information and skills. (4) Adult learners had to be in a position in life to be ready to learn because of an immediate need. (5) The orientation to learning was contextual and was centered on the immediate problem. (6) Adult learners were viewed as intrinsically motivated to learn for the value and personal payoff of the experience (Knowles, Holton, & Swanson, 2005).

Saba (2000) reported "distance education research has been dominated by quasi-experimental research which compares the effectiveness of distance education to classroom instruction, face-to-face education, or traditional education" (p. 2). The repeated findings of "no significant difference" in learning outcomes of media comparative studies were taken up in one of our field's most enduring conversations

referred to as “the great media debate” (Clark, 1994; Kozma, 1994; Tennyson, 1994). As part of the debate, scholars (Jonassen et al., 1994) recommended that the field should study learning with media using a constructivist lens. On a macro-level, they proposed that studies of learning with media should be studied in the context of a meaningful, real-world task based on theories of situated learning, constructivism, and cognitive apprenticeship. Examined from a phenomenological perspective, they contended that media and the way users consciously experienced media were personal constructions that could not be removed from the context in which they were experienced. They explained that media constrained experiences, which became a context for learning “that imposes severe constraints on the conscious construction of meaning” (Jonassen et al., 1994, p. 34). Drawing on lessons from quantum physics and chaos theory, they concluded, “it is difficult or impossible to isolate which components of the learning system, the medium, the attributes, the activities, the learner, or the environment affect learning and in what ways” (1994, p. 35). They called on scholars to examine media not as vehicles, but rather as facilitators of knowledge construction. At the heart of the great media debate was the issue of whether or not the research agenda of the field had been misguided (Shrock, 1994), given the emphasis primarily on a positivist research paradigm valuing quantitative over qualitative methodologies. Thus, the debate was a philosophical fight between a Positivist paradigm and a Naturalist paradigm.

Following the great media debate, which was spurred by the continual findings of “no significant difference” in media comparison studies, there was still a lack of theory-based research. However, a few researchers began to explore constructs related to

theories in distance education including learner interaction, social presence, and group development (Saba, 2000). Rather than relying on the traditional quasi-experimental approach, these studies used a broader variety of methodologies including survey research and discourse analysis. Saba stated, "a new strand of research using methods related to systems dynamics, as well as hierarchy and complexity theories, promises to provide a more comprehensive understanding of the field" (2000, p. 7). Warnick and Burbules (2007) examined conceptual assumptions in media comparison studies to suggest how these studies could be more useful. The areas they found to be problematic in media comparison studies were the assumptions in making a comparison, the contextual variables, and the conflation of media and methods. They stated, "the impossibility of completely separating media, methods, and content suggests that educational experiences involving media technology need to be examined more holistically" (2007, p. 2504). They recommended that scholars who conduct media comparison studies would benefit from comparing the ends made possible by media, not just the means (i.e., vehicle). They suggested that a space metaphor would be more beneficial than a conduit metaphor for media and that researchers should make comparisons beyond intended learning outcomes. They suggested "to better understand the wider scope of consequences, a qualitative methodology will often be useful. Such a methodology will be more sensitive to differences that are not easily quantifiable, and it will also be more helpful in guiding researchers to new ends and possibilities" (2007, p. 2507).

In 2009, Zawacki-Richter reported on a Delphi study that identified 15 research

areas categorized into three meta-levels of distance education research. These included (1) a macro level of distance education systems and theories, (2) a meso level of management, organization, and technology, and (3) a micro level of teaching and learning in distance education. He found that interaction and communication in learning communities was most frequently identified as being of high or very high importance, among others. The expert panel indicated a need for more research on cultural differences at the macro level, more research on leadership and strategy at the meso level, and more research on pedagogical opportunities of the mobile, social web at the micro level (Zawacki-Richter, 2009). Based on the classification of the Delphi study, Zawacki, Bäcker, and Vogt (2009) conducted a systematic review of literature in five prominent distance education journals between 2000 and 2008 to address questions related to issues in distance education research, research methods, and patterns in publication and authorship. They found a dominance of studies at the micro level, a slight increase in qualitative research methods, and a significant trend towards collaboration among researchers.

More recently, Saba (2014) conducted a critical review of research methods in distance education by following six trend analysis studies, three leading journals between 2008 and mid-2011, and selected studies in system dynamics. He noted improved quality and early signs of maturity in scholarship as indicated by a greater variety of research beyond simple descriptive studies, fewer media comparison studies, more qualitative research, and the use of validated instruments in survey research. He found a variety of qualitative methodologies in the literature reviews including case study, grounded theory,

ethnography, and phenomenology. For example, phenomenological studies that aimed to ascertain operationally present constructs. This "ascendance of the qualitative methods" (Saba, 2014, p. 158) stemmed from the lack of statistically significant findings in media comparison studies. The review of literature indicated that scholars were shifting to qualitative methodologies in exploratory studies to advance the research in distance education. With the continued development of new trends in distance education, such as massive open online courses, it was important to recall that instructional mass media experiments, such as radio and television, had failed when there was a lack of attention on instructional design that included two-way communication (Saba, 2013). A research agenda that embraced the interdependency of media, methods, and context in distance education was essential to advance the field.

In summary, contemporary distance education integrated multimedia and communication technologies with online pedagogy that was based on a foundation of distance education theory. The research on distance education has been maturing with qualitative approaches that take into account the holistic nature of learning online. In particular, phenomenology was identified as a promising approach (Jonassen et al., 1994; Saba, 2014). Additionally, the expert panel of a Delphi study determined that more research was needed on pedagogical opportunities of the mobile, social web (Zawacki-Richter, 2009). Thus, distance education was ripe for a phenomenological approach to exploring connectedness in personal learning networks.

Online and networked learning. In a burgeoning area such as distance education, emerging technologies continually impact the field. As a result, "conceptual

confusion" (Saba, 2014, p. 166) was one of the challenging issues in the field, which stemmed from the myriad of terms to describe learning with technology and the Internet in the digital age. Ally (2004) defined online learning as "the use of the Internet to access learning materials; to interact with the content, instructor, and other learners; and to obtain support during the learning process, in order to acquire knowledge, to construct personal meaning, and to grow from the learning experience" (p. 5). He pointed out, "terms commonly used for online learning include e-learning, Internet learning, distributed learning, networked learning, tele-learning, virtual learning, computer-assisted learning, web-based learning, and distance learning" (Ally, 2008, p. 16). He provided a brief historical context of the "schools of learning" (p. 19) that have informed the field beginning with behaviorism then shifting to cognitivism in which it was believed that learning, as an internal process, was acquired, but not always demonstrable through observable behaviors that behaviorists contended. Many scholars again shifted their thinking about learning from cognitivism to constructivism and the belief that the internal processes of learning were not acquired, but rather constructed individually by a learner based on her personal interpretation.

Rather than knowledge acquisition or construction, more recently, situated learning has grown in popularity, which views learning as a negotiation of meaning involving participation and reification (Lave & Wenger, 1991; Wenger, 1998). On the bleeding edge of learning theory, connectivism has been proposed as a learning theory that foregrounds technology: "its capacity to exploit the connections to knowledge and to people afforded by the now ubiquitous Internet and its applications" (Anderson, 2008, p.

6). Ally (2008) explained that the design of instruction in online learning did not necessarily pull from one theory alone, as the ideas of the learning theories overlapped. Rather, the design was often a bricolage of learning theories that incorporated ideas from behaviorism, cognitivism, constructivism, situated learning, and more recently connectivism. For example, from behaviorism, the design might include intentional sequencing of content, feedback, and testing to garner observable outcomes. From cognitivism, the design might include advance organizers or content that was grouped into small, meaningful units for working memory. From constructivism, the design might include active learning in which learners engage in personally relevant and meaningful activities that required authentic application, cooperation, collaboration, and reflection to construct knowledge (Ally, 2008). From situated learning, the design would be situated in authentic contexts. From connectivism, the design might include seminar-style strategies in which learners were encouraged to independently research information on the Internet, engage in experiential and authentic activities, and network with others (Ally, 2008).

According to Anderson (2012), connectivism and connected knowledge, developed by Siemens (2005) and Downes (2007), was a "net native" (p. 301) pedagogy that foregrounded the importance of a diversity of opinions for cultivating learning and knowledge. Furthermore, because learning occurred in the process of connecting formal and informal information sources, nurturing connections was essential for continual learning. Akin to the notion of a global learner put forth by Knowles and colleagues (2005), Anderson (2012) noted the "ability to see connections between fields, ideas, and concepts is a core skill" (p. 301). Fast, accurate, current information was the currency in a

society infused with networks. Aligned with a postmodern discourse, a core principle of connectivism was decision making that acknowledged the "socially constructed and culturally bound" (Anderson, 2012, p. 301) nature of knowledge and the influences of this shifting reality on the focus and meaning of information.

The focus on the learner was a hallmark of distance education. According to Saba (2003), "the centrality of the learner is one of the distinguishing features of distance education" (p. 4). Conrad and Donaldson (2011), in describing the kind of engaged and active learning that occurred in an online environment, recognized the influence that John Dewey (1859-1952) and Malcolm Knowles (1913-1997) had on the significance of the learner's individual experience in the learning process. Dewey (1916/2000), who advocated for student-centered learning, described "an educational aim must be founded upon the intrinsic activities and needs…of the given individual to be educated" (p. 83). His ideas about democracy and experience in education (Dewey, 1916/2000; Dewey, 1938/1997) influenced Lindeman (1926) who formulated several key assumptions about adult learning. He believed that "the resource of highest value in adult education is the learner's experience" (p. 9). Knowles and his colleagues (2005) summarized Lindeman's key assumptions as: (1) motivation stems from the learner's needs, (2) learning should be organized around life situations, (3) analysis of experience should be the core methodology, (4) the teacher's role is that of mutual inquiry as adults are self-directed, and (5) learning should account for increased individual differences among people. They described how Knowles, influenced by Dewey and Lindeman, developed six principles of adult learning known as andragogy. The first principle was that of an adult learner's need

to know the purpose of learning including the why, what, and how. Secondly, adults had a self-concept as being autonomous and capable of self-direction. Third, the adult learner's prior experience was paramount in the learning process as a resource and as an influence on the learner's schema. Fourth, adults were ready to learn when the experience would help them develop in real life situations. Fifth, adult learners had a task- and problem-centered orientation to learning that was contextual. Finally, adults were primarily motivated by intrinsic values and personal payoffs (Knowles et al., 2005).

The shift from teacher-led to learner-centered approaches was exemplified by a shift from lecturers to coaches, from competition to collaboration, from credit hours to mastery or competency, and from passive to active learning in which the learner had some control in the learning process or product (Simonson et al., 2012). Given the pervasiveness of the Internet as a medium for facilitating contemporary distance education, it would appear that online learning was synonymous with distance education. While the Internet had been an important development in distance education, online learning was also an integral aspect of distributed learning. Simonson and colleagues (2012) clarified, "not all online learning is necessarily distance learning. Much online learning activity involves students and instructors who continue to meet at least part of the time in conventional classroom settings" (p. 196).

In learner-centered adult distance education, the Internet provided access to Web 2.0 applications, which helped connect learners with one another, information, and a wider range of diverse perspectives. Anderson (2012) explained that the developments and advancements of the Internet and social technologies offered "potential for formal

education to appropriate network technologies to achieve postcraft and postindustrialized models of provision that spill beyond formal into informal and lifelong learning" (p. 299). Anderson (2012) identified three key affordances of Web 2.0 for learning, which included not only group contributions and collaboration, but also skill and attitude development and, thirdly, access to other sources of learning. He described several theories that "speak to the emerging capacities and theoretical understandings of Web 2.0 and its potential impact on both formal and informal learning" (p. 301). These theories included transactional distance theory, complexity theory, and constructivism. Anderson (2012) discussed students' experiences of role conflict, akin to the conflict between the pedagogical teacher and the andragogical learner as described by Knowles and his colleagues (2005). He noted a dissonance of learner attitude, use, and effect when using the same tools for both formal and informal learning. Crook and Harrison (2008) found that Web 2.0 "supported learners' natural curiosity" (p. 5), which was an important concept in adult learning principles put forth by Knowles and his colleagues (2005). Anderson (2012) explained that privacy, persistence of connections beyond the formal learning experience, and support were challenges of integrating Web 2.0 applications in formal education as learners would likely desire to preserve their connections beyond formal education and would seek personal learning networks to maintain social capital. Integrating formal education into persistent, personalized contexts of real living was effective for adult learners because it helped them transfer knowledge and supported self-directed lifelong learning. Given that Anderson (2012) observed an "unhealthy bifurcation between learning and education" (p. 305), Web 2.0 could be a "catalyst to

integrate formal and informal learning, thus serving as a gateway to lifelong learning opportunities" (p. 305). Informal tools were being used to help learners connect with each other, build social capital, reflect, and make meaning. Anderson (2012) explicated, "Web 2.0 applications are built on network organizational models. Networks connecting individuals and learning resources allow for flexible learning that easily extend beyond the class in formal educational contexts" (p. 306).

In sum, online learning afforded the potential for networked learning, which could occur through the use of Web 2.0 applications. Mobile and social web technologies provided opportunities for collaboration, personally meaningful inquiries, and the transfer of knowledge to lifelong learning. Online and networked learning could not only integrate a variety of pedagogical approaches from behaviorism to cognitivism, constructivism, situativity, and connectivism, but were also prime for use in both formal and informal learning contexts.

Bridging formal and informal learning. The bridge between formal and informal learning was prime space for contemporary emerging technologies. This place, where formal distance learning intersected with informal, online, networked learning, was a sweet spot for learner-centered adult distance learning. Rossett and Hoffman (2012) explicated ways to think about informal learning: the nature of outcomes and the experience; the origin; as well as the roles of the learner, instructor, and instructional designer. Since behavioral objectives were rare in informal learning, Rossett and Hoffman (2012) noted, "constructivists are particularly keen on informal learning, while objectivists acknowledge the benefits, but worry about outcomes and measurement" (p.

170). The nature of the informal learning experience was described as "vivid, emotional, unexpected, and idiosyncratic… real, often social and essentially engaging" (Rossett & Hoffman, 2012, p. 170). Most informal learning emanated from an individual or small group who took an active role in the learning process, which might be facilitated by a guide or guided by the design of the experience.

Akin to networked learning, but with a focus on primary and secondary age groups, "Connected learning addresses the gap between in-school and out-of-school learning… [and] taps the opportunities provided by digital media to easily link home, school, community and peer contexts of learning" (Ito et al., 2013, p. 4). Connected learning, as a framework and theory of intervention, was peer-supported or socially embedded, interest-driven, and oriented toward academic achievement. The core properties of the connected learning framework were centered on media production and knowledge construction, shared interests with others on the social web, and openly accessible online technologies. The four design principles for creating intentional connections of learning environments included inclusiveness where everyone could participate, experiential learning through meaningful activities, consistent challenges driven by interest, and interconnectedness through multiple learning contexts (Ito et al., 2013). As a research agenda, "the connected learning model posits that by focusing educational attention on the links between different spheres of learning—peer culture, interests and academic subjects—we can better support interest-driven and meaningful learning in ways that take advantage of the democratizing potential of digital networks and online resources" (Ito et al., 2013, p. 87). Ito and her research associates have seen "a

groundswell of activity in… open and online educational initiatives, technology innovation in gaming and other forms of learning media, new forms of activism, and innovative schools and libraries" (2013, p. 87).

As with all emerging technologies, there was a period of diverging and converging definitions. While Educause (2013a) took a more institutional perspective on connected learning, they also recognized that it was a significant shift away from traditional teacher-led instruction because it placed students at the center of the learning experience. Educause (2013a) acknowledged the emerging, complex, and interconnected landscape of connected learning and viewed it as not only encompassing connections to online resources and people, but also open courses. The Educause (2013a) authors reported several implications of a connected learning approach including competency-based credit models and the need for new teaching and learning frameworks. The Educause (2013b) report described the characteristics of a connected learning environment as a connection of (1) planning and advising for students to receive credit among multiple institutions; (2) online, on campus, and blended learning options; and (3) authentic learning experiences with scholars and professionals in the field. As an evolution of online learning, "the connected learning environment is not old-school online learning" (p. 2). They described the connected learning environment as "interconnected with experiences, resources, and knowledge" (p. 6). Several emerging trends converged with connected learning including the growing ubiquity of social media; integration of online, hybrid, and collaborative learning; a shift from students as consumers to students as creators; and an evolution of online learning that affords

flexibility, accessibility, and integration of multimedia and technologies for learning (Johnson et al., 2014).

According to Veletsianos, emerging technologies were defined as "tools, concepts, innovations, and advancements utilized in diverse educational settings (including distance, face-to-face, and hybrid forms of education) to serve varied education-related purposes (e.g., instructional, social, and organizational goals)" (2010, p.12-13). He described the characteristics of an emerging technology as a new or old technology that was evolving and going through a hype cycle in which it was not yet fully understood or researched, and its potential for disruption was not yet fully realized (Veletsianos, 2010). A personal learning network could be construed as an emerging technology with potential for connecting formal and informal learning experiences.

Personal learning networks and environments. Personal learning networks were often discussed in tandem with personal learning environments. According to Martindale and Dowdy (2010), the concept of personal learning environments grew out of a discontent with institutionally-focused learning management systems that tracked and managed learners, the desire for a more learner-centered approach, and the recognition of the importance of lifelong learning. They defined personal learning environments as the "interplay among learners and between learners and content" (p. 178) in which learners worked independently to gather, filter, and organize content to make meaning while also sharing content and their viewpoints through social software and web applications. Martindale and Dowdy (2010) noted that there was not one agreed upon industry-wide definition of personal learning environments with the main difference

being whether it was one application or a combination of many applications. Personal learning environments tended to have a greater focus on individual sense making, whereas connected learning placed a greater emphasis on the social connections in knowledge construction. Therefore, the theories that grounded each approach were slightly different. The concept of a personal learning environment was grounded in constructivism, whereas the concept of connected learning was grounded is sociocultural learning theory (Ito et al., 2013; Martindale & Dowdy, 2010). Martindale and Dowdy (2010) proposed a scenario in which the learner's personal learning environments co-existed along with an institutional learning management system in a symbiotic relationship that joined formal and informal online learning. Martindale and Dowdy (2010) viewed personal learning environments "as a manifestation of a learner's informal learning processes via the Web" (p. 182).

Couros (2010) extended this understanding to personal learning networks, which brought human connectedness to the fore. He defined personal learning networks as "the sum of all social capital and connections that result in the development and facilitation of a personal learning environment" (p. 125). The primary difference between personal learning environments and networks was the focus on tools and technologies versus social interactions and connections developed, fostered, and mediated through social media (Couros, 2010). One of the significant values of using personal learning networks as a strategy within a formal learning context was that the network could be extended beyond the space and time of the course and seed a lifelong informal learning network. As Couros (2010) remarked, "the most transformative realization… is just how important

PLNs [personal learning networks] are for sustained, long-term learning" (p. 126). While personal learning networks were discussed in relation to formal, learner-centered, adult distance learning, they were not contingent on participation in a formal course. Couros (2010) recounted using personal learning networks in the context of a hybrid formal and open course, which included both registered students and non-registered learners from outside the institution. The learners connected with one another through social media interactions using a variety of technologies including blogs and micro-blogs, wikis, social bookmarking applications, and photo and video sharing applications.

In a kind of get-connect-grow process, Dabbagh and Kitsantas (2012) proposed a three-level framework for connecting formal and informal learning by harnessing social media for self-regulated learning through the use of personal learning networks. At the first level, they recommended that the instructor should scaffold students' use of social media to help them form personal learning environments and begin to manage personal information. At the second level, they suggested focusing on the social aspects of sharing information and collaborating through activities that were afforded by social media. At the third level, they advised on targeting ways to customize personal learning networks by synthesizing and aggregating information, which could be used for reflection and personal growth.

Hung, Looi, and Koh (2004) drew connections between the kinds of authentic learning that occurred through situated cognition in communities of practice and the importance of high fidelity environments in which the experiences of learners were made to feel more real. More recently, Hung, Lee, and Lim's (2012) research focused on ways

of integrating formal learning with the low-risk tinkering, experimenting, and messing around of informal learning. Through two case studies they discovered that when learners developed fluency for articulating their learning, they leveraged tacit dimensions of knowledge. Secondly, the "pedagogy of experimentation" (Hung, Lee, & Lim, 2012, p. 1087) was authentic and anchored in rich contexts. According to Roblyer and Doering (2013), learning environments such as Jasper Woodbury and GeoThentic have been designed to harness situated cognition in which learning is anchored in authentic, real-world experiences. The third implication identified by Hung and colleagues (2012) "is that by crossing boundaries between formal and informal, and bridging the two, we have introduced a methodology for overcoming groupthink arising from enculturation" (p. 1087).

In conclusion, based on the literature about the needs of adult distance learners and the affordances of social web technologies, there would appear to be significant potential for personal learning networks to not only bridge formal and informal learning, but also foster meaningful, lasting connections. Learning that extended beyond formal contexts might also have implications for the transfer of knowledge. Learners may be aided in the transition to professional career environments with the extended support from colleagues and experiences in communities of practice (Dennen, 2014; Lave, 1991; Lave & Wenger, 1991; Rosenberg, 2012; Wenger, 1998) as part of personal learning networks.

Interaction and interactivity. Moore (1989) posited three kinds of interaction that have come to be widely accepted in formal distance education; these interactions

include learner-content, learner-instructor, and learner-learner interaction. Anderson (2003a) explicated that having specific learning objectives and interaction with a teacher were two of the distinguishing features that sets formal interactions for learning apart from informal interactions for learning. Informal interactions, particularly online, occur naturally in the context of a digitally connected lifestyle as part of modern society. Anderson (2003a) took the position that learner's needs and preferences for human interaction in distance learning ranged widely from interdependence to a minimal amount of student-student and student-teacher interaction. He proposed, through the equivalency theorem, that having one form of interaction (student-student, student-teacher, or student-content interaction) was sufficient for deep and meaningful learning (Anderson, 2003a).

Three of Chickering and Gamson's (1987) seven principles of good practice in undergraduate education were focused on interaction among students and teachers, between students, and active engagement with content. Anderson (2003b) reminded readers that Dewey (1938/1997) situated education within an existing social structure, which encompassed an array of influences and interactions beyond formal education. Through a qualitative, observational study of distance learning courses, Burnham and Walden (1997) not only confirmed evidence of learner-content, learner-instructor, and learner-learner interaction, but also discovered evidence of interaction chains in social factors, which they referred to as learner-environment interaction defined as "a reciprocal action or mutual influence between a learner and the learner's surroundings that either assists or hinders learning" (p. 62). In discussing interactions conditioned by societal norms and expectations including gender and race, Anderson (2003b) commented, "They

are very complex, often idiosyncratic" (p. 132).

Conrad (2014) positioned a study of interaction in the context of online learning communities and drew connections to Wenger's (1998) work on communities of practice as well as Garrison, Anderson, and Archer's (2000) theory of Community of Inquiry that included social presence, teaching presence, and cognitive presence. In particular, Conrad (2014) described a research stream at the intersection of relationship-based interactions, social presence and social learning theories of Bandura (1986) and Vygotsky (1978), and adult learning theory (Knowles et al., 2005). She discussed how recent developments—open educational resources, social media, social networking, and mobile learning—were changing the online learning landscape. She explained, "Research findings indicate that learners are incorporating course work questions into social media-hosted interactions with other learners, advantaging themselves of instant and continual access to their peers" (Conrad, 2014, p. 392). She found, "Traditional understandings of formal and informal learning are increasingly muddied…. Recent examples of this blurring of formal and informal abound" (Conrad, 2014, p. 393). Campbell and Schwier (2014) recognized "dynamic social and informal learning" (p. 366) cropped up from social media and communication applications. They believed, "Opening online learning environments to incorporate informal and diverse social learning spaces offers fresh opportunities to instructional designers, and also challenges the dominant discourse of what is considered 'legitimate' learning, based on institutional control of accreditation and certification" (Campbell & Schwier, 2014, p. 366).

In sum, interactions, whether learner-learner, learner-teacher, learner-content, or

other forms, are key to a discussion about connectedness in the context of bridging formal and informal learning through personal learning networks. As an emerging technological and pedagogical trend in open and distance learning, there was a dearth of research on connectedness. Therefore, this investigation into connectedness in personal learning networks was supported by literature related to online and networked learning, the bridge between formal and informal learning, and interaction in the context of distance education and online learning.

Conceptual Framework

This research study was framed by complexity theory, motivation theories, learning theories, and theories of identity. Complexity theory provided a foundation for understanding the contextual experiences of connectedness in personal learning networks. Motivation theories informed the interpretation of data related to experiences of freedom, safety, belonging, esteem, self-actualization, and being-in-the-know. Theories of learning from Dewey (1938/1997), Bandura (1986), Lave and Wenger (1991), Duffy and Cunningham (1996), and Siemens (2005) informed the interpretation of the way agents socially constructed and negotiated meaning through connectedness in personal learning networks. Rogers' (1959) humanistic personality theory of self-concept and Wenger's (1998) social theory of learning with a focus on meaning through participation and reification, as well as practice and identity informed the interpretation of data related to identity. See Figure 2.1 for a visual illustration of the conceptual framework.

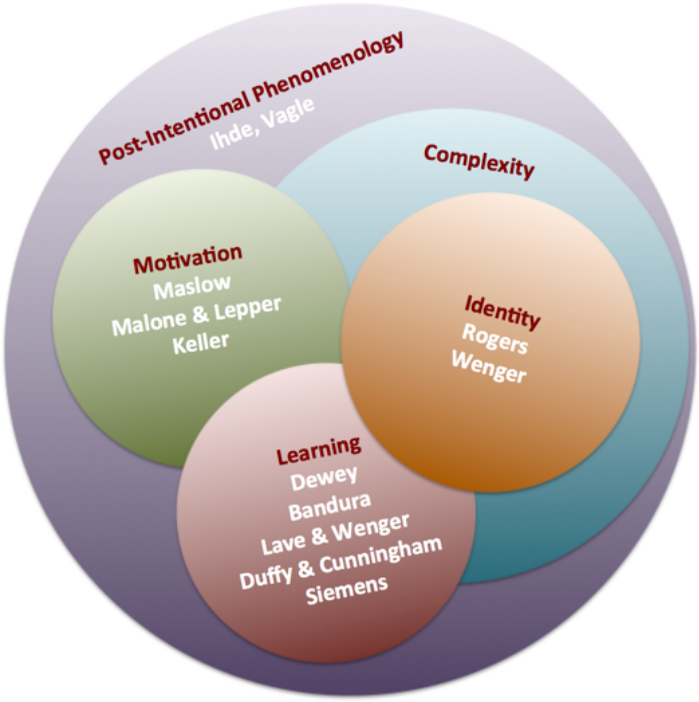

Figure 2.1

The components of the conceptual framework.

Complexity theory. Through complexity theory of nonlinear dynamics, scholars can better understand the underlying order, if any, in disorderly phenomenon. According to Patton (2002), "complexity theory offers… a new set of metaphors for thinking about what we observe, how we observe, and what we know as a result of our observations" (p. 123). Complexity theory was developed from chaos theory, which has as a core tenet a sensitive dependence on initial conditions known as the "butterfly effect" (Gleick, 2011, p. 23). Gleick (2011) used a moving maze metaphor to explain the nature of chaos and nonlinear dynamics, it "is like walking through a maze whose walls are rearranging themselves with each step you take" (p. 24). He explained, "nonlinearity means that the

act of playing the game has a way of changing the rules" (p. 24). He wrote that "islands of structure" can appear within "wild disorder" and "a complex system can give rise to turbulence and coherence at the same time" (p. 56). From a qualitative research perspective, Patton (2002) explained, "chaos theory suggests we need to learn to observe, describe, and value disorder and turbulence without forcing patterns onto genuine, meaningful chaos" (p. 126). He asked, "how do we observe and describe dynamic, constantly changing phenomena without imposing a static structure by the very boundaries we create in seeking to define and understand?" (Patton, 2002, p. 126).

Patton (2011) described the characteristics of complex adaptive systems as nonlinearity, emergence, dynamical, adaptive, uncertainty, and coevolutionary. Nonlinearity occurred when "highly improbable, unpredictable, and unexpected events have huge impacts" (p. 8). Emergence occurred when agents pursued their own path. The paths intersected, elements interacted, and patterns of interactions emerged. Dynamical was a characteristic that described the kinds of volatile, turbulent, rapid and unpredictable interactions within, among, and between elements within a system. The construct of adaptive described responsive relationships of interacting elements and how they responded and adapted in a continually evolving nature. Uncertainty described the unpredictable, uncontrollable, and unknowable nature of processes and outcomes that occur in a complex system. "As interacting and adaptive agents self-organize, ongoing connections emerge that become coevolutionary as the agents evolve together (coevolve) within and as part of the whole system, over time" (Patton, 2011, p. 8).

deWaard and colleagues (2011), in a case study of a massive open online course

that explored social media and mobile learning, examined evidence of chaos, emergence, and complexity to inform new educational environments and frameworks for the Knowledge Age. In the massive open online course that was the context of their case study research, learners had access to many technologies and multimedia. However, the researchers discovered that at the core, "dialogues were central to knowledge creation" (p. 19). The findings were reminiscent of the wisdom from Socrates, and more recently in distance education, the theories of Moore and Holmberg. Was the course, social media, or mobile learning a "mere vehicle" for dialogue and pedagogy as Clark (1994) contended of media in relation to methods in the great debate?

In a discussion focused on educational systems, Reigeluth (2004) described the key features of chaos and complexity as co-evolution, disequilibrium, positive feedback, perturbance, transformation, fractals, strange attractors, self-organization, and dynamic complexity. Co-evolution occurred when interactors are reciprocally shaped by changes in the system. For example, "an educational system is not just shaped by its community; it also helps shape its community" (Reigeluth, 2004, p. 4). He noted that perturbance in a system caused disequilibrium, which, along with positive feedback, fostered co-evolution by providing information and direction for goal shifting and growth. When a system was in disequilibrium, it was ripe for transformation through a process of emergence. He explained that autocratic control and uniformity were examples of fractals in education: fractals were "patterns that recur at all levels of a system, called self-similarity" (Reigeluth, 2004, p. 6). A strange attractor was an influential fractal that emerged during transformation of the system. When it reached a tipping point, spontaneous changes

emerged through self-organization, which allowed the agile system to adapt and evolve. He described a self-organizing system as one that had openness, freedom, and self-reference (Reigeluth, 2004).

In 2007, Laroche, Nicol, and Mayer-Smith stated "the scholarship related to application of the concepts of complexity to education is undoubtedly growing" (p. 74). They used a metaphorical comparison of machines to life in order to illustrate the differences between what they referred to as mechanistic educational systems and self-organizing pedagogy. Laroche, Nicol, and Mayer-Smith (2007) explained:

> Post-mechanistic, organic pedagogical models correspond to and embrace vital conditions of self-organization, including [a] fluid realm, openness to the information flow, turbulences and changes; freedom within flexible boundaries, richness of possibilities, interconnectedness of all parts of the system, and collective emergence. Fluid learning environments juxtapose formal and informal educational settings by blurring boundaries between schools, universities, nature, and society. (p. 74)

This attention to the value of complexity theory in education was also taken up by Morrison (2006) who looked critically at the value added by the central tenets of the theory. He drew on diverse contexts in education to discuss, among other topics, the significance of networking and connectedness. Jakubowicz (2006) specifically examined complexity theory and online learning in a case study. He found that, for students of the net generation, learning was often "non-linear, unstructured and explained well by the tenets of complexity theory" (p. 1). A systems lens could help inform the interpretation of

real-world complexities through viewing phenomenon as embedded in context. As Patton (2002) explained, "Holistic thinking is central to a systems perspective. A system is a whole that is both greater than and different from its parts…. The parts are so interconnected and interdependent that any simple cause-effect analysis distorts more than it illuminates" (p. 120).

Moore and Kearsley (1996) postulated the systems view of distance education as one that included all facets from teaching and learning to historical and institutional philosophical perspectives. Within the whole system, there were subsystems that interrelated with other subsystems. They commented:

> While we may choose to study each of these subsystems separately, we must also try to understand their interrelationships. Anything that happens in one part of the system has an effect on other parts of the system, so as we focus on any one part of the system we need to hold in the back of our minds a picture of the total context. (Moore & Kearsley, 1996, p. 5)

Shaffer (2005), having reviewed the literature of systems dynamics applied to distance education, remarked "systems theory was developed by the biologist von Bertalanffy for the very purpose of describing the complex, contextualized aspects of living systems" (Shaffer, 2005, p. 7). Saba (2003) elucidated the interconnectivity of myriad factors in nested hierarchical levels of a complex system that included hardware systems, software systems, telecommunication systems, instructional/learning systems, educational systems, social systems, and global systems.

In sum, the theory of complexity offered a relevant lens for interpreting

connectedness in personal learning networks. For several years, at least since the great media debate, the field has recognized that "media will always be embedded in a complex association with instructional methods, learner variables, content, context, and risk" (Tennyson, 1994, p. 27). Jonassen and his associates reminded us, "we delude ourselves when we manipulate attributes of the medium and expect these manipulations to have a predictable effect on a process as complex as learning" (1994, p. 35). Complexity theory, as part of this conceptual framework, helped to illuminate how connectedness took shape in personal learning networks.

Theories of motivation. In addition to complexity theory, an essential component of the conceptual framework was Maslow's (1943) theory of human motivation as well as Malone and Lepper's (1987) taxonomy of intrinsic motivations for learning, primarily. Foundational to the conceptual framework, but to a lesser extent, was Keller's (1987) ARCS model of motivation, which was grounded in the expectancy x value model of motivation. Together, these motivation theories and models created a conceptual framework for understanding and interpreting the research data related to motivation.

Maslow's theory of human motivation. In his theory of human motivation, Maslow (1943) outlined five hierarchical levels of basic needs that motivated humans beginning with physiological needs, then safety, love and belonging, esteem, and ending with self-actualization. In introducing his theory, Maslow (1943) proposed that any definitive theory of human motivation must conclude, "Man is a perpetually wanting animal… no need or drive can be treated as if it were isolated or discrete; every drive is related to the state of satisfaction or dissatisfaction of other drives" (p. 370). Maslow

(1943) affirmed that motivation theory was not synonymous with behavior theory: "The motivations are only one class of determinants of behavior. While behavior is almost always motivated, it is also almost always biologically, culturally and situationally determined as well" (p. 371). Maslow (1943) considered his theory to be "a 'general dynamic' theory" (p. 371) given that it was a fusion influenced by James, Dewey, Wertheimer, Goldstein, Gestalt Psychology, Freud, and Adler. From this synthesis of scholarly ideas and foundational assumptions about the contextual nature of human behavior, Maslow's (1943) theory of human motivation aligned with the dynamicism of the phenomenon, and as such, theoretically served an important role in the conceptual framework of this research study.

Maslow's (1943) theory of basic needs began with physiological needs, also known as the hunger drive. He wrote that the hierarchy of needs could be evident if one considered a human lacking food, safety, love, and esteem. He believed this person "would most probably hunger for food more strongly than for anything else" (p. 373). From this idea, educators could extrapolate the importance of meeting learners' physiological needs by creating a comfortable learning space and providing food through the National School Lunch Program for example.

When physiological needs were met, humans would seek to satisfy safety needs (Maslow, 1943). Since adults were taught to suppress fear reactions, Maslow (1943) looked to children to inform his observations of safety needs. He noted that an indication of the need for safety was a child's "preference for some kind of undisrupted routine or rhythm. He seems to want a predictable, orderly world. For instance, injustice, unfairness,

or inconsistency in the parents seems to make a child feel anxious and unsafe" (p. 377). Applied to adults, Maslow (1943) argued that most people in society feel safe from extreme situations such as wild animals, hot and cold temperatures, and criminal behavior. In less extreme situations, safety needs in adults may be evident in a desire for stability such as job security, a tenured position, savings, and insurance. Moreover, Maslow (1943) proposed that humans' tendency towards organizing the universe through science, religion, or philosophy was, in part, fulfilling a safety-seeking need.

Maslow (1943) claimed that humans would seek love, affection, and belonging once their physiological and safety needs were gratified. A human "will hunger for affectionate relations with people in general, namely, for a place in his group, and he will strive with great intensity to achieve this goal. He will want to attain such a place more than anything else in the world" (Maslow, 1943, p. 381). He added, "Also not to be overlooked is the fact that the love needs involve both giving and receiving love" (Maslow, 1943, p. 381). Maslow (1943) viewed love, affection, and belonging as basic human needs that people sought to fulfill.

In addition to the need for love, affection, and belonging, Maslow (1943) declared, "All people in our society… have a need or desire for a… high evaluation of themselves, for self-respect, or self-esteem, and for the esteem of others" (p. 381). He divided the esteem needs into two categories: first, the desire for strength, achievement, adequacy, confidence, independence, and freedom; and second, the desire for reputation or prestige, recognition, attention, importance or appreciation. Maslow (1943) commented, "Satisfaction of the self-esteem need leads to feelings of self-confidence,

worth, strength, capability and adequacy of being useful and necessary in the world" (p. 382). Esteem, and the corresponding desires for achievement, independence, freedom, prestige, recognition, and appreciation are prime human motivators according to Maslow's (1943) theory of human motivation.

The final, peak need in Maslow's (1943) hierarchy of needs was the need for self-actualization. He believed that humans would grow discontent and restless when they were not doing what they were fitted to do in life. Maslow (1943) proclaimed, "What a man *can* be, he *must* be" (p. 382). Self-actualization was the desire for self-fulfillment, a tendency that can be described as the desire "to become everything that one is capable of becoming" (p. 382).

Beyond the basic needs, Maslow (1943) also outlined preconditions as well as the desire to know and understand. According to Maslow (1943), the basic needs of physiological, safety, love, esteem, and self-actualization had preconditions that were required before human needs could be satisfied. These prerequisites included: "freedom to speak, freedom to do what one wishes so long as no harm is done to others, freedom to express one's self, freedom to investigate and seek for information, freedom to defend one's self, justice, fairness, honesty, orderliness in the group" (Maslow, 1943, p. 383). Humans' cognitive capacities to see, think, and learn were viewed as tools to meet their basic needs and, therefore, a threat to the cognitive capacities was viewed as a threat to their basic needs.

Closely related to the basic needs, were the issues of curiosity and the search for knowledge, truth, and wisdom, which Maslow (1943) defined as the desires to know and

to understand. According to Maslow (1943):

> Acquiring knowledge and systematizing the universe have been considered as, in part, techniques for achievement of basic safety in the world, or, for the intelligent man, expression of self-actualization. Also freedom of inquiry and expression have been discussed as preconditions of satisfactions of the basic needs. (p. 384)

For Maslow (1943) this was still a partial proposal of a human need. When he wrote his theory of human motivation, he was still wrestling with the motivational role of curiosity, learning, philosophizing, and experimenting. Therefore, he tentatively postulated "a basic desire to know, to be aware of reality, to get the facts, to satisfy curiosity, or as Wertheimer phrases it, to see rather than to be blind" (p. 385). Maslow (1943) took this notion one step further:

> This postulation, however, is not enough. Even after we know, we are impelled to know more and more minutely and microscopically on the one hand, and on the other, more and more extensively in the direction of a world philosophy, religion, etc. The facts that we acquire, if they are isolated or atomistic, inevitably get theorized about, and either analyzed or organized or both. This process has been phrased by some as the search for 'meaning.' We shall then postulate a desire to understand, to systematize, to organize, to analyze, to look for relations and meanings. (p. 385)

Maslow (1943) outlined a hierarchy of basic human needs that included physiological, safety, love and belonging, esteem, and self-actualization needs. Beyond these basic needs, he added preconditions that included many freedoms related to

humans' cognitive capacities to see, think, and learn. Taking these preconditions one step further, he theorized the potential for additional basic needs in intelligent humans, which were the desires to know and to understand, as well as to continually seek more information in order to better organize, analyze, and assign meaning to the world.

Malone and Lepper's taxonomy of intrinsic motivations for learning. Malone and Lepper (1987) proposed a taxonomy of intrinsic motivations for learning that included individual motivations of challenge, fantasy, curiosity, and control, as well as interpersonal motivations of cooperation, competition, and recognition. Their framework was a synthesis of concepts that were drawn from theories related to intrinsic motivation including Csikszentmihalyi, Harter, White, Berlyne, Hunt, Piaget, Condry, deCharms, and Deci. One of the primary differences between the categories of individual and interpersonal motivations was the idea that an individual person was motivated by challenge, fantasy, curiosity, and control, whereas the interpersonal motivations of cooperation, competition, and recognition were contingent on a learning scenario that involved others.

Malone and Lepper (1987) noted that people tended to become intrinsically motivated given an optimal level of challenge. They observed that theorists called this concept a variety of different terms including flow states (Csikszentmihalyi, 1975) or self-efficacy (Bandura, 1977). To achieve an optimal level of challenge that was neither too easy nor too difficult, the activity should have goals that were either explicit or tacit. According to Malone and Lepper (1987), while structured activities might have explicit goals, "in other, more open-ended, learning environments, however, there are sometimes

no explicit *fixed goals*, but rather many *emergent goals* (Csikszentmihalyi, 1975, 1978) that people can easily generate for themselves" (p. 231). For sustained intrinsic motivation, Bandura and Schunk (1981) showed that short-term proximal goals were better than long-term distal goals, but a hierarchical goal system that contained both could be especially motivating to people. In addition to explicit or emergent goals, an activity that had an optimal level of challenge should have goals in which the attainment was uncertain. This uncertainty could come from variable difficulty levels, multiple levels of goals, hidden information, or randomness (Malone & Lepper, 1987). Finally, for an optimal challenge level, the activity should provide performance feedback that enhanced self-esteem by promoting a sense of competence. Malone and Lepper's (1987) analysis suggested, "to be maximally motivating, performance goals should be *personally meaningful*" (p. 233). To enhance personal relevance, an activity could have: (1) instrumental relevance in which the activity was perceived as a means of pursuing another competency that was more favored by the learner; (2) fantasy relevance in which an imaginary context provided familiarity, interest, or emotional appeal for the learner; or (3) social relevance in which the social context provided interpersonal motivations of cooperation, competition, or recognition (Malone & Lepper, 1987).

Similar to challenging goals, curiosity also had an optimal level of stimulation. Malone and Lepper (1987) reported on traditional theorists who suggested that curiosity was stimulated by an *"optimal level of information complexity*" (p. 235) or by an "*optimal level of discrepancy or incongruity* from present expectations and knowledge" (p. 235). Sensory curiosity could be stimulated by audio or visual effects that promoted

interactive exchanges with the medium, whereas cognitive curiosity might be stimulated by surprise or intrigue from a paradox or incompleteness on a topic of interest for the learner, such as Socratic dialogue (Malone & Lepper, 1987).

In addition to challenge and curiosity, an activity that provided a level of control contributed to intrinsic motivation. Malone and Lepper (1987) wrote, "*Empowering* learning environments… are those in which options are rich, and dependent upon the response of the learner" (p. 238). An empowering environment was one that offered contingency, choice, and power. Contingency signified a level of responsiveness so that outcomes depended on the learner's responses. Choice referred to the number of options given to a learner. Malone and Lepper (1987) proposed that five to seven might be an optimal number of options according to Miller's (1956) magical number seven. In application to open-ended, exploratory environments, the availability of choice could be intrinsically motivating, but given too many options and lack of structure, learners might also feel overwhelmed. The third characteristic of choice was power, which indicated that the learner's actions produced powerful, salient effects (Malone & Lepper, 1987).

The fourth and final individual motivation in Malone and Lepper's (1987) taxonomy was fantasy. Fantasy contributed to intrinsic motivation in three main ways: emotional aspects, cognitive aspects, and endogeneity (Malone & Lepper, 1987). To be endogenous, a fantasy and the learning experience should be interwoven so that the learner received some kind of performance feedback in the fantasy, such as a simulation of a real-world context. Through fantasy, the emotional needs of the learner might be satisfied through identification with similar characters or situations, or through

admiration for the characters in the fantasy. Cognitive aspects of fantasy referred to metaphors or analogies that assisted learners' understanding or helped them to apply information to real-world contexts. Fantasy could also improve memory when learners were required to take on imaginary roles or view vivid, memorable images (Malone & Lepper, 1987).

The interpersonal motivations included cooperation, competition, and recognition (Malone & Lepper, 1987). Cooperation referred to the quality of interdependency in activities. In a cooperative group, learners engaged in activities as either independent or dependent units—each entailing a different level of interdependency. For example, a jigsaw activity would consist of dependent units that required cooperation from each member to complete the task. Competition could enhance the intrinsic motivation of an activity, when competitors' actions affected one another. Finally, recognition might enhance the intrinsic motivation of an activity when the process, product, or result was visible and appreciated by others (Malone & Lepper, 1987).

In sum, Malone and Lepper (1987) outlined their taxonomy of intrinsic motivators for learning. These motivators included both individual and interpersonal motivators. The individual motivators included challenge, curiosity, control, and fantasy. The interpersonal motivators included cooperation, competition, and recognition.

Keller's ARCS model of motivation. Overlapping many of the central tenets of Malone and Lepper's (1987) taxonomy of intrinsic motivations, Keller's (1987) ARCS model of motivation was grounded in the expectancy x value theory of motivation and encompassed attention, relevance, confidence, and satisfaction. According to Keller

(1987), “Expectancy-value theory assumes that people are motivated to engage in an activity if it is perceived to be linked to the satisfaction of personal needs (the value aspect), and if there is a positive expectancy for success (the expectancy aspect)” (p. 2-3). Keller (1987) divided the value construct into two categories: attention and relevance. The expectancy construct was renamed to confidence as it “refers to one’s expectation for being successful. It includes several areas of research that are concerned with people’s self-confidence and their feelings of control over their lives and environment” (Keller, 1987, p. 3). An outcomes category was added, which referred to the reinforcing value of instruction. This category was later renamed to satisfaction.

The four categories—attention, relevance, confidence, and satisfaction—made up the conditions for sustained motivation. The purpose of gaining a learner’s attention was, in part, to not only meet their sensation-seeking needs, but also to stimulate their knowledge-seeking curiosity. The attention strategies were organized into these categories: incongruity/conflict, concreteness, variability, humor, inquiry, and participation. Strategies to gain attention included: (1) introducing incongruities or conflict; (2) showing concreteness by providing visuals, examples, or analogies; (3) offering a range of variability in delivery, format, medium, materials, presentation styles, or interactions; (4) embedding humor; (5) promoting inquiry; and (6) encouraging participation (Keller, 1987).

Keller (1987) pointed out that relevance didn’t have to come from content alone, but could also come from strategies. For example, people who have a need for affiliation might find relevance in working in groups and people who have a need to achieve might

find relevance in setting challenging goals. The relevance strategies were categorized as experience, present worth, future usefulness, need matching, modeling, and choice. Strategies that supported motivation through relevance included: (1) connecting to the learner's experiences and interests by using analogies and building upon their existing knowledge and skillsets; (2) explicitly reminding learners of the present worth of the learning; (3) stating explicitly how the learning is useful for future activities and goals; (4) providing opportunities to achieve, take responsibility, or cooperate with others in order to meet the needs of the learners whether it is for achievement, power, or affiliation; (5) modeling enthusiasm, providing an enthusiastic guest speaker, or promoting class leaders as tutors; and (6) offering personal choices and meaningful alternatives to reaching goals (Keller, 1987).

Keller (1987) noted several factors that contributed to confidence, or one's expectancy of success:

> Confident people tend to attribute the causes of success to things such as ability and effort instead of luck or the difficulty of the task…. Also, confident people tend to believe that they can effectively accomplish their goals by means of their actions (Bandura, 1977). (p. 5)

The confidence strategies were organized into the following five categories: learning requirements, difficulty, expectation, attributions, and self-confidence. Confidence building strategies included: (1) providing criteria for evaluation and self-evaluation tools that align with explicitly stated goals; (2) organizing and structuring learning from easiest to most difficult in order to present conquerable challenges; (3) helping students set

realistic expectations and guiding their plans towards goal accomplishment; (4) attributing student success to effort, not luck; and (5) allowing opportunities for independence to build self-confidence by providing low-risk conditions (Keller, 1987).

The category of satisfaction related to reinforcement theory, which stated that learning should have clear tasks, clear rewards, and offer learner control (Keller, 1987). The strategies to motivate learners through satisfaction were categorized as natural consequences, unexpected rewards, positive outcomes, negative influences, and scheduling. These strategies were designed to motivate learners through satisfaction: (1) providing verbal reinforcement of student pride in accomplishment and allowing students to use their new skill in a realistic setting and to help others to master the skill; (2) rewarding intrinsically motivating tasks with unexpected, non-contingent rewards and rewarding boring tasks with extrinsic, anticipated rewards; (3) giving verbal praise and personal attention, as well as providing immediate feedback; (4) avoiding the use of threats, surveillance, or external performance evaluations; and (5) varying the schedule of reinforcements by offering frequent reinforcement during new tasks and intermittent reinforcement as the learner becomes more competent (Keller, 1987).

The components of Keller's (1987) ARCS model of motivation overlapped with Malone and Lepper's (1987) taxonomy of intrinsic motivation in several ways. Keller's (1987) emphasis of the importance of gaining attention was discussed in Malone and Lepper's (1987) taxonomy as an emphasis on curiosity. Keller's (1987) notions of relevance and confidence were similarly found in the prominence that Malone and Lepper (1987) placed on the importance of self-esteem in promoting confidence to tackle

a challenging goal, which was particularly significant when a personally meaningful goal held instrumental, fantasy, or social relevance. Keller's (1987) construct of satisfaction aligned with Malone and Lepper's (1987) ideas about the individual motivation of control and the powerful effects that might come from it, as well as meeting the emotional needs of the learners.

Theories of learning. Learning theories, as a foundational part of this conceptual framework, informed the interpretation of data. Learning theories provided a lens to interpret the meanings, nature, and issues of connectedness that were experienced by the participants in their personal learning networks. Driscoll (2005) outlined the three major epistemological traditions in the field of learning design and technologies and their relation to the study of learning. She stated that objectivism assumed "reality is objective, singular, and fragmentable" (Driscoll, 2005, p. 15). Learning and instructional theories associated with objectivism include behaviorism, cognitive information processing, and Gagne's instructional theory. Pragmatism assumed "reality is interpreted, negotiated, consensual" (Driscoll, 2005, p. 15). She posited that learning and instructional theorists associated with pragmatism include Bruner and Vygotsky (Driscoll, 2005). Interpretivism assumed "reality is constructed, multiple, holistic" (Driscoll, 2005, p. 15). Piaget and constructivist learning theories were aligned with Interpretivism (Driscoll, 2005). Still other scholars (Roblyer & Doering, 2013; Swan, 2005) proposed the two major epistemological traditions in the field were primarily objectivism—in which meaning was discovered in the world—and constructivism—in which individuals imposed meaning on the world (Swan, 2005). Schuh and Barab (2008) contended philosophical perspectives

and their underlying ontological and epistemological assumptions guided instructional design decisions, either explicitly or implicitly. They believed that learning theories were developed according to specific assumptions about the nature of reality and ways of knowing. To clarify the distinctions among the worldviews in learning theories, they delineated five learning theories: behaviorism, cognitivism, cognitive constructivism, sociocultural historicism, and situativity theory. Likewise, scholars (Dede, 2008; Ertmer & Newby, 1993) have described theoretical perspectives of learning as a continuum of assumptions ranging from behaviorist to cognitivist to constructivist, in which the focus shifts from passive teacher-led instruction to active student-centered learning.

In defining behaviorist thought, Schuh and Barab (2008) pointed out, "Proponents of the field were Pavlov, Thorndike, Watson, Tolman, Hull, and Skinner" (p. 73). Behaviorism had its ontological roots in objectivism—a worldview that assumed the nature of reality was that it existed outside of the individual (Schuh & Barab, 2008). Similarly, cognitivism was also rooted in objectivist thought, although rather than focusing on behavior, cognitivism focused on the mind as an information processor (Schuh & Barab, 2008). Duffy and Cunningham (1996) used the metaphor mind-as-computer to illustrate the way knowledge was conceptualized in cognitivist learning theory. In the mind-as-computer metaphor, people learned by processing symbols and concepts to acquire knowledge.

Swan (2005) explained that constructivists "hold that meaning is constructed in our minds as we interact with the physical, social, and mental worlds we inhabit, and that we make sense of our experiences by building and adjusting such internal knowledge

structures that collect and organize our perceptions of and reflections on reality" (p. 14). In sketching the major movements in the field of learning design and technologies, Campbell and Schwier explained "the work of Dewey (1859-1952), Montessori (1870-1952), Piaget (1896-1980), Bruner (1915-), and Vygotsky (1896-1934), among others, is generally credited with the historical precedents for constructivist learning theory" (2014, p. 358). They described constructivism as a learning theory and epistemology steeped in the belief that a learner individually constructed meaning through a process and in a context that was socially situated. The knowledge that was constructed was dependent on the meaning of the experience, which was formed in a socially constructed system of meanings based on past experience. The constructivist perspective was always centered on the learner rather than on content or the instructor. Dewey (1859-1952) put forth his student-centered approach in the early 1900s, when he fostered a value of the learner experience and collaboration with others (Conrad & Donaldson, 2011).

Dewey's philosophy of educative experience. The progressive movement, which emphasized freedom of the learner, arose in response to criticism of authoritative control of traditional schooling. Dewey (1938/1997) analyzed both traditional and progressive education in order to propose a new philosophy of educative experience. The new progressive education movement placed emphasis on the importance of experience, experimentation, freedom, and meaningful learning. One of the main criticisms of traditional education was that students were expected to be passive learners who were docile and obedient to the teacher. The instructor imposed her wisdom from above, irrespective of the student's knowledge, skills, attitudes, abilities, or interests. In

response, progressive education proposed that students should engage in active learning, not passive, and that education should be based on personal experience. Dewey (1938/1997) explicated, “Basing education upon personal experience may mean more multiplied and more intimate contact between the mature and immature than ever existed in the traditional school, and consequently more, rather than less, guidance by others” (p. 21). Dewey (1938/1997) saw the problem as one of “how these contacts can be established without violating the principle of learning through personal experience” (p. 21). His solution was to philosophize on the “social factors that operate in the constitution of individual experience” (Dewey, 1938/1997, p. 21).

Dewey’s (1938/1997) philosophy of educative experience was guided by the belief in an “organic connection between education and personal experience” (p. 25). He also believed that the process used in the experimental method aligned well with learning through educative experience. Dewey (1938/1997) pointed out that it was first and foremost essential to a philosophy of educative experience to understand and state explicitly what educative experience was and what it was not. He clarified, “Any experience is mis-educative that has the effect of arresting or distorting the growth of further experience” (Dewey, 1938/1997, p. 25). So the key to educative experience was that it promoted positive growth and opened the field of further experiences, one that does not land the person in a rut. Dewey (1938/1997) believed that while traditional education provided many experiences, they were non-educative because they did not open up learners to more experiences. In order to open students up to more experiences in the future, then present experiences should have the right quality and effect, meaning

they must be agreeable to the learner and they must promote the desire for future experiences. Dewey (1938/1997) believed it was on the onus of educators to arrange the right kind of experiences that would be agreeable to learners and promote further experiences. He explicated:

> Just as no man lives or dies to himself, so no experience lives and dies to itself. Wholly independent of desire or intent, every experience lives on in further experiences. Hence the central problem of an education based upon experience is to select the kind of present experience that lives fruitfully and creatively in subsequent experiences. (Dewey, 1938/1997, p. 27)

This illustrated Dewey's thinking behind his principle of continuity of experience, or what he also referred to as the experiential continuum. Drawing on Lincoln's Gettysburg address about democracy, Dewey (1938/1997) described his philosophy as one grounded on the belief that "education is a development with, by, and for experience" (p. 28). Thus, his philosophy of educative experience was "one of education, of, by, and for experience" (Dewey, 1938/1997, p. 29). From philosophizing to theorizing to operationalizing, Dewey believed it was essential to the success of a new education to plan for decisions about subject matter, methods, materials, and social organization.

In order to begin the process of operationalizing his philosophy, Dewey (1938/1997) set out to distinguish the criteria of experience. Core to his belief was the observation that we, as humans, find "democratic social arrangements promote a better quality of human experience, one which is more widely accessible and enjoyed than do non-democratic and anti-democratic forms of social life" (Dewey, 1938/1997, p. 34). He

elaborated, “the principle of regard for individual freedom and for decency and kindliness of human relations [comes] back in the end to the conviction that these things are tributary to a higher quality of experience on the part of a greater number than are methods of repression and coercion and force” (Dewey, 1938/1997, p. 34). Therefore, he believed, through his principle of continuity, that there was indeed inherent value in different experiences, and that the best and highest quality experiences were those that promoted further experiences. Drawing on the notion of habit formation from a biological perspective in which each experience of the habit modifies the actor and subsequent experiences, Dewey (1938/1997) explained, “the principle of continuity of experience means that every experience both takes up something from those which have gone before and modifies in some way the quality of those which come after” (p. 35). From this principle, Dewey (1938/1997) pointed out, “Every experience is a moving force. Its value can be judged only on the ground of what it moves toward and into” (p. 38). Therefore, he viewed that an educator must be able to see the direction that experiences were heading. The educator should use her own experiences and understand “the fact that all human experience is ultimately social: that it involves contact and communication” (Dewey, 1938/1997, p. 38). Given that the educator must understand the minds of students, it made education based on experience more challenging than traditional education. Through the formation of attitudes, desires, and purposes, experience goes on inside a student, but experience also changes based on the environment, what Dewey (1938/1997) called objective conditions: “the existence of roads, of means of rapid movement and transportation, tools, implements, furniture, electric light and power, are

illustrations" (p. 39). Dewey (1938/1997) described his belief in the importance of objective conditions:

> In a word, we live from birth to death in a world of persons and things which in large measure is what it is because of what has been done and transmitted from previous human activities. When this fact is ignored, experience is treated as if it were something which goes on exclusively inside an individual's body and mind. It ought not to be necessary to say that experience does not occur in a vacuum. There are sources outside an individual which give rise to experience. It is constantly fed from these springs. (p. 39)

The educator's role was not only to recognize the importance of objective conditions, but also to understand which conditions were conducive to further experience and to arrange the conditions—both physical and social, including the local community—so as to promote meaningful experiences that would lead to more experiences in the future. Dewey (1938/1997) believed that the objective conditions should be "subordinated to what goes on within the individuals having the experience" (p. 41). This notion led to what Dewey considered to be his second chief principle for education via experience, which was the interaction between objective and internal conditions. Both objective and internal conditions determine the quality and effect of the experience. Dewey (1938/1997) wrote, "An experience is always what it is because of the transaction taking place between an individual and what, at the time, constitutes his environment" (p. 43).

The two principles of continuity and interaction united to form the "longitudinal and lateral aspects of experience" (Dewey, 1938/1997, p. 44). These two principles

together "provide the measure of the educative significance and value of an experience" (Dewey, 1938/1997, p. 44). For an educator, her role was to arrange the objective conditions, which included equipment, books, materials, games, and all of the environmental and social surroundings involved in learning through experience. In order for an educator to create objective conditions that would lead to an educative experience, she must understand the needs and capacities of each student. She must also understand the importance of collateral learning—that is a learner's attitudes that form the desire for future learning. According to Dewey (1938/1997) learning about a subject-matter was only relevant when the learner also retained her appreciation for and values for topics and issues that were important to her, along with her desire to apply what she learned and extract meaning at present and in future experiences.

In discussing individual freedom and social control, Dewey (1938/1997) illustrated through an analogy to games and game rules how it was possible to have social control without violating individual freedom. He explained that because rules were a part of the game and not outside of it, that participants agreed to play by the rules. Applied to social groups, in a social community, the social rules are a part of the community experience, not outside of it. Participants of a community agree to the rules and the rules become a part of the experience of the environment. The leader of the community exercised authority in the interest of the group, not for power or personal will. For this principle of social control to work in a school setting, the teacher must be positioned as member and leader of the group in which "the primary source of social control resides in the very nature of the work done as a social enterprise in which all individual have an

opportunity to contribute and to which all feel a responsibility" (Dewey, 1938/1997, p. 56). Humans are social beings, which is the ground for a genuine community built on the innate sociability of the members. According to Dewey (1938/1997), the educator's role was to know the individuals and the subject-matter well enough to create conditions for social organization, so that individual impulses were controlled by engagement in community activity. Education was viewed as a social process and the quality of education, in part, was the extent to which the members formed a group.

On the flip side of social control was individual freedom. Dewey proclaimed, "The only freedom that is of enduring importance is freedom of intelligence, that is to say, freedom of observation and of judgment exercised in behalf of purposes that are intrinsically worth while" (1938/1997, p. 61). For Dewey, freedom was power: "power to frame purposes, to judge wisely, to evaluate desires by the consequences which will result from acting upon them; power to select and order means to carry chosen ends into operation" (1938/1997, p. 64). By thinking, observing, reflecting, and judging, individual's exercised self-control. In Dewey's mind, "The ideal aim of education is creation of power of self control" (1938/1997, p. 64). Freedom was self-control and power, which was the basis of intelligence—the formation of purpose and the organization of means to carry it out.

The student's participation by way of active cooperation in the formation of purposes that directed her activities in the learning process was a core tenet in Dewey's philosophy of educative experience. In defining purpose, Dewey (1938/1997) declared:

A genuine purpose always starts with an impulse. Obstruction of the immediate

> execution of an impulse converts it into a desire. Nevertheless neither impulse nor desire is itself a purpose. A purpose is an end-view. That is, it involves foresight of the consequences which will result from acting upon impulse. (p. 67)

In order to transform an impulse into a purpose, the student must observe conditions, remember previous experiences and advice from others, and then make a judgment to act with a plan and method of action. Therefore, intelligent activity picked up momentum from an impulse and desire, then observation, information, and judgment directed the moving force into a purpose and a plan of action. Dewey remarked, "Desires are the ultimate moving springs of action" (1938/1997, p. 70). He viewed the teacher's role as one that aided in the freedom of a student by helping her direct her impulses and desires into a purpose and plan of action. In this way, the development of a purpose was a "cooperative enterprise" (1938/1997, p. 71) in which there was "reciprocal give-and-take" (1938/1997, p. 71) between the teacher and student.

Once a purpose was established, the material for learning should be found in everyday life experiences, and then developed progressively into a more organized form. Drawing on an example of how a child learned to crawl, walk, and run, Dewey claimed, "That this change is possible without departing from the organic connection of education with experience is shown by the fact that this change takes place outside of the school and apart from formal education" (1938/1997, p. 74). The educator's role, then, was to take the learner's existing experience as a starting point and build upon that through "orderly development toward expansion and organization of subject matter through growth of experience" (Dewey, 1938/1997, p. 74). The learner's experience and

knowledge was always moving, always progressing, and always being developed and opened into new fields. For teachers, Dewey remarked, "Connectedness in growth must be his constant watch word" (1938/1997, p. 75). Thus, an educative experience was one that sought knowledge of more facts and entertained more ideas and aimed for a more orderly organization of them. Dewey called this orderly organization "analysis and synthesis" (1938/1997, p. 84). Intelligent activity involved analyzing and selecting appropriate means from the conditions, then synthesizing and arranging them to meet a purpose.

The analysis and synthesis that Dewey recognized in the ways that people learned from experience reminded him of the experimental method of science. He believed the scientific method was useful as a pattern "and ideal of intelligent exploration and exploitation of the potentialities inherent in experience" (Dewey, 1938/1997, p. 86). Some of the attributes of the experimental method that appealed to Dewey were that it attached significant importance to ideas than other methods. He also noted that ideas were tested, which led to clarification and expansion of ideas. Third, he observed that the experimental method required some kind of documentation or keeping track of ideas and activities through reflecting and summarizing. Reflecting to extract the meaning of experiences was "the heart of intellectual organization and of the disciplined mind" (Dewey, 1938/1997, p. 87). The teacher must view "every present experience as a moving force in influencing what future experiences will be" (p. 87). When Dewey discussed the use of an experimental method, he did not intend to mean the techniques used by specialists in a lab, but rather as "a working pattern of the way in which and the

conditions under which experiences are used to lead ever onward and outward" (1938/1997, p. 88). He viewed the scientific method as "the only authentic means at our command for getting at the significance of our every day experiences of the world in which we live" (Dewey, 1938/1997, p. 88). The teacher's role was to adapt the method for individuals using the constant factors, which were "the formation of ideas, acting upon ideas, observation of the conditions which result, and organization of facts and ideas for future use" (p. 88). While the ideas, actions, observations, and organization will be different for individuals, there would always be "an expanding development of experience if experience is educative in effect" (Dewey, 1938/1997, p. 88). Therefore, Dewey (1938/1997), in recognizing the place of intelligence in developing and controlling a living and moving experience, called on the use of the experimental method of science for the pattern it provided.

Bandura's social cognitive theory. In his social cognitive model of interactive agency—an integral part of his social cognitive theory—Bandura (1986) advocated for a model of triadic reciprocality in which actions, environmental factors, and personal determinants each play a bi-directional influencing role in which they operate interactively as determinants of each another. He believed humans were only partial authors of their situations, destinies, and experiences, including past experiences and their memories of them, with environmental factors also playing an influential role. Thus, he stated that it was not simply internal or external forces that drove humans, but rather it was the interacting determinants of behavior and actions, cognitive personal factors, and the environment that explained human functioning. He pointed out, "The relative

influence exerted by the three sets of interacting factors will vary for different activities, different individuals, and different circumstances" (Bandura, 1986, p. 24). Bandura (1986) was intrigued by the way humans produced novel, visionary thoughts, which led him to theorize about personal agency, freedom versus determinism, and creative modeling for innovation.

At the foundation of Bandura's (1986) social cognitive theory was the understanding that humans had the capability of symbolization, forethought, vicarious observation, self-regulation, and self-reflection. Through these capabilities, humans engage in experiences that involve interplay of the factors in the triadic reciprocality model. For example, in the interactive relation between thought and action, questions arise as to how beliefs shape behavior—i.e., how people think and feel shapes their actions. When considering the interactive relation between thoughts and environment, questions arise as to how thoughts and feelings could be modified by modeling from environmental factors. By analyzing the three deterministic factors in his triadic reciprocality model, he theorized how humans were both influencers of, and influenced by, their environments. Bandura (1986) elucidated how personal determinants are unique for each individual including physical characteristics: "People evoke different reactions from their social environment simply by their physical characteristics, such as age, size, race, sex, and physical attractiveness" (p. 26). He expanded on this concept to illustrate the way an individual's conceptions of herself could be developed: from direct experience, through vicarious experience, from judgments by others, or through inferring knowledge based on what she already knew.

A fascinating line of Bandura's (1986) work related to fortuitous determinants of life paths and chance encounters that have a profound impact on human experience. Beyond the three factors of thoughts, actions, and environment, Bandura (1986) postulated:

> There is a fortuitous element in some of the events they may encounter in their daily lives. Yet, it is such fortuitous encounters that often play a prominent role in shaping the course of lives. A comprehensive theory must therefore include the fortuitous determinants of life paths if it is to provide a full explanation of human behavior. (p. 30)

In his discussion of developmental determinism, Bandura (1986) explicated how social and technological changes influence human experience through customary life events for different generations depending on the age of the individuals when the changes occur given that they are experienced at different life stages. Fortuitous encounters can influence the course of human lives, not necessarily in the power of the event, but in the powerful interactive processes they put in motion. Bandura (1986) observed that all "human encounters involve degrees of fortuitiveness. People often intentionally seek certain types of experiences, but the persons who, thereby, enter their lives are determined by a large element of chance" (p. 32). Chance encounters have the potential to impact an individual through an intersection of both personal and social factors. Bandura (1986) proposed that the personal determinants of the impact of chance encounters included an individual's entry skills, emotional ties, and their values and personal standards, whereas the social determinants of the impact of chance encounters

included milieu rewards, symbolic environment and information management, milieu reach and closedness, and psychological closedness. Bandura (1986) highlighted fortuitous interpersonal encounters because, as he noted, “Most of the influences that alter the course of lives are socially mediated” (p. 37). However, he also discussed nonsocial serendipitous findings.

Citing the work of Austin (1978), Bandura (1986) wrote that personal attributes could contribute to serendipitous discovery in three ways. First, through ingenuity and personal interests that could impact syntheses leading to new discoveries. Second, by perseverance and an inquisitive mind interested in exploration that could promote the probability of new syntheses. Third, via specialized knowledge and skills that could potentially impact whether anomalous findings would be identified. From these attributes, it was evident that fortuity favored individuals who had a curious mind, inquiring attitude, and the initiative to take action—i.e., a strong sense of personal agency—because chasing new experiences tended to increase exposure to new people and novel ideas that spring boarded an individual into new directions.

In order to capitalize on the impact of chance encounters, Bandura (1986) proposed personal factors and social ties that could serve as guides for fostering a future life path valued by the individual. To this end, he described how personal agency required an individual to use competencies, self-efficacy, and self-regulatory capabilities to exercise self-directedness. An individual could expand her sense of freedom and capitalize on fortuitous opportunities through the development of these tools of personal agency in order to select, influence, and construct positive circumstances in life. Through

modeling and the evaluative reactions of significant others, individuals are impacted by social ties, which also provide support, incentive, meaning, and worth to an individual's actions.

In a discussion of personal agency, freedom, and determinism, Bandura (1986) defined freedom as it related to personal agency. Similar to Dewey's (1938/1997) definition of freedom, Bandura (1986) viewed freedom "positively in terms of the exercise of self-influence" (p. 39). Whereas Dewey (1938/1997) referred to the construct as self-control or self-regulation, Bandura (1986) identified it as self-influence. To illustrate his definition, he compared individuals who mastered self-regulation capabilities to those who had not, to show that a person who could regulate their own behavior would experience greater freedom over someone with limited personal agency. Bandura (1986) believed through reflective cognitive activity, people made choices to exercise their self-influence—i.e., they considered alternatives, weighed consequences, and analyzed their capabilities for success. An individual with a strong sense of personal agency regulated her behavior by choosing to direct efforts towards a desired goal. She used reflective cognitive guides and motivated herself through incentives. She also organized environmental conditions that would help her to be successful and meet her goals. Part of the social environmental conditions included learning by observation through modeling.

A core tenet of Bandura's (1986) social cognitive theory was the concept of observational learning through modeling. He believed observers could "acquire cognitive skills and new patterns of behavior by observing the performance of others" (p. 49). From

modeled events to matching patterns, individuals may experience four subprocesses of observational learning: attention, retention, production, and motivation.

Attentional processes, which regulated exploration and perception, began the experience of observational learning from modeled events. The salience, affective valence (i.e., intrinsic attractiveness), complexity, prevalence, and functional value (i.e., personal relevance) of modeled events impacted what the observer selectively observed and therefore, what subsequent information was extracted from the experience. An observer would use both perceptual and cognitive capabilities in the process of attending to modeled events, as Bandura (1986) explained:

> The process of attention is not simply a matter of absorbing sensory information that happens to impinge upon a person. Rather, it involves self-directed exploration of the environment and construction of meaningful perceptions from ongoing modeled events. Perceptions are guided by preconceptions. Observers' cognitive competencies and perceptual sets dispose them to look for some things but not others. Their expectations not only channel what they look for but partly affect what features they extract from observations and how they interpret what they see and hear. By giving coherence and meaning to available information, cognition is very much involved in perception. (p. 53)

In addition to the personal factors that influenced perceptual selectivity, attentional determinants also included associational networks. According to Bandura (1986), "The people with whom one regularly associates, either through preference or imposition, delimit the behavior patterns that will be repeatedly observed and, hence, learned most

thoroughly" (p. 55). Therefore, associational networks played a major role in impacting the selective attention of observers; specifically, what events are modeled and observed for retention.

The second major subfunction that governed observational learning was retentional processes. The information from modeled events was retained through symbolic coding, cognitive organization, cognitive rehearsal (i.e., practicing in one's mind), and enactive rehearsal (i.e., practicing performance). Retaining information required cognitive skills to transform and restructure information into vivid imagery or verbal codes. Bandura (1986) noted, "Novel response patterns are acquired most easily if they are related to what is already known. Observational learning in everyday life is often accelerated by likening new performances to familiar and meaningful activities" (p. 60). Furthermore, from heightened attention to boosts in self-efficacy, proficiency and mastery were improved when observers mentally visualized their successful performances.

The third component of modeling involved the production of converting retained observations into action. Production occurred through cognitive representations, enactment observations, feedback (i.e., visual, auditory, and kinesthetic), and conceptual matching. In order to take action, the observer had to be physically capable of the performance.

The final subprocess of observational learning was motivation. In his social cognitive theory, Bandura (1986) made the distinction between acquisition and performance because an observer may attend to and retain information without executing

the actions. He believed that enacting learned behavior was influenced by incentives that were direct, vicarious, or self-produced. In explicating the direct, external incentives, Bandura wrote: “In everyday situations, the external incentives for modeling may take the form of material benefits, enjoyable or unpleasant sensory stimulation, positive or negative social reactions, or the rewards of efficacy in exercising control over events by using the modeled skills” (1986, p. 68). Based on his theory of learning through observation of modeled events, Bandura (1986) believed that if a model were to demonstrate an action, instruct an observer to watch, and provide feedback and rewards, then the observer will perform the matching pattern. If an observer were not able to perform a matching pattern, then it would likely be due to one of the faulty subprocesses such as deficiencies in attention, cognitive skills, motor production, or motivation.

In a discussion of creative modeling and innovative syntheses, Bandura stated: “Creativity constitutes one of the highest forms of human expression. Without the existence of creative works, the scope and depth of human experience would be considerably impoverished” (1986, p. 104). He proposed that modeling could provide cognitive and behavioral tools for innovation through apprenticeships given that observational learners continue to develop new dimensions of their craft by learning from others even after mastery. Bandura (1986) viewed originality as stemming from multiple sources of models with different styles of thought and action. An observer then combined attributes to create a synthesis from the multiple observations into a new, original, innovate work or action. Each observer having viewed diverse sources would create new patterns. Thus, new innovations were most likely to come from experiences and

environments with great diversity in modeling. Moreover, people showed more innovation and versatility when they observed models that demonstrated divergent thinking patterns and approached problems in diverse ways. From a social learning perspective, a person's social environment evolves over time due to environmental conditions, multiple and diverse modeling influences, as well as personal experiences.

Lave and Wenger's situated learning theory. Lave and Wenger (1991), with backgrounds in social anthropology and computer science, respectively, developed a theory of learning based in social practice. In their seminal work on situated learning, they analyzed five cases of apprenticeship relations—Yucatec midwives, Vai and Gola tailors, naval quartermasters, meat cutters, and nondrinking alcoholics—through an analytical perspective of legitimate peripheral participation. They determined that learning was subsumed in social practice, and that engagement in an ambient community of practice provided the means for not only knowledge and skill development, but also motivation, language for participation, and cultivation of an identity as an expert practitioner engaged in full participation in their community.

Their concept of learning situated in social practice as legitimate peripheral participation was spurred by observations that apprentices became skilled experts "without being taught, examined, or reduced to mechanical copiers" (p. 30). From observations of apprenticeships to a theory of situated learning to the concept and analytical perspective of legitimate peripheral participation, Lave and Wenger (1991) shifted to a view of learning as "an integral and inseparable aspect of social practice" (p. 31). In their move from apprenticeship to situated learning, they defined situated activity

as a "general theoretical perspective… about the relational character of knowledge and learning, about the negotiated character of meaning, and about the concerned (engaged, dilemma-driven) nature of learning activity for the people involved" (Lave & Wenger, 1991, p. 33). From this whole person perspective, all activity was situated in and with the world. They believed that "agent, activity, and the world mutually constitute each other" (Lave & Wenger, 1991, p. 33). Situated learning became a conceptual bridge between seeing learning as a cognitive process to seeing learning as a social process primarily, of which learning was a characteristic, "an integral part of generative social practice in the lived-in world" (Lave & Wenger, 1991, p. 34). As a concept and analytical perspective in their social practice theory of learning, Lave and Wenger (1991) defined aspects of legitimate peripheral participation. The term *legitimacy* of participation referred to "ways of belonging, and is therefore not only a crucial condition for learning, but a constitutive element of its content" (Lave & Wenger, 1991, p. 35). The term *peripherality* was used to describe the "multiple, varied, more- or less-engaged and –inclusive ways of being located in the fields of participation defined by a community. Peripheral participation is about being located in the social world" (Lave and Wenger, 1991, p. 35). They explicated that shifting locations and perspectives in a social context was part of an agent's trajectory of learning, identity development, and changing forms of membership. Lave and Wenger (1991) noted that relations of power in social structures were implicated in a discussion of legitimate peripherality. They theorized that an agent would be empowered by access to intense, centripetal participation when legitimate peripherality was enabled. An agent would experience an opening to gaining access to resources for learning and

growth. Whereas, alternatively, impediments and barriers to full, legitimate participation would leave an agent disempowered when access to resources was closed. Not to connote marginality with peripherality, Lave and Wenger (1991) pointed out that peripherality was a positive term that suggested connectedness, relatedness, and relevance of activity and practice. However, unequal power relations could "generate characteristically interstitial communities of practice and truncate possibilities of identities of mastery" (Lave & Wenger, 1991, p. 42). As an analytical viewpoint of learning and as a means to analyze and understand how learning occurred in social contexts, legitimate peripheral participation was not proposed as a form of instructional method, but rather as a way to decouple learning from teaching.

Drawing on a collectivist, societal perspective of Vygotsky's zone of proximal development influenced by critical theory, Lave and Wenger (1991) extended an interpretation of learning beyond pedagogy to include social structures in the lived-in world. Rather than a process of internalization, learning was conceived of as a process of evolving relations among persons, actions, and the world. They asserted, "Theorizing in terms of practice, or praxis, also requires a broad view of human agency, emphasizing the integration and practice of agent, world, and activity" (Lave & Wenger, 1991, p. 50). Moreover, they briefly elucidated their theory of social practice:

> A theory of social practice emphasizes the relational interdependency of agent and world, activity, meaning, cognition, learning, and knowing. It emphasizes the inherently socially negotiated character of meaning and the interested, concerned [engaged, dilemma-driven] character of the thought and action of persons-in-

> activity. This view also claims that learning, thinking, and knowing are relations among people in activity in, with, and arising from the socially and culturally structured world. (pp. 50-51)

Lave and Wenger (1991) viewed the world as socially constituted and believed that knowledge of the world was socially mediated, in which objective activity and subjective—and intersubjective—understandings mutually constituted the world and lived-in experiences. This viewpoint led Lave and Wenger (1991) to a historical theory of social practice in which historicizing the production of persons pointed them to focusing on learning processes. Thus, they viewed participation as a socially situated negotiation of meaning, which suggested that cognition and experience were continually interacting in a mutually constitutive way: "persons, actions, and the world are implicated in all thought, speech, knowing, and learning" (Lave & Wenger, 1991, p. 52). Their primary focus on social practice positioned the individual learner as a "person-in-the-world, as a member of a sociocultural community" (Lave & Wenger, 1991, p. 52). As such, learning, and the goals, tasks, activities, and cognitions did not occur in isolation, but in the social relations that gave them meaning. Lave and Wenger (1991) advocated for a socially situated view of learning that involved the construction of identities:

> The systems of relations arise out of and are reproduced and developed within social communities, which are in part systems of relations among persons. The person is defined by as well as defines these relations. Learning thus implies becoming a different person with respect to the possibilities enabled by these systems of relations. To ignore this aspect of learning is to overlook the fact that

> learning involves the construction of identities. (p. 53)

For Lave and Wenger (1991), learning was an evolving form of membership in a community of practice and identities were considered to be "long-term, living relations between persons and their place and participation in communities of practice. Thus identity, knowing, and social membership entail one another" (p. 53). By decentering the individual in their theory that focused on social practice and simultaneously attributing agency to the individual, Lave and Wenger (1991) honored the multiple relations that informed a person's identity in practice. They drew a connection, through legitimate peripheral participation, between the transformation of identities into expert practitioners and the transformation of communities of practice.

Lave and Wenger (1991) believed "learners must be legitimate peripheral participants in ongoing practice in order for learning identities to be engaged and develop into full participation" (p. 64). In negative work conditions that are adversarial, communities of practice develop interstitially and learning takes place in response to the corrosive environment. The social conditions and access to adept practitioners, in part, shape the possible work activity and the construction of identities as expert practitioners. As Lave and Wenger (1991) explained:

> If masters don't teach, they embody practice at its fullest in the community of practice. Becoming a 'member such as those' is an embodied telos too complex to be discussed in the narrow and simpler language of goals, tasks, and knowledge acquisition. There may be no language for participants with which to discuss it at all – but identities of mastery, in all their complications, are there to be assumed.

(p. 85)

In contrast to their observations and analysis of the apprenticeship cases, Lave and Wenger (1991) noted that there might be cases in which teaching could be considered central to an apprenticeship learning experience. However, it was clarified that when teaching was central, the apprentice was required to organize her own course of study and recruit the necessary teachers or guides. This led Lave and Wenger (1991) into a discussion on structuring resources for learning. They noticed a characteristic pattern in which learners developed goals to understand the whole context and what they needed to learn to become expert practitioners. The course of study unfolded in the opportunities of engagement with others—peers and experts—in practice. Thus, they determined that expertise lied in the organization of the community, of which the experts were a part. In this way, Lave and Wenger (1991) formed a decentered view of the expert-apprentice relation.

Lave and Wenger (1991) proposed that more than merely observing, legitimate peripherality entailed practicing, in which the individual was "both absorbing and being absorbed in—the 'culture of practice'" (p. 95). From their broad peripheral perspective, apprentices learned what constituted the practice of the community, including:

> Who is involved; what they do; what everyday life is like; how masters talk, walk, work, and generally conduct their lives; how people who are not part of the community of practice interact with it; what other learners are doing; and what learners need to learn to become full practitioners. (p. 95)

Lave and Wenger (1991) defined a community of practice as "a set of relations among

persons, activity, and world, over time and in relation with other tangential and overlapping communities of practice" (p. 98). They believed a community of practice was "an intrinsic condition for the existence of knowledge" (Lave & Wenger, 1991, p. 98). To delineate a community, they suggested analyzing the reproduction cycles. For example, they hypothesized that the reproduction cycles of a physicists' community may begin in graduate school.

Having established a definition of community, Lave and Wenger (1991) turned to addressing the important issue of transparency and giving apprentices access to the activities, information, resources, and technologies of the community to enable full participation. They suggested that motivation and identity construction would be the outcomes of legitimate peripheral participation: "Acceptance by and interaction with acknowledged adept practitioners make learning legitimate and of value from the point of view of the apprentice" (Lave & Wenger, 1991, p. 110). Lave and Wenger (1991) postulated that intrinsic motivation, rather than based solely in learning skills, lied also in becoming a member of the community and developing an identity as an expert. Thus, "learning and a sense of identity are inseparable: They are aspects of the same phenomenon" (Lave & Wenger, 1991, p. 115). In defining the concept and analytical perspective of legitimate peripheral participation, Lave and Wenger (1991) aimed to show "its multiple, theoretically generative interconnections with persons, activities, knowing, and world" (p. 121). In the context of a social practice theory of learning, an individual's cognition, language, dialogue, and interactions were viewed as part of their developing identity as an active agent and community member in which meaning and

action were closely linked.

Duffy and Cunningham's mind-as-rhizome model and distributed cognition.

Duffy and Cunningham (1996) provided a comprehensive focus on constructivism and explicated metaphors of the mind, including mind-as-computer, mind-as-brain, and mind-as-rhizome, to illustrate differences in how theorists think about the mind, knowledge, and learning. Inspired by Eco (1984) as well as the work of Deleuze and Guattari (1983), Duffy and Cunningham (1996) proposed the mind-as-rhizome metaphor to highlight the way a single individual mind is connected to other minds and to their collective sociocultural constructions. They explained, "Thinking, or whatever we choose to call the activity of mind, is always dialogic, connected to another, either directly as in some communicative action or indirectly via some form of semiotic mediation: signs and/or tools appropriated from the sociocultural context" (Duffy & Cunningham, 1996, p. 8). Moreover, the rhizomous connections are not static, they are moving, dynamic, unstable, and temporal, which points to the impossibility of capturing a global picture of it, rather "we are left with 'local' descriptions, a vision of one or a few of the many potential structures derivable from the rhizome" (Duffy & Cunningham, 1996, p. 8). Instead of viewing learning as discriminating symbols and applying rules to manipulate them, Duffy

and Cunningham (1996), through the mind-as-rhizome metaphor, viewed learning as "a matter of constructing and navigating a local, situated path through a rhizomous labyrinth, a process of dialogue and negotiation with and within a local sociocultural context" (p. 8). Using an analogy of the World Wide Web, they illustrated their point by explaining that connections to an infinite number of servers across the globe were experienced through a graphic user interface at the individual's local machine. In this way, the user at the local machine "both contributes to (constructs) and is constructed by its connections" (Duffy & Cunningham, 1996, p. 9). The user at the local workstation is then both agent and acted upon.

Duffy and Cunningham (1996) presented the grounding assumptions of their constructivist theory based on their mind-as-rhizome metaphor. First, "All knowledge is constructed; All learning is a process of construction" (p. 9). Second, "Many world views can be constructed, hence there will be multiple perspectives" (p. 9). Third, "Knowledge is context dependent, so learning should occur in contexts to which it is relevant" (p. 10). Fourth, "Learning is mediated by tools and signs" (p. 11). Fifth, "Learning is an inherently social-dialogical activity" (p. 11). Sixth, "Learners are distributed, multidimensional participants in a sociocultural process" (p. 12). Seventh, "Knowing how we know is the ultimate human accomplishment" (p. 12).

In the discussion of their sixth assumption that "learners are distributed, multidimensional participants in a sociocultural process" (p. 12), Duffy and Cunningham (1996) argued for a distributed concept of self. They claimed, "A distributed concept of self shifts the activity of learning to the connections one has with communities, to the

patterns of participation, and away from efficient internalization of knowledge" (p. 12). To demonstrate their point about a distributed concept of self, Duffy and Cunningham (1996) drew on a thought experiment:

> Hutchins (1991) proposes a simple thought experiment to illustrate this idea. Look around where you are right now reading this and try to find something that "was not either produced or delivered to its present location by the cooperative efforts of humans working in socially organized groups" (p. 284). Unless your environment is strikingly different from ours, we think you will have difficulty identifying anything. Of course, your inclination is to declare those objects as different from you, as something other than self, but are they not really part and parcel of the means by which you participate in the communities that produce them? Isn't that your identity? (p. 12)

Extending this distributed concept of self to distributed cognition, Duffy and Cunningham (1996) proposed an interpretation of the concept of distributed cognition as "the rhizome distributed across minds and cultural artifacts" (p. 10) so that individuals appropriate new knowledge rather than internalize it. Swan (2005) explained the concept of distributed cognition as the belief "that thinking, hence learning, does not take place solely inside the mind of individuals, but rather that it is socially distributed among individuals and the tools and artifacts of a culture" (p. 18). In a discussion of computers and media from the perspective of the mind-as-rhizome model, Duffy and Cunningham (1996) viewed technologies as tools for learners to expand cognition—not simply for learners to acquire new facts, but rather to use the technologies to produce new

understandings and capabilities. In this way, their interpretation of distributed cognition as it related to the use of computer and media technologies was one of expanding cognition by way of the technological artifacts used in the activity. Understandings come from and through artifacts in the environment by way of the activity. As using a keyboard and mouse when sitting at a computer affords access to programs and applications for learning, "cognition is distributed among the artifacts in the activity" (Duffy & Cunningham, 1996, p. 19). The environment, activity, and artifacts afford understanding. Cognition—thinking, learning, and understanding—is not only supported, but also mediated through, and to some extent situated in artifacts and tools—technologies (Swan, 2005).

In the distributed concept of self, the self does not reside in the artifacts in the environment, but rather the artifacts and the environment are reflective of the self—one's identity. So too in the concept of distributed cognition. It is not that cognition resides in the activities and artifacts of the environment, but rather that the artifacts, activities, and environment afford cognition; they make certain understandings possible and probable. What a person thinks, understands, and learns—her cognition—occurs through the artifacts, interactions, and activities in her environment. This is the distributed concept of cognition. Extending the theory of distributed cognition, the mind-as-rhizome model, and the importance of context, particularly the influence of living and learning in a digital age immersed in technology, Siemens (2005) proposed a theory of connectivism, which integrated principles of complexity theory.

Siemens' connectivist theory. Siemens (2005) evaluated the existing learning

theories through the lens of modern computing technologies. He pointed out some of the significant trends in learning and the limitations of existing learning theories as the impetus for his proposed learning theory, connectivism. The significant trends he pointed to included the observations that often learners would shift into new jobs, positions, and fields during their lifetime. Also for most learners, informal learning would become more important and relevant than formal learning because people will learn "through communities of practice, personal networks, and through completion of work-related tasks" (Siemens, 2005, para. 3). Since life-long learning was a perpetual experience, often learning and work tasks would be integrated. The technologies used for work and learning would impact thinking. Additionally, since both an individual and an organization were "learning organisms" (Siemens, 2005, para. 3), there was a need to better understand knowledge management and the link between individual and organizational learning. Furthermore, technology had the capability to do some of the functioning addressed by early learning theories developed before contemporary computing technologies, particularly information processing. The final trend Siemens (2005) pointed out was that knowing where to find information was superseding the need to know how and know what.

Siemens (2005) believed that previous learning theories did not address how technologies impacted learning in the way that they were capable of storing and manipulating information. Moreover, the previous learning theories did not address how learning happened in organizations. He noted that when information was abundant, the ability to draw in information from outside sources, evaluate the relevance of the

information, and synthesize connections would become of greater importance in the learning process. Siemens (2005) declared, “including technology and connection making as learning activities begins to move learning theories into a digital age” (para. 17). Drawing on the tents of chaos, complexity, and self-organization, he proposed that learners must form connections among sources of information, and then recognize and adjust to information patterns in order to find the meaning that exists.

Siemens (2005) defined a network as “connections between entities. Computer networks, power grids, and social networks all function on the simple principle that people, groups, systems, nodes, entities can be connected to create an integrated whole. Alterations within the network have ripple effects on the whole” (para. 18). According to Siemens (2005), nodes (i.e., fields, ideas, or communities) compete for connections to gain recognition in order to acquire more links and expand the potential for greater recognition. He described how “small world networks are generally populated with people whose interests and knowledge are similar to ours…. This principle has great merit in the notion of serendipity, innovation, and creativity” (Siemens, 2005, para. 20).

Siemens (2005) wrote, “Learning is a process that occurs within nebulous environments of shifting core elements—not entirely under the control of the individual” (para. 21). He defined learning as “actionable knowledge” (para. 21) and believed it could reside in a database or an organization. Siemens (2005) outlined the principles of connectivism:

- Learning and knowledge rests in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.

- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known.
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision. (para. 23)

Similar to constructivist learning theories, connectivism started with the individual. Siemens (2005) explained that personal knowledge was a network that fed organizations, which, in a reciprocal manner, fed back into the network and into the individual's learning and knowledge. He remarked, "This cycle of knowledge development (personal to network to organization) allows learners to remain current in their field through the connections they have formed" (Siemens, 2005, para. 27). The way learning, knowledge, and understanding—cognition—was strengthened through a personal learning network exemplified the tenets of connectivism.

As with the nature of scientific revolutions (Kuhn, 1970), innovations, emerging technologies, and burgeoning learning theories often involve debates on the merits of new ideas before acceptance by the community. Anderson (2010) wrote about some of

the critiques of connectivism from scholars in the learning design and technologies field, primarily that the tenets of connectivism could be explained by constructivist theory and complexity theory, thus the ideas put forth in connectivism were not novel. Another critique was that connectivism does not have a place in formal education given that there was no role for the teacher. Moreover, connectivist learning was only designed for motivated learners who would be capable of self-directed learning, thus alienating many learners, particularly young or struggling learners. Furthermore, there was some debate about how to categorize connectivism, whether as a learning theory or a theory of curriculum—the goals and means of student learning.

Anderson (2010) suggested that networked learning would be one way to facilitate connectivist learning. By combining formal and informal learning, extending the connections beyond a classroom, and supporting new connections, Anderson (2010) believed networked learning was one possible instantiation of connectivism, as a theory in practice. In these networked learning courses, membership was fluid, leadership was emergent, and the courses were less temporally bound than traditional courses, often extending beyond the semester time limits of formal learning.

Theories of self and identity. Self-identity theories were an essential foundation of this conceptual framework. They helped to inform the interpretation of data regarding self-concept and identity. The work of Rogers (1959) and Wenger (1998) provided lenses to interpret the meanings, nature, and issues of self-concept and identity that were experienced through connectedness in the agents' personal learning networks.

Rogers' humanistic personality theory. Influenced by Dewey and Maslow,

Rogers (1959) developed his theory of personality based on thirty years of experience as a therapist. In that time, he discovered "an orderliness which was inherent *in* the experience" (Rogers, 1959, p. 187). Similar to Dewey's (1938/1997) notion that an educative experience could be patterned after the experimental method of science, Rogers (1959) believed research and theory was "the persistent, disciplined effort to make sense and order out of the phenomena of subjective experience" (p. 188). Moreover, he believed "that the type of understanding which we call science can begin anywhere, at any level of sophistication. To observe acutely, to think carefully and creatively—these activities, not the accumulation of laboratory instruments, are the beginnings of science" (p. 189). He advocated for a dynamic interpretation of the scientific movement in which all theories, at the time of their formulation, contained unknowable mistaken inferences, and that theories should serve the purpose of stimulating further creative thinking. This idea resembled Dewey's (1938/1997) principle of continuity of experience.

Rogers' (1959) theory of personality was part of an interrelated system of theories that also included a theory of therapy, a theory of interpersonal relationships, and a theory of the fully functioning person, which was similar to Maslow's (1943) concept of self-actualization in his theory of human motivation. In Rogers' (1959) theory of personality, he proposed that an individual's concept of self was a fluid and changing gestalt process with three primary components. First, the self-concept was composed of self-perceptions, self-awareness, or self-image. As a gestalt, influenced by perception, Rogers (1959) explicated how "the self-concept was configurational in nature" (p. 202) by using a familiar picture:

> The product was clearly a gestalt, a configuration in which the alteration of one minor aspect could completely alter the whole pattern. One was forcibly reminded of the favorite textbook illustration of a gestalt, the double picture of the old hag and the young woman. Looked at with one mind set, the picture is clearly that of an ugly old woman. The slightest change, and the whole becomes a portrait of an attractive girl. (pp. 201-202)

Second, Rogers (1959) proposed that the self-concept included conditions of worth such as an unconditional positive self-regard, self-worth, or self-esteem. According to Rogers (1959) a condition of worth would arise when the positive regard from another individual was conditional. Thus, an individual only felt a positive self-worth in some instances, but not in others based on what others believed. When the beliefs of others about one's self became internalized, then the individual's self-regard changed so that the individual's self-experiences came to be evaluated based on the external criteria set by others, and not on the internal value of self-experiences for the enhancement of the individual. Subsequently, Rogers (1959) determined self-esteem, and an unconditional positive self-regard, was dependent on an individual having an internal locus of evaluation, rather than external to the self.

Third, Rogers (1959) proposed that the self-concept included the self-ideal or the ideal self, meaning "the self-concept which the individual would most like to possess, upon which he places the highest value for himself" (p. 200). As a whole, Rogers' (1959) construct of self-concept included one's self-image, self-worth, and self-ideal. These constructs were shaped through the organization of self-experiences, which were

"defined as being any event or entity in the phenomenal field discriminated by the individual which is also discriminated as 'self,' 'me,' or 'I,' or related thereto" (Rogers, 1959, p. 200). Rogers' (1959) theory of personality was embedded in an interrelated system in his theories of therapy, interpersonal relations, and fully functioning persons.

Wenger's concept of identity in practice. In 1998, Wenger expanded on the theory of situated learning and legitimate peripheral participation that he developed with Lave in 1991. He focused on the dual concepts of communities of practice and identity as entry points into his social theory of learning. His position was that learning took place in the context of lived experiences of participation and that learning was essentially a social phenomenon. Wenger's notion that learning was fundamentally an aspect of the human experience of everyday life was reminiscent of Dewey's (1893) suggestion that education should not be thought of as preparation for life, but rather as life itself: "cease conceiving of education as mere preparation for later life, and make of it the full meaning of the present life" (p. 660). He proposed that these four components of his theory illustrated how social participation entailed learning: the way humans experience life as meaningful (meaning), shared resources that sustain mutual engagement (practice), social configurations (community), and how humans learn and create a history of becoming in communities (identity).

Wenger (1998) explicated that humans were members of many communities related to work, school, home, and personal interests and that learning took place in these contexts all the time in explicit and tacit ways, so that all learning could be conceived as social. Thus, informing his social theory of learning were theories of practice, theories of

identity, theories of social structure, and theories of situated experience. He viewed learning as a vehicle not only for evolving practice in communities, but also for the social formation of the person and the transformation of their identity. He maintained a belief in the "inseparable duality of the social and the individual" (p. 14). Thus, he included in his social theory of learning both theories of collectivity—local and global—and theories of subjectivity—agency of the individual.

Practice and identity were core constructs in his social theory of learning. He interpreted the concept of practice as an aspect of being human, mutually engaged with others in everyday life, pursuing joint enterprises through a shared repertoire. Thus, for Wenger (1998), practice was always a social experience that occurred in various kinds of communities. He delineated aspects of practice that included practice as meaning, practice as community, practice as learning, practice as boundary, and practice as locality.

Wenger (1998) believed that humans throughout life engaged in a continual process of negotiating meaning, characteristic of Heidegger's (1927) existential phenomenological notion of being-in-the-world. The continuous interaction of negotiating meaning entailed a duality of participation and reification. In this way, the negotiation of meaning was an ongoing process of "interpreting and acting, doing and thinking, or understanding and responding" (p. 54). Meaning, as a product of negotiation, was born out of the dynamic relations in everyday life. It was, therefore, neither simply produced internally to a human nor externally in the world, but rather in the social interaction of practice, through participation and reification.

Wenger (1998) used the concept of participation to describe the social nature of human beings in which activity and practice were always situated within a social context. As a complex process involving the whole being, Wenger (1998) considered participation to be a source of identity that was broader than temporal engagement in practice. A natural outcome of social participation was the projection of meanings into the world, so that the meanings were perceived as being real on their own. This concept of reification (i.e., of creating a real, concrete object from an idea) was part of the duality of negotiating meaning. Reification produced ways of organizing meaning through "processes that include making, designing, representing, naming, encoding, and describing, as well as perceiving, interpreting, using, reusing, decoding, and recasting" (Wenger, 1998, p. 59). Reification could be a process or a product that shaped experience in concrete ways, for example "having a tool to perform an activity changes the nature of that activity" (Wenger, 1998, p. 59). Wenger (1998) offered examples of reification: journals, records, encyclopedias, recipes, advertisements, news, and databases. He asserted, "In all these cases, aspects of human experience and practice are congealed into fixed forms and given the status of object" (p. 59). In a duality, participation—a social process and personal experience—and reification—a collective enterprise that informed individual perceptions, interacted in an interplay in which they implied each other in the negotiation of meaning: "Through the negotiation of meaning, it is the interplay of participation and reification that makes people and things what they are. In this interplay, our experiences and our world shape each other" (Wenger, 1991, pp. 70-71). Reminiscent of Duffy and Cunningham's (1996) explanation of a distributed concept of self, Wenger

(1998) elucidated, “our sense of ourselves includes the objects with which we identify because they furnish our practices” (p. 70). Shared practices served as a cohesive function for a community through three dimensions—through mutual engagement, joint enterprise, and a shared repertoire—which had the potential to transform and influence individual lives (Wenger, 1998).

According to Wenger (1998), “learning is the engine of practice” (p. 96) so that it was involved in not only the development of practice and the ability to negotiate meaning, but also in the formation of identity. Wenger (1998) contended that because learning gave rise to communities of practice, it was also a source of emergent social structure produced by members through the negotiation of meaning. Moreover, because “learning involves a close interaction of order and chaos,” (p. 97), thus communities of practice had “chaordic” (p. 289) organization that was not only a locus of creativity, but also perturbability and resilience, which were signs of adaptability. Wenger (1998) believed, “The continuity of an emergent structure derives not from stability but from adaptability” (p. 97). These processes, features, and functions of practice as learning illustrated how communities of practice evolved through the learning and practice of members, pointing to the inseparable duality of the social and the individual.

The idea of practice as a boundary implied that participation and reification were connections in the negotiation of meaning across multimembership in a nexus of communities and perspectives. Core to the construct of practice as a boundary were the connecting elements of boundary objects and brokers. Boundary objects were “artifacts, documents, terms, concepts, and other forms of reification around which communities of

practice can organize their interconnections" (Wenger, 1998, p. 105). Wenger (1998) went on to describe that brokering involved "connections provided by people who can introduce elements of one practice into another" (p. 105). He observed, "The design of artifacts—documents, systems, tools—is often the design of boundary objects" (Wenger, 1998, p. 108). Brokers made new connections across communities to open new ways to negotiate meaning. Wenger (1998) pointed out that while most people do some brokering, he had observed that certain individuals "thrive on being brokers: they love to create connections" (p. 109). In discussing practice as connection, Wenger (1998) identified three ways that practice might become a connection: as boundary practices—for example, community committees and teams; as overlaps—when communities overlap aspects of each practice; and as peripheries—when communities offer multiple ways of participating, particularly for newcomers.

In addition to a focus on practice, Wenger's (1998) social theory of learning had a dual focus on identity. In discussing the social formation of identity, he narrowed the focus onto the individual—from a social perspective, and simultaneously broadened the focus beyond practice to processes of identification and social structures. In this way, he positioned identity "between the social and the individual, so that each can be talked about in terms of the other" (Wenger, 1998, p. 145). Wenger (1998) posited, "The resulting perspective is neither individualistic nor abstractly institutional or societal. It does justice to the lived experience of identity while recognizing its social character – it is the social, the cultural, the historical with a human face" (p. 145). He proposed that the characteristics of practice could also be perceived as characteristics of identity, so that

identity could be understood as negotiated experience, as community membership, as learning trajectories, as a nexus of multimembership, and as a relationship between the local and global. Wenger (1998) advocated, "These parallels constitute a level of analysis that presents identity and practice as mirror images of each other" (p. 149).

For Wenger (1998), identity as negotiated experience involved the ongoing interplay of participation and reification, he explained: "The experience of identity in practice is a way of being in the world" (p. 151). He went on to elucidate: "Identity in practice is defined socially not merely because it is reified in a social discourse of the self and of social categories, but also because it is produced as a lived experience of participation in specific communities" (p. 151). Wenger (1998) postulated that by bringing the two together—both participation and reification—in the process of negotiating meaning, humans construct their identity. Thus, he believed both meaning and identity—the self—were born out of the continual, ongoing process of negotiation. As Wenger (1998) wrote: "It is in the cascading interplay of participation and reification that our experience of life becomes one of identity, and indeed of human existence and consciousness" (p. 151).

In his social theory of learning, Wenger (1998) posited that practice defined community through dimensions of mutual engagement, joint enterprises, and shared repertoires. In his notion of identity as community membership, these dimensions also informed competence and thus identity through the mutuality of engagement, accountability to an enterprise, and the negotiability of a repertoire. In this way, full-, partial-, or even non-participation as a member of a community influenced experiences of

competence and subsequently an individual's identity.

In his discussion of identity as learning trajectories, Wenger (1998) presented his view that given that an identity in practice was fundamentally temporal and arose out of the negotiation of meaning between participation and reification, thus, "It is not an object, but a constant becoming. The work of identity is always going on…. Our identity is something we constantly renegotiate during the course of our lives" (pp. 153-154). He proposed five trajectories of learning in the context of practice: peripheral trajectories, inbound trajectories, insider trajectories, boundary trajectories, and outbound trajectories. As an individual participated in a nexus of multimembership in various communities of practice, a unique identity was formed in the interaction of convergent and divergent trajectories. Wenger (1998) defined the term *trajectory* as "a continuous motion—one that has a momentum of its own in addition to a field of influences" (p. 154). A community of practice offered a field of potential learning trajectories that could inform a member's identity in part. Wenger (1998) explained the influence of multimembership on identity:

> We all belong to many communities of practice: some past, some current; some as full members, [and] some in more peripheral ways. Some may be central to our identities while others are more incidental. Whatever their nature, all these various forms of participation contribute in some way to the production of identities. As a consequence, the very notion of identity entails: (1) an experience of multimembership [and] (2) the work of reconciliation necessary to maintain one identity across boundaries. (p. 158)

Given this perspective, an identity was conceived of as a continual reconciliation of trajectories at a nexus of multimembership. Wenger (1998) proposed, "The work of reconciliation may be the most significant challenge faced by learners who move from one community of practice to another" (p. 160). According to Wenger (1998), reconciling the nexus of multimembership epitomized the duality of the social and the individual:

> The experience of multimembership can require the reconciliation of a nexus that is unique and thus very personal. Indeed, this nexus may not, in its entirety, be relevant to any practice or even to any relationship we have with anyone. Even though each element of the nexus may belong to a community, the nexus itself may not. The careful weaving of this nexus of multimembership into an identity can therefore be a very private achievement. By incorporating into the definition of the person the diversity of the social world, the social notion of a nexus of multimembership thus introduces into the concept of identity a deeply personal dimension of individuality. (p. 161)

In sum, by drawing a parallel between practice and identity, Wenger (1998) viewed identity in practice as a lived experience that was negotiated on a continual basis, so that it was an act of becoming. Moreover, Wenger (1998) believed identity was shaped by participation and reification in a nexus of multimembership in communities of practice in which an individual reconciled converging and diverging learning trajectories.

Philosophical Commitments

The umbrella term "phenomenology" represents a plurality of philosophical viewpoints and methodologies. Not only are there numerous variants of

phenomenological philosophies, there are also a variety of phenomenological methodological approaches that cohere to specific philosophical underpinnings. This naturalistic inquiry adhered to a post-intentional phenomenological philosophy and methodology (Vagle, 2014). Much like phenomenology, there are also many philosophies of technology. This work drew on Ihde's (1979) phenomenological philosophy of technology. While still in a nascent stage, there is a growing body of phenomenological research in the field of learning design and technologies, as well as a move to the "post," that is towards postmodern and poststructural thought in which the nature of realities and ways of knowing are multiple, dynamic, partial, situated, and fleeting (Cilesiz & Spector, 2014; Hlynka, 2004; Solomon, 2000; Yeaman et al., 1996). A move to the "post" entailed a shift in ontological and epistemological beliefs about the nature of reality and ways of knowing informed by "post" theorists such as Deleuze and Guattari, among others (St. Pierre, 2013). St. Pierre (2013) explained: "Ontology in the 'posts' flattens what was assumed hierarchical. Here, there is no Real—nothing foundational or transcendental—nothing beneath or above, outside—being to secure it" (p. 649). Moreover, in discussing Deleuze's experimental ontology, she stated: "Being in every sense is entangled, connected, indefinite, impersonal, shifting into different multiplicities and assemblages" (p. 653). Phenomenological research studies and literature on postmodern and poststructural theory in the learning design and technologies field were reviewed and analyzed to provide support for the post-intentional methodological approach of this research study.

Ihde's phenomenological philosophy of technology. Ihde (1979) made several

salient arguments that were relevant for this research and connected to the learner's online experiences. The arguments were related to: (1) a learner's shifting heuristic and embodied relations with technology; (2) technology as a socially constructed cultural instrument with a reflective arc that informed self-perceptions and self-efficacy; (3) a technological way of being-in-the-world; (4) the value of multiple perspectives; and (5) power structures. Ihde's (1979) philosophy of technology as a way of thinking about human computer interaction that was useful for interpreting the lived experiences of connectedness from the learner's perspective and theorizing about the phenomenon.

A novice technology user may have experiences "of" a computer or Internet program when they are first learning how to use it. This is what Ihde (1979) referred to as a heuristic relation. The relationship may shift to having experiences "through" the technology when novices become experts and the technology faded into the background becoming more transparent. Ihde (1979) referred to this as an embodied relation. An expert technology user may have experiences "of" technology (heuristic relation) when using a new software program for the first time. This shifting movement in and out of embodied and heuristic human-technology relations was useful for thinking about how participant-agents in this study may experience connectedness when using emerging technologies and social media in an online environment.

According to Ihde (1979), technology was not a mere tool; it was a socially constructed cultural instrument in which the current paradigms were an index of the sedimentation of beliefs. According to Ihde (1979), in the reflective arc, the observer saw the world within a socio-cultural context. This world reflected back upon the observer in

the reflective arc informing the observer's self-perception. If we think of the current socio-culture paradigm of the Information Age as a technocracy in which nature was perceived as a standing-reserve for energy to fuel technologies (e.g., river as hydro-power), how does the reflective arc inform the observers self-perspective? What was the human's role in a technocracy? Could the human race be perceived as a standing reserve? The reflection from a technocratic worldview informed the observer's judgments about her position in the technocracy based on self-perceived competencies of that which the society valued, which were learned socially and culturally from others. This might occur while engaging and connecting in personal learning networks.

In a technocracy, a technological way of being-in-the-world influenced the experiencing of the life world (i.e., lived time, space, body, relations) (Ihde, 1979). The way humans related to each another, communicated, and presented their selves and bodies was mediated by technology and influenced by a technological way of being-in-the-world. Ihde's (1979) notion of a technological way of being-in-the-world had implications for agents' experiences in online environments. The way that agents related, communicated, presented themselves, and were perceived by others was mediated by technology when online.

Ihde (1979) used examples to demonstrate how technological instruments mediated perception both literally and figuratively. His pointed out beliefs in reality and the technologically mediated world were not the same as in a non-mediated world. Technology was non-neutral in that it amplified and reduced simultaneously. Social media or reality television might impact an individual's perceptions of reality, but to what

extent were these real? Did a microscope or telescope provide a clearer picture of reality than the naked eye? What constituted reality? What was legitimate information? In a global world, there may be multiple realities and while there might be many perspectives, each one by itself may not provide the whole picture of truth or reality. There might be a spectrum of perspectives that might make up the whole truth. An understanding of multiple perspectives for creative and critical thinking would likely be an essential skill for participant-agents in a technologically saturated world.

In his phenomenological philosophy of technology, Ihde (1979) discussed the relevance of power structures in two distinct ways. First, he anticipated that society was coming into a Creator Age in which poetics and aesthetics would open up possibilities that might otherwise be closed by technology. Also, Ihde (1979) showed how those who controlled computer language had influence in a technocracy. The technology programs influenced workflows in business and industry, organizational structures in higher education, and ways of thinking. Information management was becoming an essential digital age skill. People would have to be able to gather, organize, store, and find information—values based in the digital age. Ihde (1979) showed that it was possible for creators to disrupt traditional power dynamics; for when everyone was a creator, rather than a consumer, the conditions existed for the potential to disrupt power structures.

Ihde's (1979) philosophy of technology helped frame an understanding of emerging technologies. The dominant view was that technologically literate cultures had power over nature and were more legitimate than cultures that do not have technologies. Historically, other cultures had navigational feats akin to Columbus, but a Euro-centered

culture honored the moment that shifted from Old World to New World with the landing of Columbus in the Americas. As new technologies emerge in the future, it will be useful to consider how they are experienced, including the amplifications, the reductions, and the agent's perspective.

In sum, from Ihde (1979) it was possible to see that human computer relations shifted from a heuristic relation of the technology to an embodied extension through the technology in which the technology became more transparent and the actions or interactions afforded by the technology were foregrounded. Second, technology was a socially constructed cultural instrument that informed an observer's position and experience from the reflective arc in a technocratic worldview. Third, in a technocracy, a technological way of being-in-the-world influenced lifeworld experiences of lived space, time, body, and relations. Fourth, in a technologically saturated world in which perceptions and experiences were mediated by technology, there was a possibility of multiple perspectives and multiple beliefs about reality. Lastly, as the information age moves into a creator age, the power dynamics will likely shift and those who control the computer language might have greater influence on how others use, experience, and think about technology.

Vagle's post-intentional phenomenological approach. For Vagle (2014), phenomenology represented a plurality of philosophies and methodologies. In particular, he conceived post-intentional phenomenology as an encounter, a way of living, and a craft. He described phenomena as forms that become manifest and appear in our world. As a phenomenological craftsperson with an affinity for post-structuralism, Vagle (2014)

viewed phenomena not as "constructed, designed, or defined" (p. 20), but rather as "the ways in which we *find-ourselves-being-in-relation-with others* (e.g., teacher with students, nurse with patient, therapist with client) and *other things* (e.g., a good book, some bad news, our favorite activity, an anxiety" (p. 20). Unlike other qualitative approaches, phenomenologists were interested in the phenomena and not subjective experience. While human subjects may grant phenomenologists access to the phenomena, the human subjects were not the unit of analysis, rather the phenomenon was the unit of analysis for phenomenologists.

According to Vagle (2014), intentionality was one of the most important "old" phenomenological concepts to keep in his post-intentional phenomenological approach. He explained, "Phenomenologists use the word *intentionality* to mean the inseparable connectedness between subjects (that is, human beings) and objects (that is, all other things, animate and inanimate, and ideas) in the world" (Vagle, 2014, p. 27). Intentionality can be thought of as the way humans "are meaningfully connected to the world" (p. 27). To study phenomena, is to study "the intentional relations that manifest and appear" (p. 27). Vagle (2014) read intentionality post-structurally, as a moving, unstable, and dynamic intentional relation between researchers, participants, text, and positionalities that were "always already being interpreted" (p. 30). He clarified, "I do not add the word *post* to this research approach to mean 'after' intentionality – as though it is time to progress beyond intentionality. Rather, I bring particular aspects of post-structural work to bear in phenomenological research" (Vagle, 2014, p. 30).

Vagle (2014) used prepositions to highlight the major movements in

phenomenology beginning with Husserl's (1970) transcendental-descriptive phenomenology and the preposition "of" to indicate how Husserlian phenomenology sought the essence and invariant structure of a phenomenon. Next, Vagle (2014) moved to Heidegger's (1927) existential-hermeneutic-interpretive phenomenology and the preposition "in" to highlight how Heideggerian phenomenology sought states of being-in-the-world. In the third movement, Vagle (2014) pointed to the variants of phenomenology and used the preposition "through" to signify movement and a focus on becoming. From this view, intentionalities—humans' meaningful connections in the world—could be conceived of "as multiple, partial, fleeting meanings that circulate, generate, undo, and remake themselves" (p. 41). Crafting phenomenology as through-ness required phenomenologists to chase "intentionalities and their various possibilities as they take complicated shape in multiple, sometimes competing contexts" (p. 41). Furthermore, "Crafting this type of phenomenological research means that we embrace phenomena as social and not as belonging to the individual" (Vagle, 2014, p. 41). Thus, through-ness situated humans in a socio-cultural historical context, not experiencing the world in isolation, but rather "their experiences are 'shot through' the world" (p. 42).

In discussing methodological approaches, Vagle (2014) emphasized his interpretation of method: "Following a way (a path, an approach) to do something allows us, as phenomenological craftspeople, to have parameters, tools, techniques and guidance, but also allows us to be creative, exploratory, artistic and generative with our craft" (p. 48). This interpretation pointed to openness in methodological approaches, rather than viewing them as rigid and linear processes. Vagle (2014) highlighted the

plurality of contemporary phenomenology in outlining various possible phenomenological methodological approaches including: Finlay's (2008) phenomenological variants—descriptive empirical, heuristic, lifeworld, interpretive phenomenological analysis, critical narrative, and relational; Giorgi's (2009) descriptive phenomenology in which he modified the Husserlian approach; van Manen's (1990) hermeneutic and pedagogical approach; and Dahlberg, Dahlberg, and Nystrom's (2008) reflective lifeworld research approach.

Vagle (2014) addressed the nuts and bolts of phenomenological research by explicating how phenomenologists tend to concerns about validity, researcher reflexivity, literature reviews, theory, and selecting participants. Notably, he elucidated the conceptual shift from Husserlian bracketing of pre-understandings to Dahlberg's (2006) notion of bridling as a reflexive act, and then to his own concept of post-reflexivity "as a dogged questioning of one's knowledge as opposed to a suspension of this knowledge" (Vagle, 2014, p. 74-75). Regarding participation selection, Vagle (2014) offered the adage: "the phenomenon calls for how it is to be studied" (p. 75). Markedly, he also discussed multiple data moments "as interviews, writings, and observations from a number of participants, over a period of time" (Vagle, 2014, p. 97). Thus, rather than thinking in terms of the number of participants, a researcher might want to think in terms of multiple data moments.

The openness in methodological approaches in post-intentional phenomenology extended to an openness in data gathering. While interviews, observations, and written descriptions were common forms of data, phenomenological data gathering could also

include arts-based methods such as drawings, paintings, photos, visuals, films, and performance art (Vagle, 2014). The unstructured interview was the most common form of interview type in phenomenology because of its open dialogic nature. Vagle (2014) drew on Tina Fey's (2011) rules of improvisation to suggest a way researchers could prepare for an open mindset in the interviewing experience: (1) agree and say "yes," (2) say "yes, and," (3) make statements, and (4) there are no mistakes. Vagle (2014) recommended that researchers should take "phenomenology walks" (p. 85) as a way to orient oneself to a thoughtful mindset for observations. A common written anecdote in phenomenology originated from van Manen's (1990) lived experience description protocol. Vagle (2014) noted other forms of written texts: "Poetry, short stories, fiction, realistic fiction, 'three minute' video scripts, narratives, and so on can also open up aspects of the phenomenon" (p. 90).

While phenomenologists tended to have an open stance to data gathering, most variants of phenomenology adhered to a whole-part-whole analysis process:

> All phenomenological research approaches that are routinely practiced have a substantive commitment to a whole-part-whole analysis method. In short, whole-part-whole analysis methods stem from the idea that we must always think about focal meanings (e.g., moments) in relation to the whole (e.g., broader context) from which they are situated – and once we begin to remove parts from one context and put them in dialogue with other parts, we end up creating new analytic wholes that have particular meanings in relation to the phenomenon. (Vagle, 2014, pp. 96-97)

The whole-part-whole analysis process was not the only data analysis commitment, phenomenological analyses were also committed to "a focus on intentionality, not subjective experience, a balance among verbatim excerpts, paraphrasing, and your descriptions/interpretations, [and] an understanding that you are crafting a text—not merely coding, categorizing, making assertions and reporting" (Vagle, 2014, p. 98). Vagle (2014) recommended a whole-part-whole analysis and synthesis process that included: (1) a holistic reading of the all texts; (2) a first line-by-line reading with note taking, marking, and journaling; (3) writing follow-up questions to ask the participants; (4) a second line-by-line reading while articulating meanings, in which the gathered parts of texts become a new whole document; (5) a third line-by-line reading while articulating analytical thoughts about the parts for all participants; and (6) subsequent readings in which the researcher read across participant data looking for "tentative manifestations" (p. 99) of the phenomenon.

In explicating the philosophical underpinnings of post-intentional phenomenology, Vagle (2014) elucidated the impact of Ihde's (2003) work as well as the work of Deleuze and Guattari's (1987) on his approach to phenomenology. He suggested that "a post-structural commitment such as seeing knowledge as partial, situated, endlessly deferred, and circulating through relations would be a most helpful way to reconceive phenomenological research today" (Vagle, 2014, pp. 111-112). Critiques of phenomenology have assumed that the field has not grown since Husserlian phenomenology's focus on essence. However, Ihde (2003) addressed the Husserlian emphasis on invariant structures by acknowledging both variance and invariance, but

focusing more on the importance of variants. Moreover, a second move that Ihde (2003) made in postphenomenology that was informative to Vagle's (2014) post-intentional phenomenology was that he replaced the concept of subjectivity with the concept of embodiment attributing Merleau-Ponty's notion that the physical body gives an individual access to the environment and other people and thus was not above the lifeworld (transcendental), but rather was the lifeworld (existential). More specifically, Ihde (2003) proposed that the world was not experienced subjectively in the isolation of one's mind, but rather was an embodied experience. Vagle (2014) extended this notion and applied it to the construct of intentionality—our meaningful connections in the world:

> When I "post" intentionality I am saying that intentionalities cannot be traced. One cannot start with a stable subject and try to follow that subject's intending toward and with the world. That very subject is both constructed and constructing, not dissolved. She is both agent and acted upon: what is available for that subject is both a manifestation of the social and is made possible by that subject's intending. This both/and move is important to a post-intentional conception as it complicates the subject just enough to keep the focus on the intentionalities, but does not fall prey to the view that all that circulates are intentionalities – that is, these intentionalities are brought into being by embodied subjects. (pp. 113-114)

Placing phenomenology in conceptual dialogue with postmodern and post-structural thought broke it free from being "stuck in-resistance-to Cartesian thinking" (Vagle, 2014, p. 114). This significant move made it possible to re-imagine the nature of reality and

ways of knowing could be multiple, partial, fleeting, and tentative. Positioning phenomenology in this light, made it possible for it to become a dialogic philosophy capable of becoming a political philosophy when placed in dialogue with external theories such as critical theory or queer theory. Vagle (2014) pointed to both Grumet's (1988) feminist work and Ahmed's (2006) work on sexual orientation as a lived experience as examples of post-intentional phenomenology as a political philosophy.

However, Vagle (2014) explained how post-intentional phenomenology, as a dialogic philosophy, was not only useful for "making external dialogues with other philosophies/theories even more fertile and fruitful" (p. 118), but was also made powerful through an internal dialogism influenced by Deleuze and Guattari's (1987) conception of lines of flight. Vagle (2014) operationalized the Deleuzo-Guattarian concept of lines of flight in three ways. First, through an emphasis on connections rather than stabile finality, operationalizing the concept of lines of flight served "as a way to discuss and open up complicated movements and interactions" (p. 118). Second, by explicating that lines of flight do not tolerate rigidity signified that post-intentional phenomenologists should "remain open, flexible, and contemplative in our thinking, acting, and decision-making" (p. 119). Third, lines of flight could be visualized as "resisting the tying down of lived experience and knowledge.… [And, as such] it assumes that knowledge takes 'off' in ways that we may not be able to anticipate. Post-intentional phenomenological craftspeople are encouraged, then, to follow these lines of flight" (Vagle, 2014, p. 119). Moreover, Vagle (2014) proclaimed, "We are encouraged to make every effort to identify and boldly follow possible lines of flight toward something either not-yet-discovered or

unknown" (p. 119). To see phenomena in the world as resisting stability, as shape shifting in a fleeting, tentative manner is core to the philosophical viewpoint of post-intentional phenomenology.

Phenomenological research in learning design and technologies. In 2003, Saba advocated for a new paradigm in distance education that could expound the "contextual crafting of the *moment* of teaching and learning experience as the instructional-learning process unfolds in time and produces both expected, determinate behavior and general patterns of emergent behavior the nature of which is anticipated but not determined in advance" (p. 18). In 2014, he noted an "ascendance of the qualitative methods" (p. 158) that grew out of the shortcomings of media comparison studies and beyond mere descriptive studies. He explained, "using qualitative approaches, researchers in distance education have produced exploratory studies that are most appropriate for theory building by identifying new constructs or examining their operational presence" (p. 158). He noted that, in the past decade, "researchers have expanded their use of phenomenological methods" (p. 158). He supported this statement by citing three research studies that explored the experiences and practices of instructional designers crafting problem-based learning (Scripture, 2008), rural students' experiences of synchronous and asynchronous time online (Barbour & Hill, 2011), and online adjunct faculty members' experiences of isolation (Dolan, 2011).

Hauser (2013) conducted an analysis of literature on qualitative research in distance education by reviewing research that had been published in four prominent peer-reviewed journals during the years 2005 to 2012. Her analysis showed that "most journals

are publishing research containing qualitative methods at least 50% of the time" (Hauser, 2013, p. 161). She explained, "As researchers continue examining the complex relationship between variables and examining the processes of distance education in more detail, many believe qualitative methods are crucial to advancing the extant body of knowledge" (Hauser, 2013, p. 161). In describing the potential contribution of qualitative research, Hauser stated, "qualitative research gives voice to distance learners and… provides insights that are impossible to achieve with quantitative methods alone" (2013, p. 161).

Cilesiz (2011) reviewed the limited existing phenomenological literature on experiences with technology and proposed that phenomenology was a "highly suitable" theoretical and methodological approach to researching lived experiences with technology. She suggested future research directions on experiences with technology that drew on phenomenology as either a theoretical framework or a methodological approach could include teachers' experiences with technology adoption or integration, experiences with new technologies, adolescents' experiences with computers, and the lived experiences of video gaming. More recently, phenomenological methodology has been applied in research studies of students' and teachers' lived experiences of technologies.

Phenomenology has been used to explore the lived experiences of teachers' developing use of new technologies (Clark & Boyer, 2016), students' off-task use of technologies during class (Aagaard, 2016), and faculty's technology integration (Donlan, 2016). Phenomenological methodologies have also been used to better understand the lived experiences of: student learning in a massive open online course (Adams, Yin,

Vargas Madriz, & Mullen, 2014), higher education students with disabilities completing online coursework (Heindel, 2014), and student engagement in online learning in higher education (Pazurek, 2013), just to name a few. In fact, the review of research of phenomenological studies in the field of learning design and technologies would indicate a growing trend. There were 65 total studies identified (listed in Tables 2.1 and 2.2) as using some variant of phenomenology. Of the 65 studies, 41 were published in peer-reviewed journals and 24 were doctoral dissertations. Of the 41 peer-reviewed journal articles, one was published in 2016, eight in 2015, eight in 2014, four in 2013, one in 2012, five in 2011, four in 2010, two in 2009, three in 2008, two in 2006, one in 2005, one in 2000, and one in 1994. Interestingly, 1994 was the year of the great media debate when Jonassen and his colleagues (1994) interrogated instructional media message design from the theoretical lens of phenomenology. Of the 24 phenomenological dissertations identified, three were completed in 2016, eight in 2015, eight in 2014, three in 2013, one in 2012, and one in 2011.

Figure 2.2 shows the trend of growing phenomenological research studies in learning design and technologies. Table 2.1 lists phenomenological research studies in learning design and technologies beginning with the most recent. Table 2.2 lists phenomenological dissertations in learning design and technologies. Of the 65 phenomenological research studies reviewed, 29 were Husserlian transcendental-descriptive (of which 15 were peer-reviewed journal articles and 14 were dissertations), 29 were Heideggerian existential-hermeneutic-interpretive (of which 24 were peer-reviewed journal articles and 5 were dissertations), 4 were “posted” using either Ihdean

postphenomenology or Vaglean post-intentional phenomenology (of which 1 was a peer-reviewed journal article and 3 were dissertations), and 3 were Finlayan interpretative phenomenological analysis (IPA) (of which 1 was a peer-reviewed journal article and 2 were dissertations).

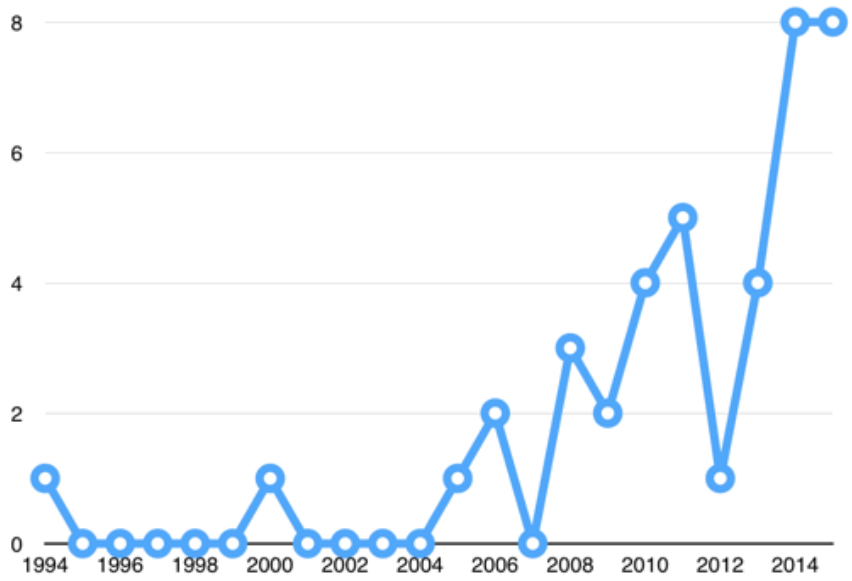

Figure 2.2

The growing trend of phenomenology in learning design and technologies

Most of the research studies used a purposive sampling strategy including criterion sampling and snowball sampling. The sample sizes ranged from 1 to 647 participants. The most common sample size was seven participants (12 studies: 5 published in peer-reviewed journals, and 7 dissertations), followed by ten participants (7 studies: 5 published in peer-reviewed journals, and 2 dissertations), and 6 participants (6 studies: 5 published in peer-reviewed journals, and 1 dissertation). Most of the research studies used interviews to gather data. The number of interviews per participant most

often ranged from one to three interviews. The interview types included structured, semi-structured, and un-structured. The interviews were conducted in person or mediated by email, telephone, instant messaging text, or synchronous video conferencing. Additional methods of data gathering included focus groups, surveys, written anecdotes or lived experience descriptions, observations, video reflections, the researcher's analytic journal, digital artifacts, conceptual maps, literature, film, video clips, context-specific instruments, and electronic portfolios.

Table 2.1

Phenomenological research studies in learning design and technologies

Study	**Study Purpose**	**Study Approach**	**Methods**	**Sample Size**
Clark, C., & Boyer, D. D. (2016). Twenty-first-century technology integration staff development: A phenomenology. *Journal of Computers in Education*, 1-20.	To understand how in-service teachers with 3 to 5 years of experience perceived staff development related to the integration of twenty-first-century technology	Transcendental	Interviews, Focus groups	20
Aagaard, J. (2015). Drawn to distraction: A qualitative study of off-task use of educational technology. *Computers & Education, 87,* 90-97.	To understand students' off-task use of technology during class	Postphenomenology Ihde	Interviews, Observations	14
Blackmon, S. (2015). The pixelated professor: Faculty in immersive virtual worlds. *International Review of Research in Open and Distance Learning, 16*(1).	To explore faculty members' lived experiences with recreating their faculty personae in the three dimensional virtual world classroom	Hermeneutic Van Manen	Virtual interviews	10
Brown, M., Hughes, H., & Delaney, L. (2015). Giving voice to distance learners: Methodological	To better understand what it means to be an active and engaged online/distance learner	Descriptive	Video diary reflections	20

Study	Study Purpose	Study Approach	Methods	Sample Size
decisions and challenges. *European Journal of Open, Distance and E-learning*, *18*(1).				
Chan, N. N., Walker, C., & Gleaves, A. (2015). An exploration of students' lived experiences of using smartphones in diverse learning contexts using a hermeneutic phenomenological approach. *Computers & Education*, *82*, 96-106.	To understand what it means to learn with smartphones: What are the lived experiences of learning with smartphones? What are the participants' perceptions of their learning with smartphones? How is the learning related to participants' identity formation, identity management and presentation of self?	Hermeneutic	Interviews, Written reflective exercises	12
Galehbakhtiari, S. & Hasangholi Pouryasouri, T. (2015). A hermeneutic phenomenological study of online community participation: Applications of Fuzzy Cognitive Maps. *Computers in Human Behavior*, *48*, 637-643.	To understand the users' motivations to participate in online communities according to their lived online experiences: Are there any causal relations between the identified concepts? What are the strongest paths toward online community participation?	Hermeneutic	Interviews	10
Mbati, L., & Minnaar, A. (2015). Guidelines towards the facilitation of interactive online learning programmes in higher education. *The International Review of Research in Open and Distributed Learning*, *16*(2).	To explore the persons in his or her world in online learning in an open and distance learning (ODL) institution	Husserlian	Online and face-to-face Interviews	9
Symeonides, R., & Childs, C. (2015). The personal experience of online learning: An interpretative phenomenological analysis. *Computers in Human Behavior*, *51*, 539-545.	To explore online learners' experiences of asynchronous text-based computer-mediated communication	Interpretative (IPA)	Skype Interviews	6

Study	Study Purpose	Study Approach	Methods	Sample Size
Szilagyi, A. (2015). "I Am Different From Other Women In The World" The Experiences Of Saudi Arabian Women Studying Online In International Master Programmes. *European Journal of Open, Distance and E-Learning*, *18*(1), 85-98.	To understand experiences of Saudi Arabian women studying online in an international masters program	Hermeneutic Van Manen	Interviews	7
Adams, C. (2014). What's in a name? The experience of the other in online classrooms. *Phenomenology & Practice*, *8*(1), 51-67.	To explore the experiential significance of student names in online classrooms	Heidegger, Van Manen	Written anecdotes, Interviews	40
Adams, C., Yin, Y., Madriz, L. F. V., & Mullen, C. S. (2014). A phenomenology of learning large: the tutorial sphere of xMOOC video lectures. *Distance Education*, *35*(2): 202-216.	What is it like to learn in a MOOC [massive open online course]?	Heidegger, Van Manen	Written anecdotes, Interviews	10
Friesen, N. (2014). Telepresence and Tele-absence: A Phenomenology of the (In) visible Alien Online. *Phenomenology & Practice*, *8*(1), 17-31.	To understand the lived experience of space, the body and eye contact in videoconferencing contexts. To examine and interpret incidents experienced by teachers and moderators using online conferencing technologies.	Hermeneutic	Interviews, Literature, Film, Video Clips	X
Joo, K. P. (2014). A cultural-historical activity theory investigation of contradictions in open and distance higher education among alienated adult learners in Korea National Open University. *The International Review of Research in Open and*	To illuminate the origins, patterns, and features of contradictions experienced by alienated KNOU (Korea National Open University) students. To identify structural contradictions in KNOU education as experienced and identified by KNOU students.	Van Manen	Interviews, Focus groups, Observations	26 Int 2 FG 3 Obs

Study	Study Purpose	Study Approach	Methods	Sample Size
Distributed Learning, *15*(1).				
Rose, E. & Adams, C. (2014). Will I ever connect with the students?" Online Teaching and the Pedagogy of Care. *Phenomenology & Practice*, *7*(2), 5-16.	To understand care as it is experienced in online postsecondary instructors' interactions and relations with their students	Van Manen	Lived Experience Descriptions	4
Ruggiero, D., & Watson, W. R. (2014). Engagement Through Praxis in Educational Game Design Common Threads. *Simulation & Gaming*, *45*(4-5), 471-490.	-What common threads do experienced educational game designers employ when reflecting on the game design process? -To what extent do common threads inform the use of engagement and motivation to enhance learner gameplay?	Husserlian	Surveys, Interviews	22
Tannis, D. (2014). Technology help seeking and help giving in an intercultural community of student life. *Phenomenology & Practice*, *8*(1), 32-50.	To understand technology help seeking and giving	Van Manen Heidegger Merleau-Ponty Ihde	Interviews	X
Yanchar, S. C. & Hawkley, M. (2014). "There's got to be a better way to do this": a qualitative investigation of informal learning among instructional designers. *Educational Technology Research and Development*, *62*(3), 271-291.	To explore everyday, informa learning among instructional designers	Hermeneutic	Interviews	6
James, S., & Cameron, B. (2013). Using Simulation and Virtual Practice in Midwifery and Nursing Education: Experiencing Self-Body-World "Differently". *Phenomenology & Practice*, *7*(1), 53-68.	To understand the student experience of simulation.	Heidegger Gadamer	Anecdotes	X

Study	Study Purpose	Study Approach	Methods	Sample Size
Kennedy, K., Cavanaugh, C., & Dawson, K. (2013). Preservice teachers' experience in a virtual school. *American Journal of Distance Education*, *27*(1), 56-67.	To understand the experiences of three preservice teachers who voluntarily participated in a virtual school. To describe the essence of the virtual school field placement. How do preservice teachers experience a field placement in a virtual school?	Moustakas	Interviews	4
Veletsianos, G., & Kimmons, R. (2013). Scholars and faculty members' lived experiences in online social networks. *The Internet and Higher Education*, *16*, 43-50.	To understand faculty members' lived experiences of adopting, using, and rejecting social networking sites.	Lifeworld Research Dahlberg, Dahlberg, & Nystrom	Interviews	3
Watson, S. (2013). Tentatively exploring the learning potentialities of postgraduate distance learners' interactions with other people in their life contexts. *Distance Education*, *34*(2), 175-188.	To explore postgraduate distance learners' interactions with other people in the life contexts about the academic content of their studies, and the ways these interactions contribute to their learning.	Experiential hermeneutic	Interviews (via Skype or telephone)	15
Şad, S. N., & ÖZhan, U. (2012). Honeymoon with IWBs: A qualitative insight in primary students' views on instruction with interactive whiteboard. *Computers & Education*, *59*(4), 1184-1191.	To investigate the lived experiences of primary students about interactive whiteboard use in their classes from attitudinal and pedagogical perspectives.	Descriptive	Focus groups	50
Baugher, G. (2011). A brief look at online tutorial experiences of older students in remedial college mathematics. *Journal of Online Learning and Teaching, 7*(4), 475-479.	-How would you describe your level of anxiety about math? -Is there anyone who helps you with math? -How do you feel about the math program? How easy is it to use? How much time did you use it?	Husserlian	Questionnaires, Interviews	4

Study	Study Purpose	Study Approach	Methods	Sample Size
Connolly, S., & Diepenbrock, A. (2011). Perspectives of online graduate preparation programs for student affairs professionals. *The American Journal of Distance Education*, *25*(2), 79-90.	To explore how midlevel student affairs professionals perceive online education for preparation in the field	Husserlian Descriptive	Survey	647
Glassmeyer, D. M., Dibbs, R. A., & Jensen, R. T. (2011). Determining utility of formative assessment through virtual community: Perspectives of online graduate students. *Quarterly Review of Distance Education*, *12*(1), 23.	To understand graduate student experiences with formative assessment within online mathematics education courses	Descriptive	Interviews, Observations, Surveys	6
Rose, E. (2011). The phenomenology of on-screen reading: University students' lived experience of digitised text. *British Journal of Educational Technology*, *42*(3), 515-526.	To gain insight into university students' experiences of reading digitized texts	Hermeneutic	Interviews	10
Williams, D. D., South, J. B., Yanchar, S. C., Wilson, B. G., & Allen, S. (2011). How do instructional designers evaluate? A qualitative study of evaluation in practice. *Educational Technology Research and Development*, *59*(6), 885-907.	To understand how instructional designers use evaluation in everyday design practice	Hermeneutic	Interviews	7
DeGagne, J. C., & Walters, K. J. (2010). The lived experience of online educators: Hermeneutic phenomenology. *Journal of Online Learning and Teaching*, *6*(2), 357-366.	-What concepts do online educators think are important in teaching online? -What knowledge, skills, and attitudes do they perceive as essential in teaching online?	Heideggerian	Interviews	11

Study	Study Purpose	Study Approach	Methods	Sample Size
	-What differences in terms of faculty role do they perceive between face-to-face instruction and online teaching? -What strategies do they use to facilitate active learning? -What ethical and legal issues do they face in online teaching? -What do they think academic leaders can do to help them achieve successful online teaching?			
Edwards, J. T., & Helvie-Mason, L. (2010). Technology and instructional communication: Student usage and perceptions of Virtual Office Hours. *Journal of Online Learning and Teaching*, *6*(1), 174.	To examine undergraduate students' perceptions and usage of virtual office hours to communicate with their professor through instant messaging software	Descriptive	Questionnaires	81
Ottenbreit-Leftwich, A. T., Glazewski, K. D., Newby, T. J., & Ertmer, P. A. (2010). Teacher value beliefs associated with using technology: Addressing professional and student needs. *Computers & Education*, *55*(3), 1321-1335.	To understand the value beliefs that underlie teachers' uses of technology	Hermeneutic	Interviews, Observations, Electronic Portfolios	8
Yanchar, S. C., South, J. B., Williams, D. D., Allen, S., & Wilson, B. G. (2010). Struggling with theory? A qualitative investigation of conceptual tool use in instructional design. *Educational Technology Research and Development*, *58*(1), 39-60.	To investigate instructional designers' views and uses of conceptual tools (i.e., learning theories and design theories) in design work. What is the nature of instructional designers' practical involvement with formalized theories? How do theories tend to be viewed by designers? What functions are theories commonly used to	Hermeneutic	Interviews	7

Study	Study Purpose	Study Approach	Methods	Sample Size
	perform? What (if anything) hinders the use of theory in design work?			
Cilesiz, S. (2009). Educational computer use in leisure contexts: A phenomenological study of adolescents' experiences at Internet cafes. *American Educational Research Journal, 46*(1), 232–274.	The phenomenon of adolescents' educational uses of computers at Internet cafes.	Husserlian	Interviews	6
Crawley, F. E., Fewell, M. D., & Sugar, W. A. (2009). Researcher and researched: The phenomenology of change from face-to-face to online instruction. *Quarterly Review of Distance Education*, *10*(2), 165-76.	To report on the transformation over time of one senior science educator from face-to-face to online instruction. What are the fundamental characteristics of this instructor's face-to-face teaching? How does this instructor capitalize on these characteristics in an online environment? What resources does this instructor introduce to teaching that are unique to online, technology rich environments that are unavailable in face-to-face instruction?	Descriptive	Videos, Interviews	2
Miller, C., Veletsianos, G., & Doering, A. (2008). Curriculum at forty below: A phenomenological inquiry of an educator/explorer's experience with adventure learning in the Arctic. *Distance Education, 29*(3), 253–367.	-How was a hybrid educational environment able to engage over three million learners in a short (six-month) window? -What is the experience of providing this nature of collaborative real-world learning? -What is the experience of traversing the Arctic to engage students and teachers from around the world in a truly authentic learning context?	Heideggerian	Interviews	1
Priebe, L. C., Ross, T. L., & Low, K. W. (2008).	To explore the lived experiences of first-	Descriptive	Survey	7

Study	Study Purpose	Study Approach	Methods	Sample Size
Exploring the role of distance education in fostering equitable university access for first generation students: A phenomenological survey. *The International Review of Research in Open and Distributed Learning*, *9*(1).	generation students enrolled in a distance learning environment. To understand parental influences on university enrollment, and students' reasons for choosing university and distance education. To determine potential factors that may explain why a higher proportion of first-generation students choose distance education. To identify potential areas for future studies.			
Veletsianos, G., & Miller, C. (2008). Conversing with pedagogical agents: A phenomenological exploration of interacting with digital entities. *British Journal of Educational Technology, 39*(6), 969–986.	-What is it like to have a conversation with a pedagogical agent? -What is the experience of conversing with an intelligent agent?	Heideggerian	Written anecdotes, Interviews	13
Al-Harthi, A. S. (2006). Distance Higher Education Experiences of Arab Gulf Students in the United States: A cultural perspective. *The International Review of Research in Open and Distributed Learning, 6*(3).	To investigate students' experiences in distance education, and how those experiences relate to their cultures. To provide cultural understanding about the nature of distance education experiences of Arab graduate students pursuing degrees in the United States	Van Manen	Interviews	6
Conceição, S. C. (2006). Faculty lived experiences in the online environment. *Adult Education Quarterly*, *57*(1), 26-45.	To understand the experiences of college faculty who teach online. How do college faculty perceive and describe their online teaching experiences in a computer-mediated environment that is fully absent of physical presence?	Moustakas	Interviews	10
Maples, J., Groenke, S., & Dunlap, D. (2005).	To understand how eight-grade inner-city middle	Descriptive	Interviews Chat room	24

Study	Study Purpose	Study Approach	Methods	Sample Size
The web pen pals project: Students' perceptions of a learning community in an online synchronous environment. *Journal of Interactive Online Learning*, *4*(2), 108-128.	school students' perceive the effects of computer-based technologies on a learning community in an online synchronous environment		transcripts, Student journals, Field notes, Group interview Student artifacts	
Robinson, P. (2000). The body matrix: A phenomenological exploration of student bodies on-line. *Educational Technology & Society*, *3*(3).	To understand students' experiences of their bodies in an asynchronous online learning environment. What is the lived experience of students in online learning environments?	Hermeneutic Van Manen	Interviews	7
Howard, D. (1994). Human–computer interactions: A phenomenological examination of the adult first-time computer experience. *International Journal of Qualitative Studies in Education,* *7*(1), 33–49.	Adult's first-time computer experience	Heideggerian	Interviews	8

In most of the research studies reviewed, the analysis processes usually aligned with the phenomenological approach. A Husserlian transcendental-descriptive phenomenological research study aligned with the analytic process put forth by Moustakas (1994) or Giorgi (2009). A Heideggerian existential-hermeneutic-interpretive phenomenological research study aligned with Van Manen's (1990) analytic process or Dahlberg, Drew, and Nystrom's (2001) lifeworld research. A post-intentional phenomenological research study aligned with the five-component analytic process put forth by Vagle (2014). The findings were most often organized by theme, but were also organized by participant, by research question, or by context-specific categories.

Table 2.2

Phenomenological dissertations in learning design and technologies

Study	**Study Purpose**	**Approach**	**Methods**	**Sample Size**
Donlan, P. (2016). *Faculty lived experiences integrating technology-assisted educational practices into an entry level physical therapy curriculum: An interpretative phenomenological analysis* (Doctoral dissertation). Retrieved from ProQuest. (10094592)	To uncover how physical therapy faculty make sense of their lived experiences integrating innovative technology-assisted educational practices (ITAEP) into their curriculums.	Interpretative phenomenological analysis (IPA)	Interviews	X
Kolo, Y. I. (2016). *Experiences of African American young women in science, technology, engineering, and mathematics (STEM) education* (Doctoral dissertation). Retrieved from ProQuest. (10004180)	To describe the lived experiences of African American young women in relationship to STEM education. How do STEM experiences in K-10 education influence African American young women's academic choices in their final years of high school?	Descriptive	Interviews	11
Strohmyer, D. (2016). *Student perceptions of flipped learning in a high school math classroom* (Doctoral dissertation). Retrieved from ProQuest. (10052579)	To describe student perceptions of the flipped model in relation to (a) how it compared to traditional learning and instruction strategies, (b) how it contributed to learning content and critical thinking, and (c) how the model may have influence on collaboration and social aspects of learning and instruction. What are high school math students' lived experiences of the flipped learning?	Descriptive	Surveys, Interviews, Focus Group	6
Kearns, L. (2015). *The experience of teaching online: Its impact on faculty professional*	To explore the influence that teaching online may have on instructors who also taught face-to-face.	Hermeneutic Van Manen	Surveys, Interviews	8

development and innovation (Doctoral dissertation). Retrieved from ProQuest. (3715525)				
Ritzdorf, M. A. (2015). *Women in STEM: Attaining and retaining leadership positions under stereotype threat* (Doctoral dissertation). Retrieved from ProQuest. (3708583)	What is the impact of stereotype on women in leadership roles in STEM careers?	Descriptive	Personal narratives, Interviews, Observations	7
Sage, V. L. (2015). *Moving beyond hastiness and superficiality: Being an ethical technical communicator via digital communication technologies in health care* (Doctoral dissertation). Retrieved from ProQuest. (1590510)	To examine digital technologies used by technical communicators in healthcare settings.	Descriptive	Interviews	10
Schone, M. L. (2015). *The lived experience of the educator: A study of the digital divide in the community college classroom* (Doctoral dissertation). Retrieved from ProQuest. (3714753)	To explore the lived experience and perspective of English faculty members explaining how technology has affected the learning environment in their community college classroom. What is the lived experience of the educator in the field of English in dealing with a digital divide, that is, a gap that exists between individuals in managing required use of classroom technology, in the community college classroom?	Descriptive	Interviews	7
Sexto Santiago, M. (2015). *ESL teachers' perception towards the use of technology in teaching English* (Doctoral dissertation). Retrieved from ProQuest. (3703358)	To reveal the perception of Puerto Rican English teachers regarding the integration of technology in their teaching of English as a second language.	Descriptive	Questionnaires, Interviews, Reflective essays	7
Singh, T. (2015). *A*	To explore what factors	Descriptive	Interviews	X

qualitative phenomenological study of K-12 teacher perceptions of technology integration in southeastern Georgia (Doctoral dissertation). Retrieved from ProQuest. (3746477)	are perceived by teachers and administrators to attribute to the limited integration of technology in the classroom.			
Trinkowsky, R. S. (2015). *Interpretative phenomenological analysis of accessibility awareness among faculty in online learning environments* (Doctoral dissertation). Retrieved from ProQuest. (3717916)	To gain a better understanding of accessibility in online learning environments from the perspective of faculty. To understand the lived experience of faculty within online learning environments to determine the status of accessibility awareness.	Interpretative phenomenological analysis (IPA)	Surveys, Interviews	7
Wright, S. T. (2015). *Lived experiences of online undergraduate faculty regarding successful practices for promoting student-faculty engagement* (Doctoral dissertation). Retrieved from ProQuest. (3714034)	To explore the lived experiences and perceptions of online undergraduate faculty's use of successful student-faculty engagement strategies that impact attrition and the obstacles that make it difficult to successfully use student-faculty engagement strategies.	Hermeneutic Van Manen	Interviews	5
Boelryk, A. (2014). *Professional learning and post-secondary teaching: Investigating faculty's lived experiences of development in teaching practice* (Unpublished doctoral dissertation). Simon Fraser University, British Columbia, Canada.	-How do full-time, mid-career, college faculty experience the process of development in teaching practice?	Husserlian	Surveys, Interviews	24
Heindel, A. J. (2014). *A phenomenological study of the experiences of higher education students with disabilities with online coursework* (Doctoral dissertation). Retrieved from ProQuest. (3617345)	-How do students with various disabilities assess the quality of their learning experience in terms of course interaction, structure and support provided in online learning environments?	Husserlian	Surveys, Interviews	12

Juarez, L. M. (2014). *Transforming literacy instruction: Exploring pre-service teachers' integration of tablet technology in reading, comprehension, and writing* (Doctoral dissertation). Retrieved from ProQuest. (3619985)	To explore pre-service teachers' integration of tablet technology in reading, comprehension, and writing instruction.	Descriptive Giorgi	Interviews, Artifacts, Reflections	14
Luo, Y. (2014). *Use of web 2.0 technologies: A virtual ethnography and phenomenological study of first-year engineering students' experiences* (Doctoral dissertation). Retrieved from ProQuest. (3636377)	To investigate first-year engineering students' (educational) experiences of using Web 2.0 technologies in online communities.	Descriptive	Journals, Interviews	15
Mark, C. L. (2014). *Growth and decline of second life as an educational platform* (Doctoral dissertation). Retrieved from ProQuest. (3584527)	To uncover the reasons for the rapid decline of second life as an educational platform.	Descriptive	Interviews, Surveys	7
O'Hearn, M. (2014). *At the college gates: A phenomenological study of STEM identity formation at a STEM program at a historical black university* (Doctoral dissertation). Retrieved from ProQuest. (3662437)	To describe lived experiences of African-American students attending a STEM Honors college at a state HBCU. To generate an understanding of a pipeline from high school to STEM HBCU in shaping their STEM identities.	Van Manen	Interviews	7
Rook, M. M. (2014). *Technohubs in teacher education: The lived experience of assisting peers with instructional technology issues* (Doctoral dissertation). Retrieved from ProQuest. (3583396)	To understand prospective teachers' lived experiences of assisting peers with instructional technology issues.	Descriptive Moustakas	Questionnaires, Interviews, Observations	3
Valentine, K. D. (2014). *Problematizing space and perspective: A middle*	Study 1 -What is the lived experience investigating	Post-intentional, Vagle	Written anecdotes, Interviews,	Study 1= 10 Study

school mathematics experience (Unpublished doctoral dissertation). The University of Georgia, Athens, GA.	dimensional relationships, including the fourth dimension? -What role does the video, *Flatland*, play in the experience for students? -Are there indications that persistent, or long-term learning occurred? Study 2 -What is it like for learners to find themselves perceiving space that is problematized? -What role does the learning environment play in the experience for learners?		Conceptual maps, Digital observations, Artifacts,	2= 21
Cool, K. L. (2013). *Informal Learning as Performance: Toward a Hermeneutic Phenomenology of Museum Learning in Second Life* (Doctoral dissertation). Retrieved from ProQuest. (3558270)	To explore how avid users of second life experience and make meaning of informal learning activities in virtual art museums and similar cultural spaces through their avatars.	Hermeneutic	X	X
Engelke, C. R. (2013). *Technically Speaking: On the Structure and Experience of Interaction Involving Augmentative Alternative Communications* (Doctoral dissertation). Retrieved from ProQuest. (3564507)	To examine the impacts of augmentative alternative communications on interaction and intersubjectivity.	Descriptive	Observations, Video recordings, Digital correspondence, Interviews	8
Pazurek, A. (2013). *A phenomenological investigation of online learners' lived experiences of engagement* (Doctoral dissertation). Retrieved from ProQuest. (3667747)	-What is it like to be an adult learner in online learning environments? -What is it like to experience engagement in online learning environments? -How do various elements of learning online and dynamics of the learning environment influence adult learners' feelings of	Post-intentional, Vagle	Written anecdotes, Interviews, Digital artifacts	4

	engagement?			
Benson, T. K. (2012). *A post-intentional phenomenological case study of pedagogical awareness of technology integration into secondary science teaching* (Doctoral dissertation). Retrieved from ProQuest. (3540869)	-In what ways do pre-service teachers come to identify tentative manifestations of their own pedagogical awareness of good teaching and learning through the implementation of technology in the secondary science classroom? -What challenges exist in identifying how and why the tentative manifestation of or intentional relationship with pedagogical awareness changes throughout teaching?	Post-intentional, Vagle	Activities, Observations, Interviews	2
Rambo, A. L. (2011). *Being the Bridge: The Lived Experience of Educating with Online Courseware in the High School Blended Learning Setting* (Doctoral dissertation). Retrieved from ProQuest. (3508171)	To explore the lived experiences of educators who teach in flex model blended learning settings using online, vendor-provided courseware.	Hermeneutic Van Manen	Interviews	7

Postmodernism and poststructuralism in learning design and technologies. The phenomenological research in the learning design and technologies field represented a range of approaches from Husserlian transcendental-descriptive research to Heideggerian existential-hermeneutic-interpretive research to the more recent approach of phenomenology in dialogue with postmodern and poststructural theory (Ihde, 1993, 2003; Vagle, 2014). Postmodern and poststructural thought is not new to the learning design and technologies field. In 1997, Wilson explained that since the late eighties, the number of postmodern researchers and theorists within the Association for Educational

Communications and Technology (AECT)—a prominent organization in the field—has been growing. From the postmodern worldview, he described truth as a dynamic and changing contextual construct that was bounded by perspective, time, and space. He stated that the roots of constructivist beliefs, for example in situated cognition, came from postmodern philosophy (Wilson, 1997).

In 1992, Hlynka and Yeaman stated, "postmodern thinking has entered the mainstream of educational technology theory and practice" (p. 4). They described the postmodern perspective as a belief in pluralism, a focus on rethinking and deconstructing beliefs, multiple truths, and multiple ways of knowing. For the first edition of the *Handbook of Research on Educational Communications and Technology*, an in-depth foundational understanding of postmodern and poststructural theory for the field was outlined (Yeaman et al., 1996). In 2000, Solomon advocated for a postmodern research agenda in instructional technology by illustrating the relevance of postmodernism to inform research and theory in the field. In the second edition of the *Handbook of Research on Educational Communications and Technology*, Hlynka (2004) pointed to a growing corpus of postmodern scholarship in educational technology. In the fourth edition of the *Handbook of Research on Educational Communications and Technology*, Cilesiz and Spector (2014) presented postpositivism, constructivism, and phenomenology as three philosophical approaches relevant to educational technology research.

In conclusion, this research was an exploratory study into the lived experiences of connectedness in personal learning networks. It cohered to philosophical and methodological commitments in post-intentional phenomenology. A growing number of

scholars in the learning design and technologies field have been turning to phenomenology as a philosophical and methodological approach and finding relevance in postmodern and poststructural thought.

Summary of the Literature Review

The review of literature positioned this research study in the context of distance learning in the field of learning design and technologies. The phenomenon of connectedness was supported with literature about online and connected learning, bridging formal and informal learning, as well as interaction and interactivity. The conceptual frameworks were drawn from complexity theory, motivation theories, learning theories, and theories of identity. The philosophical commitment cohered with a phenomenological philosophy of technology and a post-intentional phenomenological philosophy and methodology, which was a growing research approach in the learning design and technologies field.

The research in distance education was maturing beyond media comparison studies and quantitative methodological approaches that were primarily descriptive in nature. Scholars were turning to theory-based qualitative research studies that addressed comprehensive areas of the field at macro-, meso-, and micro-levels of teaching and learning at a distance. A distance education expert panel had identified that more research was needed on pedagogical opportunities of the mobile, social web (Zawacki-Richter, 2009).

Online and connected learning, through the affordances of mobile, social web technologies, provided opportunities for collaboration, personally meaningful inquiries,

and the transfer of knowledge to lifelong learning. Personal learning networks might have the potential to bridge formal and informal learning (Anderson, 2010, 2012) that was particularly important and relevant for adult learners. The literature on interactions and interactivity helped inform this research study on connectedness in personal learning networks.

This research study was grounded in the conceptual frameworks of complexity theory, motivation theories, learning theories, and theories of identity. The motivation theorists included Maslow (1943), Malone and Lepper (1987), and Keller (1987). The learning theorists included Dewey (1938), Bandura (1986), Lave and Wenger (1991), Duffy and Cunningham (1996), and Siemens (2005). The identity theorists included Rogers (1959) and Wenger (1998).

A moving, fluid, complex phenomenon such as connectedness in personal learning networks called for a commitment to a phenomenological research approach that was in dialogue with poststructuralist thought about the nature of reality and ways of knowing. Therefore, while there were many variants of phenomenology to choose from, this research study cohered with a post-intentional phenomenological research philosophy and methodology. In the field of learning design and technologies, scholars have not only drawn on post-intentional phenomenological research philosophy and methodologies (Benson, 2012; Pazurek, 2013; Valentine, 2014), but have also written about the value and importance of a move to the "post" for the future of the learning design and technologies field (Cilesiz & Spector, 2014; Hlynka, 2004; Solomon, 2000; Yeaman et al., 1996).

In summary, the review of literature provided a foundation for a phenomenological exploration into the lived experiences of connectedness in personal learning networks. The phenomenon of connectedness was germane to online and connected learning, to bridging formal and informal learning, and to interaction and interactivity in distance learning. This research study was: (1) anchored in the context of distance education; (2) informed by theories of complexity, motivation, learning, and identity; (3) committed to a phenomenological philosophical and methodological approach in dialogue with postmodern and poststructural thought; and (4) supported by existing literature and research in the learning design and technologies field.

Chapter 3: Post-Intentional Methodological Approach

> "A rigorous human science is prepared to be 'soft,' 'soulful,' 'subtle,' and 'sensitive' in its effort to bring the range of meanings of life's phenomena to our reflective awareness." Max van Manen, *Researching Lived Experience* (1990)

This inquiry was a post-intentional phenomenological research study. This methodology chapter describes the research design including a description of the purpose with a statement of the research questions. The study context explicates the setting, the participants, and the role of the researcher. A description of the methods and data sources follows. This section ends with a description of the post-intentional data analysis and synthesis techniques of whole-part-whole and chasing lines of flight (Vagle, 2014).

Research Purpose

The purpose of this research study was to contribute to the knowledge base in the learning design and technologies field by exploring how learners experienced connectedness in personal learning networks. This inquiry was guided by the following primary research question: *How might connectedness take shape in personal learning networks?* The secondary research questions helped to further focus the inquiry:

- What is it like to experience connectedness with people, ideas, information, and technologies in a personal learning network?
- In what ways might a learner experience connectedness between formal and informal learning?
- What are the processes and products of meaning-making through connectedness in personal learning networks?

Furthermore, to clarify the secondary research questions, Stake (1995) advocated for the use of an outline of topical information questions. These guiding questions pertained to each of the secondary questions and informed the data gathering instrument development. The topical information questions included the following:

For personal learning networks,

- What does it mean to build a personal learning network? What is it like to be connected with others in a network?
- What are the processes learners use to build a personal learning network?
- What does a personal learning network look like and what is it like to experience learning in a personal learning network?
- What is the reciprocal nature of the experience? How does reciprocity play into the experience?

For bridging formal and informal learning,

- When does this bridging occur and what does it look like?
- What is it like to experience the connection between formal and informal learning?
- How does it relate to constructivist learning and the transfer of knowledge?

For meaning-making,

- How do learners make sense of and within their personal learning networks?
- What digital and critical literacies are used in the experience of meaning-making?

Contexts

This study was situated within the personal learning networks of doctoral

students. The phenomenon of being connected with and through others, ideas, and technologies in an online space resided in the lived experience of the doctoral students. The mobile, online, connected, and networked context provided the basis of this inquiry into connectedness in personal learning networks. The complexities and multiplicities of human connections and social technologies could only be accessed through individuals who had experienced them within the context of networked learning.

Given that the umbrella context was personal learning networks, it was possible to look more closely at the multiple ways that connections may be afforded, facilitated, represented, or observed in the online context. These may or may not include voice through audio or text, synchronous or asynchronous discussions, images of people through personal photographs of learners and their friends or family, synchronous or asynchronous video, or other forms of social multimedia.

Participant Selection

Based on recommendations for phenomenological participant selection (Cilesiz, 2011; Creswell, 2013; Smith, Flowers, & Larkin, 2009; Vagle, 2014), six participants were selected through purposeful sampling. Upon Institutional Review Board (IRB) approval (see Appendix A) for human subjects research, a call went out to potential participants through individual email messages (see Appendix B) to a network of 44 graduate students at a large, public four-year institution of higher education in the Midwest. Cilesiz (2011) recommended that purposeful sampling was a suitable method for sampling in a phenomenological study. This network of students was selected because they were likely to offer the researcher access to the phenomenon and thereby provide

rich, thick raw data for the study. Given the description of the study in the email request to participate, 13 students responded to the invitation. Upon response to the email request to participate, an introductory online meeting via synchronous video was scheduled with 9 students in which the study was explained in more detail. Four of the 13 original students who responded to the invitation determined that they had scheduling conflicts and were not able to participate. During the introductory meeting the consent form (see Appendix C) was discussed and participant questions were answered pertaining to the research study. Of the nine students who consented to participate, three dropped out, and six students completed all three waves of data moments. Of the six participants, three were men and three were women. The ages of the participants ranged from adult Millenials to Gen-Xers according to generational cohorts defined by the Pew Research Center (Fry, 2016).

Methods and Data Sources

As qualitative, exploratory research, this study was situated within an Interpretivist paradigm that viewed the nature of realities as multiple, constructed, and holistic (Lincoln & Guba, 1985). Within this Interpretivist paradigm, the origins of knowledge were assumed to come from shared understandings and social contexts (LeCompte & Preissle, 1993). These essential ontological and epistemological assumptions were integral to this investigative endeavor. Moreover, this inquiry was steeped in postmodern and poststructural philosophical thought, particularly as it related to the concept of intentionality in phenomenology. As Vagle (2014) described "intentionality has been used to describe the way in which humans are connected

meaningfully in the world" (p. 28). Cohen, Manion, and Morrison (2011) explained, "one can suggest that post-positivism, postmodernism and post-structuralism argue for multiple interpretations of a phenomenon to be provided, to accord legitimacy to individual voices in research, and to abandon the search for deterministic, simple cause-and-effect laws of behavior and action" (p. 28). Vagle (2014) described what it means to "post" intentionality:

> For me, intentionality is the most important "old" phenomenological concept to preserve. As previously mentioned, I think it signifies interconnectedness, moves away from subjective knowing, and allows for consideration of the circulation of meanings. That is, I read intentionality a bit differently – a bit more post-structural perhaps – than many phenomenologists. Like Merleau-Ponty, I think the threads of intentionality connect all meaning that runs through relations. Perhaps unlike Merleau-Ponty, I think those threads are constantly being constructed, deconstructed, blurred, and disrupted. For me, intentionality is running all over the place, all the time – at times with clarity, but most often in the gnarlyness of life. (p. 113)

A second important move away from traditional Husserlian transcendental-descriptive phenomenology, which aimed to capture the essence of invariant structures of a phenomenon, was a shift towards a focus on the variants rather than the invariant structures, an argument that Ihde (2003) advocated for more than a decade ago. Phenomenological craftspeople aimed to open up phenomena when reporting tentative manifestations. Ihde (2003) explained, "postphenomenology is precisely the style of

phenomenology which explicitly… takes multidimensionality, multistability, and the multiple "voices" of things into account—to that degree it bears a family resemblance to the postmodern" (p. 24-25).

This research study called for a wave of data collection methods to illume the phenomenon. Openness to a variety of methods that would illuminate a phenomenon was a hallmark of Heideggerian existential-hermeneutic-interpretive and lifeworld phenomenological research methodology (Dahlberg, Drew, & Nystrom, 2001; Van Manen, 1990, 1997). Furthermore, Creswell (2013) identified observations, interviews, documents, and audiovisual materials as part of a compendium of data collection approaches common in qualitative research. The data for this research study was collected in three waves of written anecdotes (i.e., lived experience descriptions), observations (i.e., think-aloud), and in-depth interviews as described in Table 3-1.

Table 3.1

Waves of data moments

Week	**Wave**	**Method**	**Description of Data Moment**
1-2	1	Written Lived Experience Description	Wave 1 was a written lived experience description. Participants were provided with written guidelines and asked to complete it within two weeks.
3	2	Think-Aloud Observation	Wave 2 was a Think-Aloud Observation of the participant's personal learning network. This data collection method was scheduled to occur one week after Wave 1. The researcher used screen capture to record the audio and video of the online meeting.
4	3	In-depth Interview	Wave 3 was an in-depth interview. This data collection method was scheduled to occur one week after Wave 2 was completed. This interview took place through a synchronous video conferencing meeting that was recorded.

The first wave of the data gathering was a formal written anecdote known as a

lived experience description (Van Manen, 1990). The participants were asked to complete this brief written anecdote within a two-week timeframe. The whole-part-whole data analysis approach (Dahlberg, Drew, & Nystrom, 2001; Vagle, 2014) began with an initial reading of this first wave of data (Vagle, 2014) before the second wave of data was gathered.

Following the lived experience descriptions, the second wave of data was gathered using a think-aloud method of observation (Ericsson & Simon, 1980; Johnstone, Bottsford-Miller, & Thompson, 2006; Jonassen, Tessmer, & Hannum, 1999; Nielsen, Clemmensen, & Yssing, 2002;) in which a participant spoke her thoughts aloud while navigating her personal learning network during a recorded online video meeting. A written protocol guided this method (see Appendix E). The whole-part-whole data analysis approach (Dahlberg, Drew, & Nystrom, 2001; Vagle, 2014) continued with an initial auditory review of the data gathered from the think-aloud observation along with phenomenological walks (Vagle, 2014) and post-reflexion journaling (Vagle, 2014) prior to the third and final wave of data gathering, the in-depth semi-structured interview.

An interview protocol (see Appendix F) was used to guide the data gathering during the in-depth semi-structured interviews, which were conducted via an online synchronous video conferencing meeting and audio recorded for transcription purposes. Researching connectedness in the wild, in the lifeworld, as a lived, everyday experience, could be thought of as trying to see, analyze, and synthesize the phenomenon of connectedness in the moving, fleeting, partial, tentative lines of a postmodern Jackson Pollock drip painting intended to convey action (see Figure 3.1, considered a fair-use of a

low-resolution painting for depiction of action painting).

Figure 3.1. A Jackson Pollock painting, No. 5 from 1948

Throughout the three waves of data gathering and analysis, the researcher documented written analytic memos in a post-reflexive journal (Vagle, 2014), which epitomized the post-intentional philosophy and methodological approach. This journal of analytic memos documented: (1) moments when the researcher instinctively connected or disconnected with the data; (2) assumptions of normality; (3) beliefs, perceptions, perspectives, opinions that the researcher held; and (4) moments when the researcher was surprised by the raw data (Vagle, 2014). Throughout the analytic phase, post-reflexive journaling was essential for opening up tentative manifestations of the phenomenon.

In sum, multiple sources of data moments from various contexts in the lives of the participants informed this research. Lived experience descriptions provided initial data

about experiences to uncover meanings of connectedness in personal learning networks. This was followed by a think-aloud observation method, which was conducted using online synchronous video and recorded using audio and screen capture software. Finally, an in-depth interview with each participant was conducted via synchronous video conferencing and audio recorded for transcription purposes.

Data Analysis

To illuminate the phenomenon, data was analyzed using a whole-part-whole analysis and synthesis process (Dahlberg, Drew, & Nystrom, 2001; Vagle, 2014). The analysis began with a reading of the written lived experience descriptions of each participant as a whole, followed by a holistic reading of the transcripts from the think-aloud observation method and the in-depth interview for each participant. See Figure 3.2 for an illustration of the whole-part-whole analysis process. The figure should be read left to right beginning with the first line-by-line reading (Whole Reading1 column) for the first participant-agent (Agent1).

For each participant-agent, the first line-by-line reading was conducted in which the parts that resonated with the research questions were highlighted and marked with margin notes. This process continued systematically for each data moment (DM1-Lived Experience Description, DM2-Think-Aloud Observation, and DM3-Interview) for each participant. The parts (P-A, P-B, P-C, etc.) from each participant were gathered into a new document and read as a whole for each participant during a second line-by-line reading (Whole Reading2). From this reading, parts were organized and analytic thoughts were combined into a new whole for the third line-by-line reading (Whole Reading3).

Finally, the fourth line-by-line reading (Whole Reading4) combined the parts from all of the data moments (DM1, DM2, DM3) for all of the participant-agents (Agent1, Agent2, Agent3, etc.) and these were read as a whole with the goal of looking for what Vagle (2014) called "tentative manifestations" (p. 99), "that van Manen would most likely call 'themes,' Dahlberg 'patterns of meaning,' and Giorgi 'meaning units' and then 'invariant structures'" (p. 99).

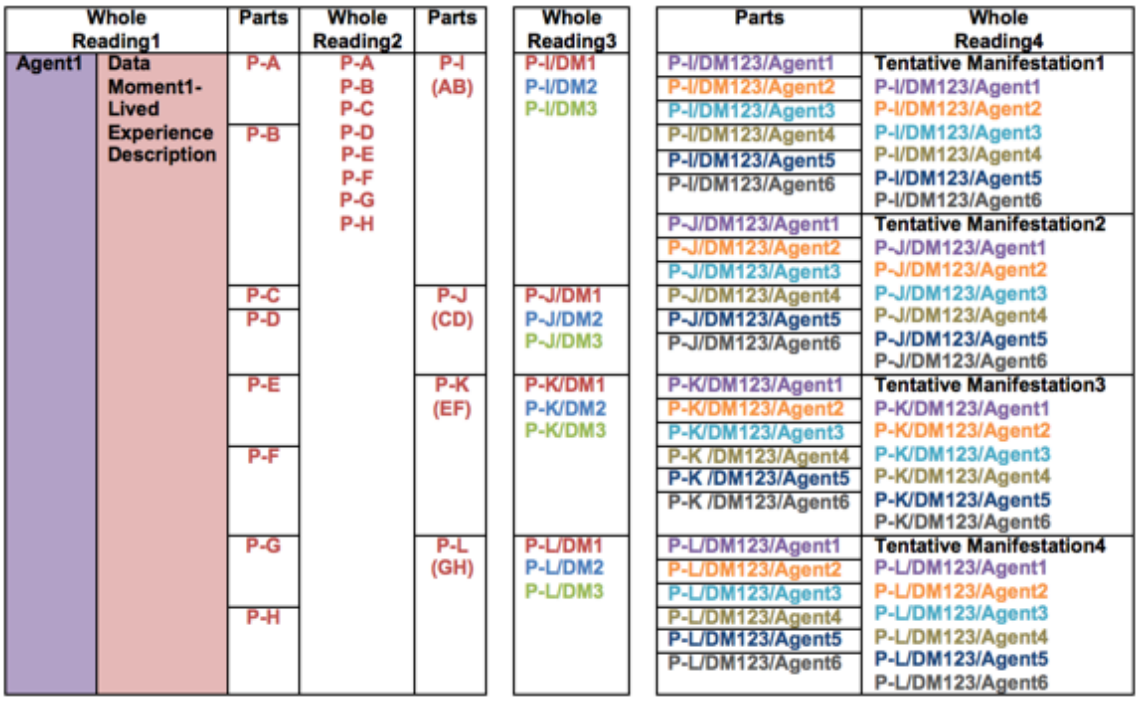

Figure 3.2

The whole-part-whole analysis and synthesis process.

In parallel, on an on-going basis, analytic memos were documented in a post-reflexive journal. The whole-part-whole analysis and synthesis process resulted in tentative manifestations of the phenomenon, which were promptly interrogated using the

post-intentional data analysis technique of chasing lines of flight (Vagle, 2014). In this technique developed by Vagle (2014) and informed by Deleuze and Guattari (1987), the researcher applied two analytical "noticings" (Vagle, 2014, p. 135). The first noticing called for the researcher to "actively look for ways that knowledge 'takes off'" (p. 135). In this noticing, the researcher interrogated the data during analysis, most intently during the fourth line-by-line reading, by asking: "what doesn't seem to fit? If I follow this 'mis-fit' notion, idea, insight, perspective, what might I learn about the phenomenon that is not yet think-able?" (p. 135). The second noticing called for the researcher to "distinguish lines of flight from other lines operating on us and the phenomenon" (p. 135). In this noticing, the researcher interrogated the data and preliminary tentative manifestations during the fourth line-by-line reading by asking the following questions:

> Where might I have retreated to either/or thinking? … Where might I appear "certain" of what something means? … Where might I have extended to something creative and intriguing, but then backed off to something a bit more safe? … Where might I appear "uncertain" of what something means? (Vagle, 2014, pp. 135-136)

From this interrogation of the fourth line-by-line reading, tentative manifestations of the phenomenon appeared more evident and were reported in the findings and discussion chapter.

Chapter 4: Findings and Discussion - A Harmony of Voices

> "Concerning the 'voices' of evidence, harmonies are most likely to arise when there are convergences…. Postphenomenology is precisely the style of phenomenology which explicitly and dare I say 'consciously' takes multidimensionality, multistability, and multiple 'voices' of things into account – to that degree it bears a family resemblance to the postmodern." Don Ihde, *Postphenomenology -Again?* (2003)

The post-intentional data analysis and synthesis of the three waves of data moments—lived experience descriptions, think-aloud observations, and in-depth interviews—revealed four tentative manifestations: connectedness in context, connectedness as motivation, connectedness as learning, and connectedness as identity. This chapter is organized according by tentative manifestations beginning with connectedness in context, followed by connectedness as motivation, connectedness as learning, and concluding with connectedness as identity. Within each tentative manifestation, the findings are illustrated and discussed.

Connectedness in context entailed immersion in a complex adaptive system of emergence, self-organization, adaptive co-evolution, self-similarity, dynamic non-linearity, and systemic interconnectedness. Connectedness as motivation encompassed the needs for safety and freedom, esteem through affiliation, self-actualization, and the desire to be-in-the-know. Connectedness as learning comprised of agency, goal formation, observation and modeling, reciprocity, multiple perspectives, serendipity, and syntheses. Connectedness as identity included an evolving self-concept and identity through practice.

Tentative Manifestation: Connectedness in Context

Connectedness in a personal learning network was an immersive experience in a complex adaptive system. To experience connectedness in a personal learning network was to be immersed in a complex adaptive system. In pursuit of understanding connectedness through the participant-agents' lived experiences, the qualities and characteristics of personal learning networks were uncovered. The context in which connectedness was experienced was an immersive environment that exhibited characteristics of a complex adaptive system that entailed emergence, self-organization, adaptive co-evolution, self-similarity, dynamic non-linearity, and systemic interconnectedness. These findings, as interpreted from the participant-agents' lived experiences, are illustrated and discussed.

Immersiveness. Sociocultural contextual factors of pervasive computing, the Internet, web technologies, and mobile applications afforded systemic interconnectedness that lent itself to experiences of immersiveness. When an agent was immersed in the experiences of his personal learning network, the network and the technologies became invisible. Ihde (1979) would describe this experience with technology as an *embodied relation* with technology in which the agent no longer had experiences "of" the technology, but rather "through" the technology. The technologies faded into the background and became invisible to the agent who no longer needed to focus energy on how to use technologies, but rather saw only the activities that could be accomplished with the technologies as an *embodied extension* of his self.

Jason described it as an "autonomic" (Interview, l. 951) experience—an involuntary

or unconscious experience—given the “ubiquitous, omnipresent nature” (Interview, l. 965) of his personal learning network. Michelle also explained how she was “constantly immersed” (Interview, l. 668) in her personal learning network. Andrea’s experience illustrated the integral way systemic interconnectedness led to feelings of immersion:

> I will check my email like
> 10 times a minute <laughing>
> or whatever
> yes, I check it a lot
> and I don't like if there is a number
> in my inbox.
> I will just click it and click it,
> like this.
> I don't like if there is a number beside my inbox <laughing>
> just like,
> I feel uncomfortable with it.
> So this is another way to get connected
> with my colleagues, and ah classmates, teachers.
> So, this is typically what
> I usually do in my daily life,
> every day…
>
> And sometimes I text to my classmates
> to, like, to do some,
> to schedule a time
> to do research
> or to study again…
>
> I also use my cell phone
> to go to, into the gmail here
> and I will check it in here
> and I also use my cell phone
> go to Twitter to scroll down and see
> see whats happening here
> and I also get Facebook…
>
> So I use my cell phone a lot
> and I also use my laptop a lot
> but I think that’s what I usually do
> everyday.
> (Think-Aloud Observation, l. 118)

Andrea's lived experiences of using technologies and mobile applications in her life everyday were not unusual. In moments of intense focus and concentration, an agent could become so engrossed in an activity that she experienced temporal distortions in which her subjective experience of time was altered in a flow-like experience as described by Nakamura and Csikszentmihalyi (2002). They explained that in an intrinsically rewarding flow experience, an agent's actions and awareness merged, she felt agency, and experienced a loss of self-consciousness (p. 90). Furthermore, "Experiencing anxiety or boredom presses a person to adjust his or her level of skill and/or challenge in order to escape the aversive state and reenter flow" (p. 90). This adjustment in response to anxiety was illustrated well in Nicole's lived experiences.

Nicole described the feeling of being "glued to my device" (Lived Experience Description, l. 52) at conferences when she tweeted everything she found interesting or inspiring. She remarked that sometimes "if there's a story that I'm missing then I get all anxious" (Think-Aloud Observation, l. 14). She was immersed in conversations through social media applications like Twitter and Facebook. For example, she felt compelled to click on links in Facebook, when "people that I work with post something that I think is interesting" (Think-Aloud Observation, l. 24). For Nicole, "it's like this anxiety, like I have to see it" (Think-Aloud Observation, l. 40). She received email digests daily with interesting articles to read (Think-Aloud Observation, l. 146). She commented, "When I first started reading Twitter it almost seemed like my eyes watered because it's a different way of reading for your eyes" (Think-Aloud Observation, l. 195). Teary eyes might be a symptom of eye fatigue from digital eyestrain stemming from intense focus upon a screen

without breaks. This would be yet another indicative sign of an immersive experience. After retelling her lived experiences in her personal learning network, she reflected, "It sounds like I maybe spend way too much time" (Think-Aloud Observation, l. 793), but she feels as though she is sucked in to the immersive experience:

> I think of my personal learning network
> as a distraction
> ya know, even though
> I know that it makes me a better employee
> and a better learner,
> but its hard for me
> to just,
> it's hard to engage just for five minutes,
> ya know,
> ya get sucked in for an hour…
>
> It's hard because
> it's just not valued
> the same way as it looks.
> I can get so much more information
> and so much more learning
> from 30 minutes on Twitter
> than I can
> sitting in a really boring class.
> But in society I still don't feel like it's valued
> the same way.
> So you get put in this corner feeling like,
> oh I should keep my Twitter,
> like I should be ready at any moment to like hide my Twitter feed
> even though
> like I know
> that this is beneficial…
>
> It's so embedded
> in my mind
> that you're not supposed to be doing that stuff I guess
> especially because I think for everybody
> It takes, it's never a five-minute deal.
> (Interview, l. 804)

Nicole alluded to the temporal distortion of the immersive experience, when she

twice mentioned that the experience was "never a five-minute deal." The temporal distortion, and the intense, focused concentration pointed to a flow-like state (Nakamura & Csikszentmihalyi, 2002) of immersiveness as an inherent contextual quality of an agent's personal learning network in which the phenomenon of connectedness was experienced. When an agent felt uncomfortable or anxious in this state, she was pressed to act, or adjust, in order to avoid the aversive state and stay in flow. An agent's personal learning network, in which she experienced connectedness, was largely invisible due to the immersive nature of technologies. This finding pointed to the agents' embodied relations with technologies, in which agent's experienced connectedness "through" technologies, rather than "of" technologies (Ihde, 1979). This finding would further support Ihde's (1979) notion of a technocracy, which is a technological way of being-in-the-world that influenced lived experiences of time, space, body, and relations—the lifeworld. The way that the agents communicated and related was mediated largely by technology. For an agent, being connected in her personal learning network was an immersive experience in a complex adaptive system.

Complex adaptive system. According to Reigeluth (2004) and Patton (2011), complex adaptive systems exhibited features that included emergence, self-organization, adaptive co-evolution, dynamic non-linearity, and self-similarity. Additionally, Saba (2003), drawing on systems theory, and supported by Laroche, Nicol, and Mayer-Smith (2007) who applied complexity theory to education, further suggested systemic interconnectedness as a key feature of complex systems. Through an analysis and synthesis of the lived experiences of agents, connectedness in personal learning networks

took the shape of a complex adaptive system with features that included emergence, self-organization, adaptive co-evolution, self-similarity, dynamic non-linearity, and systemic interconnectedness.

Emergence. An agent's personal learning network emerged in an unconscious, organic way that was born out of natural curiosity and a need or desire to learn more about a personally interesting and relevant content topic. Patton (2004) noted that emergence occurred when agents pursued their own path, "Each agent or elements pursues its own path but as paths intersect, patterns of interactions emerge and the whole of the interactions becomes greater than separate parts" (p. 8). Sparked by agency, a personal learning network emerged from the connections made through interactions with others in pursuit of learning more about a topic of interest.

Eric stated, "I never sat down and said I'm gonna create a PLN this week; it just kinda evolved" (Interview, l. 27). Nicole described a similar experience, "When I was first starting I don't think I made a lot of conscious decisions" (Interview, l. 122). The personal connections in a personal learning network tended to form organically in a natural way through a shared goal or common interest. Jason commented how personal connections in his learning network "tend to be very organic. That's it, ya know. I've met somebody through somebody or maybe a couple more degrees of separation than that even" (Interview, l. 252). The unconscious, emergent nature of a personal learning network may be seen in its invisibility to the agent. For Jason, "it's just sort of there" (Interview, l. 907) and likewise for Michelle, "I don't really, it's not very, at the conscious level for me. I feel like it's very second nature so I just do it…. It's kind of like

trying to explain how a person breathes, you just do it" (Interview, l. 620). While an agent may be guided to consciously initiate the formation of a personal learning network, it will likely not emerge in an evident way to the agent until the agent sees value in the experiences because it fulfills a personal need. This fulfillment of an immediate need supported the principles of adult learning theory (Knowles et al., 2005), namely that an adult learner was ready to learn when there was an immediate need and the learning was focused on this need. Furthermore, the adult learner wanted to know why it was important to learn, and she had a self-concept as a self-directed learner, which created conditions for intrinsic motivation to learn for the value and personal payoff (Knowles et al., 2005). An excerpt from Michelle's lived experience description illustrated this finding:

> So I didn't think about Twitter again till the next semester
> when one of the assignments was to sign-up on Twitter and tweet out something.
> I dreaded it.
> I didn't want to do anything with it,
> but I did the assignment.
> That was all I did, nothing more.
> Then this year, things started to change.
> My school was getting iPads for the whole ninth grade.
> That would impact me.
> I started looking for resources to help prepare.
> I took a class this semester specifically aimed at this.
> As part of our assignment, I had to retweet 10 articles out.
> Luckily I remembered I had created an account.
> Having to use it more than once made me investigate it a little more.
> I started by following people I knew and organizations that interested me;
> my interests mainly with interaction design and 1-1 initiatives.
> This is when I started to feel more connected.
> I started looking for people who were interested in the same things
> that I was interested in.
> And then look to see who they followed.
> I was following people who provided tips
> that I could use with my class right away.

> I started to see and use Twitter for professional development.
> (Lived Experience Description, l. 22)

This excerpt from Michelle's lived experience description illustrated the emergence of her personal learning network based on her immediate needs. Similarly, Nicole described the emergence of a personal learning network as a tipping point when an agent was ready to jump in, "one person helps them get on to like Twitter or LinkedIn, guides them through that process and then it kind of, if it catches, and it doesn't always, then it kind of flows" (Interview, l. 57). Nicole's description of how a personal learning network "catches" as on fire was a useful metaphor for visualizing emergence. Reigeluth (2004) proposed, "Transformation occurs through a process called 'emergence,' by which new processes and structures emerge to replace old ones in a system" (p. 6). While Reigeluth was referring to transformation of an educational system, the idea of transformation could be extended to the agent's experience. A personal learning network emerged through agency and connectedness. Given agency to pursue one's curiosity and interests, a personal learning network had potential to support transformative learning as theorized by Mezirow (1991). Aligned with the theory of adult learning known as andragogy (Knowles et al., 2005), Mezirow (1991) proposed a constructivist theory of adult learning that stipulated a learner's real interests would emerge given more freedom in an educational context. He elucidated, "The authenticity of a learner's interests is measured by their congruence with the learner's self-concept or concept of the good life. Assessment of learner 'needs' should be broadened to include their real life interests" (p. 226). The emergent nature of a personal learning network was discovered as a contextual factor of the lived experiences of connectedness. Emergence was a key feature of a

complex adaptive system. Emergence, in this context, pointed to the potential for transformative learning and educational transformation. Mezirow (1991), in outlining his constructivist theory of adult learning, addressed the potential power of transformative learning for social action through critical discourse. Similarly and more recently, in outlining connected learning, Ito and her research team (2013) proposed, "new media networks empower marginalized and non-institutionalized groups and cultures to have voice, mobilize, organize, and build economic capacity" (p. 12). Scholars (Ito et al., 2013; Mezirow, 1991; Reigeluth, 2004) have recognized the need for educational change and have theorized about the path towards transformation that involves complex systems, constructivist approaches, and connected learning.

Self-organization. Self-organization was seen in the order that took shape within an agent's personal learning network and also in the spontaneous, self-organization of groups within an agent's personal learning network. Reigeluth (2004) pointed out that a self-organizing system was adaptive and agile. He noted the characteristics of a self-organizing system included having an openness to seek and share information, to self-reference core ideas that gave it identity, and to afford freedom for independent decision-making about changes by people in the self-organizing system (Reigeluth, 2004).

Within his personal learning network, Eric experienced spontaneous self-organizing groups that formed around both personal and professional interests. Professionally, a self-organizing group was formed with work colleagues around the topic of online and hybrid learning in response to an immediate need. Eric described it as a "set of people, of experts, that I can go to when I have questions or to find out if they have resources that

are gonna be helpful for me when I'm designing coursework" (Interview, l. 31). Eric had also "created this foodie group" (Interview, l. 50) in which members gathered to share recipes, cook together, and have dinner parties. Evident in Eric's lived experiences were freedom to make decisions, an openness to seek and share information, and topics of interest that aligned with Eric's self-concept and identity. This finding aligned with Reigeluth's (2004) description of a self-organizing system.

Self-organization was also evident in the order of an agent's personal learning network, which was shaped to meet personal, professional, and academic needs. The design and affordances of technologies also impacted the organization that shaped a personal learning network. Gleick (2011), drawing on chaos theory and observations of space, wrote that self-organizing systems could be considered "stable chaos" (p. 55). He noted, "islands of structure could appear within the disorder" (p. 55). He extended this understanding to complex systems by declaring, "a complex system can give rise to turbulence and coherence at the same time" (p. 55). Gleick's (2011) lens of chaos helped to interpret the order in the systemic interconnectedness of personal learning networks.

The technological affordances of systemic interconnectedness meant that Chris could connect with people on all of his devices across multiple platforms (Think-Aloud Observation, l. 10). He used a wide range of technologies for organizing himself and his personal learning network including Moodle and Flipgrid for teaching and learning (Think-Aloud Observation, l. 15). He used Evernote (Think-Aloud Observation, l. 194), Zotero (Think-Aloud Observation, l. 325), Email and Calendar (Think-Aloud Observation, l. 419), and Pages (Think-Aloud Observation, l. 485) for productivity and

organizing his professional life, academic life, and personal life. In particular, Chris had Email and Calendar open at work because he used them most of the time (Think-Aloud Observation, l. 425). His personal learning network was shaped and organized by his immediate personal, professional, and academic needs. The design and affordances of the technologies that he selected to meet his needs also shaped his personal learning network. This demonstrated the self-organizing nature of a personal learning network, in that the technologies that made up the network in turn shaped the kinds of actions that could be taken, and the way information, ideas, and connections could be organized. It was this influence of the design and affordances of the technologies that pointed to a self-organizing system. Ihde (1979) theorized that technology was not a mere tool, but a socially constructed cultural instrument. The way that the design and affordances of technologies had the power to shape personal learning networks and the organizational activities within the networks would tend to support Ihde's (1979) notions of a technocracy and the view of technologies as socially constructed cultural instruments.

The way an agent organized her personal learning network was shaped not only by the technological affordance of systemic interconnectedness, but also by her own unique, personal, and idiosyncratic way of using technologies. For example, Michelle didn't search for information on Twitter, but rather relied on her timeline to see tweets from the people that she followed (Think-Aloud Observation, l. 70). She marked tweets as "favorites" as a way to catalog bits of information and ideas for later retrieval (Think-Aloud Observation, l. 74). Michelle commented, "I just use it so it works for me" (Think-Aloud Observation, l. 113). In this way, the design of the technologies that she used in

her personal learning network impacted the possibilities and probabilities of organization through the processes it afforded. This was further evidence of the self-organizing characteristic of a personal learning network.

Moreover, Andrea's process of organizing her personal learning network took shape through a multitude of technologies including Google (Think-Aloud Observation, l. 165), a University online library website (Think-Aloud Observation, l. 168), the Mendeley citation manager (Think-Aloud Observation, l. 476), Mac Notes app (Think-Aloud Observation, l. 174), web bookmarks across mobile devices (Think-Aloud Observation, l. 891, 922), learning management system course sites (Think-Aloud Observation, l. 941), frequently visited websites (Think-Aloud Observation, l. 951), content folders in Finder (Think-Aloud Observation, l. 483), and a To-Do list in a Microsoft Word document on the desktop of her laptop (Think-Aloud Observation, l. 183). Similar to Chris' and Michelle's personal learning networks, Andrea's personal learning network was also shape shifting through an adaptive, evolving process of self-organization. It was not static, but rather an evolving process of changes determined by the agent, influenced by technological designs and affordances from an array of technologies in varied states of ascendance, maturation, and decline in a personal learning network.

From the variety of technologies and their unique designs and affordances, as well as the idiosyncratic way agents used technologies and the unique processes they developed to meet their personal, professional, and academic needs, one could observe both order and chaos, structure and disorder, turbulence and coherence. From Gleick (2011) this could be interpreted through chaos theory as moments of self-organization, a quality of a

complex adaptive system. The openness to seek and share information, the freedom to make decisions, and the self-referential nature of a personal learning network pointed to characteristics of a self-organizing system as put forth by Reigeluth (2004). The finding of self-organization in a personal learning network further supported Ihde's (1979) notions of a technocracy and technologies as socially constructed cultural instruments.

Adaptive co-evolution. According to Patton (2011), the characteristic of *adaptive* means, "interacting elements and agents respond and adapt to each other so that what emerges and evolves is a function of ongoing adaptation among both interacting elements and the responsive relationships interacting agents have with their environment" (p. 8). He defined the characteristic of *co-evolutionary* as a process that occurred among interacting agents and the system: "As interacting and adaptive agents self-organize, ongoing connections emerge that become coevolutionary as the agents evolve together (coevolve) within and as part of the whole system, over time" (Patton, 2011, p. 8). Reigeluth (2004) also noted, "Typically, co-evolution occurs through self-organization" (p. 10). In a reciprocal fashion, an agent both shaped and was shaped by the interacting elements in his personal learning network in a process of adaptive co-evolution.

The adaptation and co-evolution of an agent and his personal learning network was evident in the evolving shape of the network as the agent adapted, grew, and evolved along with his network. For Eric, this characteristic was evident in his digital literacy skillset that he adapted as the technologies in his personal learning network required him to evolve beyond the skills he learned in secondary school because technologies continually evolved at a rapid pace (Think-Aloud Observation, l. 800). He explained that

the technologies that he learned in middle school were not relevant today, but the *way* he learned them helped him to adapt to using new technologies in his own personal learning network and also shaped the way he educated teachers on how to use technologies in his practice (Think-Aloud Observation, l. 1158).

For Eric, part of the adaptation process involved gaining a sense of comfort, confidence, and self-efficacy, which propelled him to evolve beyond his comfort zone, try new technologies, and expand his network in the process (Interview, l. 157). Eric shaped his network by drawing in trustworthy people. The feedback he received from the people in his network reciprocally shaped him by the way they challenged him. His network helped, encouraged, and supported his growth and development (Interview, l. 969).

The technological affordance of usability impacted the shape of a network by influencing the ease by which an agent could adapt to using a new technology, integrate it into her personal learning network, and evolve her process of organization. Nicole explained that she had "been through the gamut and seen that not everything sticks as well, too. So what's not for me I don't generally [use]. Even this new periscope thing that's coming out where you can live um, put a live feed of yourself doing nothing, cause I don't do anything that's worth like a live feed" (Interview, l. 190). For Chris, technology upgrades impacted the use of technologies in his personal learning network. For example, at one time he used VoiceThread, but the upgrade required too much time to adapt to the changes and he didn't have the time to dedicate to integrating it into his practice (Think-Aloud Observation, l. 109). Nicole believed that "tools themselves are

becoming easier and easier… to be a part of" (Interview, l. 204). As technologies became easier to use, they lent themselves to a participatory culture. Evident in these experiences, was the observation that an agent's personal learning network was not contingent on one technology, but rather evolved and adapted as technologies ascended, matured, and declined.

Similar to the experience of learning in a personal learning network, Jason experienced adaptation and evolution as a cycle in which ideas would stick if and when they were relevant to him, and otherwise the ideas were experienced as noise that fizzled away (Interview, l. 892). In an organic process of growth, ideas that might be initially perceived as noise, may cycle back into the agents lived experience, at which time the ideas may become more meaningful when understood in a new, clearer way (Interview, l. 901). This experience demonstrated, not only the temporal nature of knowledge and learning in a network, but also how exposure to new ideas afforded through people and technologies in a network impacted the organic process of adaptation and co-evolution of an agent and his personal learning network. Akin to this experience, Michelle described the experience of adaptation as a "branching out" (Interview, l. 25) into new areas of interest as she took on a new position at work and explored new academic interests. Again, in a reciprocal fashion, the agent, the content, and the shape of her personal learning network co-evolved, which demonstrated not only the characteristic of adaptive co-evolution, but also self-similarity.

Through exposure to new ideas, technologies, and ways of practicing and organizing, an agent and her personal learning network co-evolved. For example, when Andrea saw a

professor modeling the use of a technology in a new way, she thought about ways to incorporate this new use into her own personal learning network (Think-Aloud Observation, l. 641). Through a process of adaptation, the agent and the personal learning network co-evolved and grew together. This adaptive co-evolving process could take time to find responsive people (Andrea, Interview, l. 55), and required patience and persistence in finding enlightening content (Nicole, Interview, l. 83), again pointing to the temporal nature of the lived experiences. The observation and interpretation that an agent and her personal learning network displayed characteristics of adaptive co-evolution in multiple, partial, and varied contexts further supported the finding that an immersive, complex adaptive system was a tentative manifestation of the agents' lived experiences of connectedness.

Self-similarity. Reigeluth (2004) in applying chaos and complexity theory to the American education system described fractals as patterns of self-similarity: "Fractals are patterns that recur at all levels of a system, called self-similarity. In educational systems, they can be considered 'core ideas' and values or beliefs (Banathy, 1991, 1996) that guide or characterize the design of the system" (p. 6). The ideas of an agent were evident in the content that made up his personal learning network. The content of an agent's personal learning network was related to his current and future practices and identity. In this way, the agent and the personal learning network displayed the characteristic of self-similarity.

Given that the participants for this study were recruited from one graduate school program, they shared a common interest in the content of that program. Therefore, the

content area of the graduate school program was a thread that ran through the agents' personal learning network so that it illuminated the sociocultural context in which they lived and learned. By attending to and following the content within a personal learning network, the characteristic of self-similarity was evident between an agent and his personal learning network. This self-similarity pointed to how an agent shaped his personal learning network and was reciprocally shaped by his personal learning network; that is, he was both agent and acted upon. Furthermore, it illustrated how an agent's identity was shaped by the sociocultural context in which he learned. The characteristic of self-similarity was illustrated in Eric's description of how his personal learning network was a representation of his identity:

> My PLN is like a
> It's a representation of who I am.
> There's this saying in Spanish,
> when translated into English sounds like,
> "Tell me who you walk with and I'll tell you who you are."
> So like this PLN
> is a representation of who I am
> because that,
> those are people that I walk with.
> (Interview, l. 974)

The specific content of Eric's personal learning network could reveal his identity, as he alluded to in the excerpt. Similarly, the specific content in each agent's personal learning network could reveal her or his identity because the network personified the agent—illustrating the concept of self-similarity. Or reversely, agents embodied their networks. If the specific content within each personal learning network were reported, it could reveal the identities of the participants since their interests and ideas, although common to a broad professional content area, were also sufficiently idiosyncratic to

potentially reveal their identity, therefore, it was determined in the interest of participant privacy to not report specific contents of the agents' personal learning networks.

By following the thread of content that ran through an agent's personal learning network, the characteristic of self-similarity between the agent and network became evident, along with the sociocultural context of the lived experiences. Interestingly, the content within a personal learning network was also the thread that ran through all of the tentative manifestations. Content was inherent to the object of agents' goals in the tentative manifestation of connectedness as learning. Content was inherent in the needs of participant-agents in the tentative manifestation of connectedness as motivation. And content was also inherent in the practice of participant-agents in the tentative manifestation of connectedness as identity.

Dynamic nonlinearity. According to Patton (2011), the characteristic of dynamical means, "Interactions within, between, and among subsystems and parts within systems are volatile, turbulent, cascading rapidly and unpredictably" (p. 8). He defined the characteristic of nonlinearity as, "Sensitivity to initial conditions; small actions can stimulate large reactions, thus the *butterfly wings* (Gleick, 1987)… metaphors, in which highly improbable, unpredictable, and unexpected events have huge impacts" (Patton, 2011, p. 8). From these definitions, dynamic nonlinearity was observed and interpreted in the moments in which agents described experiences that resembled dynamic interactions, as well as in the metaphors, analogies, and images of their networks that depicted nonlinearity.

The characteristic of dynamic nonlinearity in a personal learning network was most

salient in the metaphors, analogies, and images that participants used to describe their lived experiences. These metaphors and images illustrated the continual state of movement an agent experienced in his personal learning network. For example, Eric described it as a fisherman smelting and casting a wide seine net (Interview, l. 367). The experience was also perceived as similar to a pinball game in which forces impacted the trajectory of ideas (Interview, l. 659). Likewise, Jason explained how ideas bounced around like in a Ping-Pong game (Interview, l. 546). He also used the metaphor of an atom to describe his personal learning network:

> You've got the nucleus
> which I would say is sort of my core learning network,
> which would be people I know through [graduate school]
> and people I rely on a lot, friends and family,
> and maybe even, ya know, technology in a sense.
> But then there's this electron cloud ya know
> in multiple levels um
> of stuff moving around
> that's always in motion
> and always in flux,
> whereas the nucleus is fairly stable um,
> and things come, things go in the electron shell
> and it's always moving
> and it's always really interesting.
> ya know it's, in a sense,
> more intense out in the electron cloud
> Because of all the activity
> and all the stuff going on out there ya know,
> ya kinda interact with it for a little bit and then
> WHOA!
> okay, that was,
> that wasn't what I was looking for,
> or expected at all,
> but man,
> I gotta think about that,
> and then I kinda withdraw in a sense
> back to the nucleus,
> where the react, the interactions tend to be less intense,

> but there's many more of them
> over a longer period of time
> and um, so that I don't know
> that's kind of like the comfort zone
> in a way, ya know,
> in the nucleus where its warm and soft and cushy <laughing>
> and then out in the electron cloud
> things are just buzzing around so much that ya know,
> I have to take a break to go process stuff that I learn out there,
> but it's always so fascinating
> that I couldn't possibly stay away from it
> (Interview, l. 326)

Jason's experience illustrated the dynamic nonlinearity of a personal learning network in the way he described his experiences of interactions and elements that were always in motion. Michelle chose the metaphor of a flight map to illustrate her personal learning network (Interview, l. 107) and Andrea recounted a similar image of a complex network of dots and linked tunnels (Interview, l. 270). Both of these images illustrated the dynamic, rhizomatous nature of the agents' networks and experiences in the networks.

Furthermore, Michelle used the analogy of a bustling house in which people are moving around between different rooms that served different purposes (Interview, l. 538). Nicole chose the analogy of a blossom and petals to illustrate the centrality of Twitter in her personal learning network. She commented that Twitter was "the epicenter of the information" (Interview, l. 428). Pointing to the transparency of the emergent and immersive nature of a personal learning network, Nicole selected the concept of a glass bridge to show the connections between formal and informal learning (Interview, l. 688) in her network. Similar to most participants, Jason defined his personal learning network as "centered on relationships with people" (Interview, l. 13). In each of these

descriptions, the dynamic nonlinear nature of the network was evident in the images that the agents used to illustrate their perceptions and experiences.

Much like the agent and her experiences in a personal learning network, the agent's network could be characterized as being in a state of constant change through adaptation and evolution. Experiences within the personal learning network pointed to the ways that interactions impacted the trajectory and shape of a personal learning network. For example, Eric was astonished by the rapid pace of a Twitter chat with 20 to 30 active participants who shared a multitude of resources, ideas, and information in a flurry of tweets, re-tweets, favorites, and follows: "I was surprised more than anything to find myself treading water to keep up with the pace of the conversation" (Lived Experience Description, l. 13). Dynamic nonlinearity signified conditions for unexpected outcomes, which was evident in serendipitous moments that participants described in their lived experiences of connectedness. Serendipity is discussed as an important element in the tentative manifestation of learning.

The dynamic turbulence could feel overwhelming at times for agents, as Jason explained: "The electron cloud is very intense, um, I find myself sometimes overwhelmed and sometimes, ah, totally off-track, but completely engaged" (Interview, l. 363). It could feel like a circuitous route that is "all over the place… and it's kind of crazy making" (Interview, l. 370). Likewise, Michelle portrayed the experience as "a whirlwind because you have all these things funneling through your head… so it gets overwhelming" (Interview, l. 425). The characteristic of dynamic nonlinearity was most notable in the images, metaphors, and analogies of a personal learning network. These

observations and interpretations of the data further supported the finding that being connected in a personal learning network was an immersive experience in a complex adaptive system.

Systemic interconnectedness. In a discussion of a pragmatic paradigm for distance education theory, methodology, and epistemology that drew on systems theory and complexity theory, Saba (2003) pointed out the nested hierarchical levels of a complex system that included not only hardware, software, and telecommunication systems, but also learning, educational, social, and global systems. Laroche, Nicol, and Mayer-Smith (2007), in a discussion of the concepts of complexity as applied to education, noted that self-organization occurred under several conditions including "interconnectedness of and intercommunication among all parts of the system" (p. 72). From these scholars' application of complexity theory to education, systemic interconnectedness could be viewed through the way social systems, educational systems, learning systems, and technological systems (telecommunication, hardware, and software systems) ran through the agents' lived experiences of connectedness in their personal learning networks.

Eric used many technologies in tandem that afforded systemic interconnectedness among his professional and personal interests. For Eric, each technology served a different purpose and afforded a different experience. For example, he used Twitter for professional connections, whereas Facebook was used mainly for connections with family and close personal friends. He joined and accessed his graduate program's customized Ning network to stay abreast of current events, conferences, presentations,

and job openings (Think-Aloud Observation, l. 247, 375). Likewise, Michelle tended to use Pinterest for cataloguing personal interests, whereas she used Twitter for topics that were more related to professional development (Think-Aloud Observation, l. 586). While Michelle had a desire to keep these systems separate, she had collected useful pins on Pinterest that were relevant to her academic and workplace pursuits (Think-Aloud Observation, l. 612).

Similarly, Nicole described that she wouldn't consider Facebook to be a part of her personal learning network because she mostly used it for social interactions "except for the fact that I have found, um, people who I work with keep friending me" (Think-Aloud Observation, l. 7). Not only for connecting with workplace colleagues, she also found Facebook useful professionally when she read trending stories that helped her to remain relatable to others in her professional practice (Interview, l. 649). She followed Edutopia on Facebook and found similar news through Twitter (Think-Aloud Observation, l. 29), which she used "for finding resources for everything" (Think-Aloud Observation, l. 122). She explained that she used Twitter everyday to push out news and information related to her content area of expertise (Think-Aloud Observation, l. 135). Slack was another technology that afforded systemic interconnectedness for Nicole when colleagues were "constantly connecting… whether it's professional or just being collegial (Think-Aloud Observation, l. 118). Systemic interconnectedness was evident in the way agents used technologies to pursue personal, professional, and academic interests. From the lens of systems theory, this could be interpreted as interconnectedness of social systems, educational systems, learning systems, and professional workplace systems for

supporting informal learning primarily.

Beyond the systemic interconnectedness of personal, professional, and academic interests and connections, systemic interconnectedness took on a literal meaning when technological systems were interconnected. For example, Chris used his University online library system to download journal articles directly into his Zotero citation manager (Think-Aloud Observation, l. 435) and he connected with people in his network across all of his devices (Think-Aloud Observation, l. 10). With the introduction of social media to formal learning environments, systemic interconnectedness among social systems and learning systems may becoming more common. One example came from Chris' lived experience participating in a synchronous video meeting in which he met his classmates online while each person was in the comfort of their own home (Interview, l. 75). The technology afforded the feeling of comfort and also afforded systemic interconnectedness among social and learning systems. In this moment, the technology also afforded motivational drivers of feelings of safety from the structure of a formal class and the sense of freedom and autonomy while participating in his home (Interview, l. 754). In these examples, systemic interconnectedness occurred within the context of formal learning environments primarily.

Systemic interconnectedness was also evident in a personal learning network by the people that the agent drew into the network. For example, Jason not only drew on his own experiences as a professional, but he also drew in expertise from professors and colleagues in order to advance his ideas and projects (Think-Aloud Observation, l. 19). This exemplified how a personal learning network could foster systemic

interconnectedness among formal and informal learning environments. Jason described how “a PLN could be anywhere” (Interview, l. 25) including interactions through technologies or direct interactions with a person or group of people (Interview, l. 26). Through systemic interconnectedness, he experienced stable structure from his core social systems of family, friends, and close colleagues, while simultaneously experiencing the turbulence of a multitude of interesting new ideas and information from stimulating learning systems, both formal and informal (Interview, l. 333).

The systemic interconnectedness in Andrea’s personal learning network was also evident through the people she drew into her network and the experiences that resulted. The connectedness of formal and informal learning could be seen in the people that Andrea met in formal classes who remained personal friends and colleagues. Andrea perceived formal learning as a narrow experience, whereas she perceived informal learning to encompass broader experiences that she experienced “everyday online” (Interview, l. 214) and in her personal life when she socialized with friends from a formal class. At times when socializing with friends from class, they would discuss shared professional interests or plans to take future classes together. In some instances, they remained connected through a collaborative research project or made plans to attend professional conferences together. The systemic interconnectedness of social and learning systems—formal and informal—created a supportive personal learning network.

Similarly, Michelle explained how she used Pinterest in the evening when winding down because it was more relaxing than the professional content she read on Twitter, which required “more brain power and brain work” (Think-Aloud Observation, l. 745).

She used Facebook intermittently throughout the day prompted by pop-up notifications on her mobile phone of messages sent from family and close personal friends (Think-Aloud Observation, l. 730). Michelle used Schoology for teaching (Think-Aloud Observation, l. 800), which was a separate learning system from the technologies connecting her social system. However, one example of a moment of systemic interconnectedness between these social and learning systems could be seen when Michelle serendipitously found memes relevant to her teaching content area while on Pinterest. When she shared her memes with students, they replied, "Yours are weak, yours are lame, we can create…better ones" (Think-Aloud Observation, l. 790). This prompted her students to post their own memes relevant to the content area in Schoology (Think-Aloud Observation, l. 800). Michelle rotated the student memes and the students were "super excited cause theirs is on and its kinda, theirs are super funny too" (Think-Aloud Observation, l. 807). In more than one instance for Michelle, being immersed in an adaptive, self-organizing, systemically interconnected personal learning network led to serendipitous information that fostered professional success by way of rich and motivating learning experiences for her students. Another example of serendipity stemming from systemic interconnectedness occurred when she found a timely news article that illustrated a concept in a way that was relevant to real life for her students:

> It's quite interesting when things like that happen
> 'cause what you don't expect to find,
> that piece is the most interesting part is,
> when you don't expect to find something specifically for it.
> You find it there, and it's like,
> WOW, this is really good!
> This is real interesting!
> And it helps students to make connections

> because it's like, it's not in the context of a dry
> 'this is what [this content topic] is like',
> but it's like here's how what's being played out in the real world because of this,
> so um that's what I love about my personal learning network
> is being able to find these things
> that makes things applicable
> and makes things richer for the students,
> um to make the connections of these concepts
> that they feel like,
> oh, we're just learning this in this class and its all self-contained,
> but then they start to see if there are other connections to it
> outside of school in different ways.
> (Interview, l. 436)

For Michelle, systemic interconnectedness ran through formal and informal learning experiences via the thread of content topics in her roles as student, teacher, and colleague (Interview, l. 319). In this way, the systemic interconnectedness of her personal learning network supported multiple areas of her life including work, professional development, academic coursework, and personal growth. The value that Michelle found through the systemic interconnectedness of her personal learning network was a motivational driver that propelled continual growth and evolution. This affordance of support through systemic interconnectedness of her personal learning network was also highly important to Andrea, who described her personal learning network in this way:

> I'm surrounded by a lot of awesome people
> and I can reach out to them
> no matter if it is online through the Internet or in person
> and if sometimes I need some help
> no matter if it's for a course
> or for my study
> or for some life situation,
> I can reach out to one or two.
> Yeah, so that is very important for me as well.
> (Interview, l. 137)

Systemic interconnectedness was an inherent part of the contextual lived

experiences of connectedness in a personal learning network. This characteristic impacted the unique experiences that were possible and probable in an agent's personal learning network. Through technological affordances and human connections, agents were motivated and driven to adapt, evolve, and self-organize in a trajectory of becoming through growth, development, and learning. Systemic interconnectedness pointed to the importance of context and the role that context played in the lived experiences of connectedness within a personal learning network.

Summary of connectedness in context. To experience connectedness in a personal learning network was to be immersed in a complex adaptive system. By exploring connectedness through lived experiences, it was discovered that the context in which the lived experiences occurred, namely the personal learning network, exhibited characteristics of a complex adaptive systems, specifically emergence, self-organization, adaptive co-evolution, self-similarity, dynamic nonlinearity, and systemic interconnectedness. The theory of complexity offered a useful lens for interpreting this finding. The interpretation of the data would support Tennyson's (1994) conclusion in the great media debate that "media will always be embedded in a complex association with instructional methods, learner variables, content, context, and risk" (Tennyson, 1994, p. 27). Given this important contextual finding, this research study further supported the suggestions from scholars that qualitative research methodologies have a place in the research agenda of the instructional design and technologies field (Saba, 2014; Schrock, 1994; Warnick & Burbules, 2007), phenomenological methodologies in particular (Cilesiz & Spector, 2014; Jonassen et al., 1994), as well as postmodern and poststructural

thought (Hlynka & Yeaman, 1992; Solomon, 2000; Yeaman et al., 1996). The findings point to the significant value of Ihde's (1979) phenomenological philosophy of technology and Vagle's (2014) post-intentional phenomenology—which drew on the ideas of Deleuze and Guattari's (1987) notion of a rhizome—for exploring issues and experiences in the field of contemporary learning designs and technologies.

In 2003, Saba advocated for a new paradigm in distance education that could explicate the "contextual crafting of the *moment* of teaching and learning experience as the instructional-learning process unfolds in time and produces both expected, determinate behavior and general patterns of emergent behavior the nature of which is anticipated but not determined in advance" (p. 18). Both complexity theory and post-intentional phenomenological methodology were beneficial for uncovering the context in the moment of learning. Given the value that complexity theory offered to an interpretation of the data, the finding supported scholars' (Morrison, 2006; Jakubowicz, 2006; Siemens, 2005) positions that complexity theory had value for theories and interpretations of learning, particularly for learners immersed in computer-based technologies, the Internet, and mobile applications. Aligning with scholars' (Laroche, Nicol, & Mayer-Smith, 2007; Patton, 2011; Saba, 2003; Reigeluth, 2004) descriptions of complex adaptive systems, personal learning networks exhibited characteristics of emergence, self-organization, adaptive co-evolution, dynamic non-linearity, self-similarity, and systemic interconnectedness. The agents' lived experiences showed that being connected in a personal learning network was an immersive experience in a complex adaptive system.

Tentative Manifestation: Connectedness as Motivation

Agents were motivated through connectedness. To experience connectedness in a personal learning network was to be motivated by the needs for safety and freedom, esteem through belonging, self-actualization, and a desire to be-in-the-know. These motivational elements were experienced through connectedness in the lived experiences of the participant-agents. Connectedness as motivational entailed curiosity, relevance, and challenging goals. Agents sought experiences that afforded a sense of safety and freedom. They found confidence and satisfaction through esteem in belonging. These motivations drove agents in the trajectory of self-actualization. Furthermore, the participant-agents fulfilled their desires to know and understand by seeking a perpetual state of being-in-the-know.

Safety and freedom. Maslow (1943) proposed in his theory of human motivation that all people seek safety from harm, "Everyone seems to want a predictable, orderly world" (p. 377). He also proposed that people require freedoms as prerequisites to fulfilling their basic human needs. These freedoms included the freedom to speak, to express one's self, to seek information, and to defend one's self (Maslow, 1943). In the experiences of connectedness, agents sought safety, freedom, comfort, and support. Eric described how meeting with colleagues in a private Facebook group gave them freedom and safety: "a chance for us to chat 'off the record' and not on school email" (Lived Experience Description, l. 43). The group had received push back from staff members who were not on board with their direction and they needed a private, safe space to share ideas:

We were kind of working on designing these courses
and creating some procedural things
like handbooks;
handbooks that we would all fall back to
in case there was a question about um, ya know,
if a student is not participating in online work on online days,
then how would we
what is the procedure that we would kind of all collectively do,
so we were just trying to create some common goals and common procedures
as we were designing these courses
and this worked great for this
because we could share resources,
we could share links,
we could share about conferences that were coming up,
we could collaborate on conference proposals that we were going to write,
and we have, we have presented together.
A reminder about meetings.
And this is something that people looked at,
and people contributed to
and I think it felt *safer*.
I think as a staff member of a high school,
that this was off the record
not on school stuff.
I'm not sure why 100%
but I think Facebook for me meant I could
I felt more willing to maybe *editorialize*
or to um maybe say things kind of off the record.
Not in an unprofessional way,
but to, it felt more *free* in a closed group like that.
ah we talked about tools like,
should we all start with Moodle as a platform
is Schoology a better choice?
should it vary by content and discipline?
so that's kind of the main reasons that we used
um Facebook as a group.
I think there are about 10 of us that are on this,
that contribute,
And we still keep in touch.
The group has kind of launched about two years ago
in terms of getting those courses off the ground, um
and now were just kind of keeping in touch
once in a while.
(Think-Aloud Observation, l. 128)

Eric showed his freedoms in action while participating in the private, professional Facebook group. He, along with everyone in his group, was free to speak, free to do what he wanted, and free to express himself. In the context of his private group, he felt safe to express these freedoms. This group was working on a controversial issue that caused some staff members to push back. In this way, connectedness took the shape of support, of feeling and being supported by like-minded people who the agent trusted. Therefore, having a walled garden to feel safe in sharing ideas was essential for success, as Eric explained:

> I feel like people that are in this group of teachers
> are friends that I *trust*
> and stuff that I can share openly
> not that we have anything to hide as… teachers,
> But there was some push back from other staff members
> that we didn't anticipate,
> that we kind of felt like they were teachers
> that were on a camp of either on board or off board
> and I felt like I could share stuff about the
> goals of this group within this group openly
> without getting that kind of backlash
> versus creating a like a school-supported source.
> So using a tool that the school district supports
> I wasn't going to just open myself up
> to comments from people who weren't kind of on board
> ‘cause that’s not productive for me.
> (Think-Aloud Observation, l. 188)

The support from this group and the success they experienced together gave Eric confidence to take risks as a professional:

> It makes me feel like I can take risks along with others
> and know that they're not going ta, um.
> I know that if I ran an idea by the group,
> that they would kind of not just say, yah [Eric] that’s a great idea.
> They would push me and nudge me ta say, have you thought of this or,
> It’s a *safe* group ta take calculated risks.

(Think-Aloud Observation, l. 193)

At times, in moments, it took courage to engage and participate. The freedom to express one's self, to speak, and to do what one wants took courage. When an agent went to his network, it was not always for comfort, at times, an agent looked to others to challenge his thoughts and ideas. This experience could feel intimidating at first, particularly when the agent started a new conversation with an expert or leader that was well respected in the profession. Eric described it as the kind of courage required to enter a pie in a contest:

> When I go to a conference
> I have,
> ya know how there are like traditionally
> the strong presenters and writers at a conference
> that you really want to see.
> For [certain content] teachers, it's like [Jane Smith],
> it's ah [Maria Johnson] is another one.
> Those are the people that …
> they have the most um, the most people sitting in their presentations
> 'cause they are well known and well respected
> and those are the people that I want to sit in on their conference session
> and they are the people that I want to be able to bounce ideas off of either,
> if not at the conference, then online on a site like Twitter,
> Um ya know, it takes a lot of *courage* to sit in on a conference session
> by one of those people.
> Just like it takes courage to submit a pie for the fair…
> I think it's good.
> I mean that's how you're gonna improve
> when you, um watch other chef's cook
> then you can improve your own
> just like the golf analogy that I talked about earlier
> ya know, if you were just okay with um,
> cooking up the same recipes year after year,
> you wouldn't watch a food network,
> you wouldn't look for recipes that were new to you
> wouldn't sharpen your knives,
> you would just
> the same thing year after year,

> but when you go to a contest like that
> just like when you go to your network,
> you're challenging yourself and
> It can feel *intimidating* at first to start a conversation
> with a … leader that's well-respected in the profession,
> but then you walk out a better [practitioner] as a result of that conversation
> So it's a *frightening* because you're thinking, ya know, I
> I'm gonna ask Dr.[Jane Smith] a question about… learning
> but then ya know ya ask her ta sign your methods book from college
> and she's tickled pink to sign your book
> um, and then you get to share a story with her about… learning
> or now you've built up this connection at the conference
> that you can then springboard
> on ta Twitter and say thanks for signing my book, great session on Saturday
> so you can start that conversation that way and then kinda
> know that you can go back ta [Jane Smith] to ask her
> questions about projects that you're working on, or ask her to be
> on your dissertation committee or whatever.
> (Interview, l. 458)

An agent's connections to people, that is human connectedness, afforded feelings of safety. The nature of the relationships afforded certain kinds of experiences, feelings, and support. Eric admired and trusted the people in his network (Interview, l. 1052). There was a feeling of familiarity (Interview, l. 1008). These people were his "go-to" people, like his "go-to" recipes that he could count on (Interview, l. 1019). This familiarity with others occurred in informal and formal spaces, as well as both in person and digital. For Chris, he experienced familiarity and comfort in an online course when the instructor facilitated a synchronous video meeting with the class. The live video in the formal online course afforded feelings of comfort:

> The instructor, [Jennifer], started each week with a video of herself,
> often in her own home, welcoming us to this week's assignments and tasks.
> We also had some live video sessions
> where multiple people joined simultaneously,
> all from our own homes in the evening.
> I felt *comfortable* with this,

because it gave the illusion
that we were all joining casually to discuss and learn together.
There was also little to prepare for this meeting,
and its purpose was to explore an online tool for collaboration and learning.

I had had the opportunity to meet with [Jennifer] before taking her class.
We met in person,
and she was willing to explain
what challenges she was facing as a teacher.
My connection with her in person
made online interactions more *familiar*.
[Jennifer] acknowledged the limitations of online work
(poor synchronicity, technical glitches, etc.),
and we operated under the assumption that if something went wrong,
we would simply take some time to address the problem
or come up with a plan B.
The schedule was not tight, the deadlines were not critical…

But we were connected when we saw each other live,
when we could see a peer's dog come up and lick her in the face
while she was trying to participate in the group discussion;
when we could [see] who was drinking coffee, who was drinking tea,
and who was drinking water at their homes, and we could, over distance,
share enjoying a warm beverage in the evening together.
Each person even got to bring their very own mug to the meeting.
And their very own couch!
(Lived Experience Description, l. 16)

Chris described how this synchronous video meeting afforded freedom and comfort in the context of a formal class that was not possible in the courses he had taken in a traditional classroom:

I was physically more *comfortable*
because I could choose a piece of furniture to be on that was my own
I had access to the things that I try to give my access to at home,
beverages and what have you.
Whereas that's not the case in a classroom for the most part,
It's just kind of technically difficult to try to bring hot tea to your class in a mug,
in an open top mug because it's gonna spill everywhere
you might be able to bring it in a tumbler,
but I don't usually drink from a tumbler in my home.
I drink from a mug that maybe I got on a trip

> or that I've chosen
> that it's a ah it's not only designed,
> well, I don't know, it's designed for its practical purpose,
> but it's not designed for transportation purpose
> so it kind of gave us some level of *freedom*
> That we didn't, we do it right from the space that we were most *comfortable* in,
> and it happened to be evening, I think,
> so most people ended up being in their homes.
> (Interview, l. 737)

In this excerpt, Chris pointed out how he felt physiologically comfortable in his home surroundings while engaging in the synchronous video meeting and learning online in a formal class. Maslow (1943) determined that physiological needs were the first most basic needs of humans. When physiological needs were met, then humans attended to needs for safety. It was through his experience of safety and comfort afforded by the synchronous video meeting that Chris was able to see another side of his classmates:

> Everyone could see the more casual side of you that is brought in.
> It's sort of like um, it's sort of like the first time that you're
> It's sort of like the first time you see your teacher's children
> and you see your teacher in a new role.
> We're seeing each other in a new role.
> New roles, yes, that was a big part of it.
> Before this point we had seen each other as peers, as students,
> or each person was assuming a student role,
> where our task is to come up with um intellectual products, discuss,
> ask inquiring questions, ask clarifying questions
> and that was the role that we were bringing with,
> it was the primary role that we were assuming in most of our space
> but in this instance, we were seeing the other roles.
> When they were shouting at their kids to go to bed,
> or to stop that, or eat their dinner,
> or something like that.
> Or their role as a pet owner and the pet is just like
> "you're my owner, we're just living out this relationship" <laughing>
> And ah um I don't think there was a hesitancy to do that.
> It was actually sort of *fun*
> because everyone was doing that.
> Everyone.

It was sort of like show and tell,
here's the rest of, a small piece of the rest of my life.
Here are the informal roles that I also play
um so there was not a hesitancy
that there may have been
if I was doing a video interview for a job for the first time.
ya know if I had done an interview
and my dog comes in and licks my face, ya know,
I would be a little like EEEYAAA!
I'm trying to like, my kids comes in starts singing a song,
or ya know whatever, yeeahhh,
I'm trying to separate these spaces right now.
But this is one where it was okay
and we had some time at the very beginning to acknowledge each person,
each person's space and to not separate those
separate the formal and the informal,
so we took some time to ya know,
as people were signing on,
the instructor would say,
would either comment on the space like
"oh, your living room, that looks like a nice couch."
Whatever.
"oh, what are you drinking? Gatorade..."
that kind of small talk like that to acknowledge that space,
to acknowledge those roles
um and then after we had done that and established that
as what roles we were going to play for the next hour,
we lived out again student roles, but maybe a little bit more,
a little bit more realistic of the variety of roles that we have to play
so we were not stuck in those informal roles,
we got back to the student roles
it wasn't that someone was so distracted by their informal role
that instead of doing the student work that they were going to do
that they instead were playing with their dog
they still came back to their formal role,
but we had an awareness of their informal roles.
(Interview, l. 669)

From Chris' experience, it was possible to see how the synchronous video meeting in the context of the formal course could lend itself to fostering a sense of safety, comfort, and freedom. The technologies that afforded the experiences could also foster a

feeling of risk or exposure to danger. Agents experienced many risks through connectedness. Not only were there risks to an agent's esteem and risks of not belonging, but there were also risks to an agent's safety. The web could be a dangerous place filled with trolls, predators, and identity thieves. Chris explained: "If we were in a conversation, I would not likely expose vulnerable parts of my identity if I was in a public space, but I would more likely if I'm in my home" (Interview, l. 421). At times, privacy afforded an agent a feeling of comfort and safety. Chris believed that his preference for private technological spaces was innate to his personality:

> I use this [citation manager] mostly just in an individual basis.
> I don't find that I am sharing my citations very often in my
> [professional] work, in my [academic] work so far.
> I don't find that I'm gathering um citations from other people
> or collecting them from other people for the most part.
> This is pretty much an individual ahh index,
> which is not surprising because actually
> the other index that I mentioned, the [beverage] index,
> is also a very sort of individual um, ah tool.
> I don't share that.
> I don't blog really,
> I don't post that online.
> That's something that is much more of a journal than it is about a blog
> and I find that, I think that's probably,
> that's part of my personality.
> I'm a little more introverted
> and I don't feel a need to tell the whole world
> about every little thing that I do, so um
> I think that that definitely reflects itself
> because people have asked me,
> are you blogging? blogging about this?
> or are you on a social tool for this?
> And no, it is a private, a *private* tool.
> It's Evernote only.
> There are apps of course,
> where you can post
> where you were and
> who you were with

> and everything,
> but really I just kind of collect them,
> that's for my own memories I suppose.
> (Think-Aloud Observation, l. 382)

These issues of privacy, safety, freedom, and physiological or emotional comfort were motivational aspects of experiencing connectedness. When an agent experienced connectedness, it was like having his needs met. He felt safe, supported and surrounded by trustworthy people. Through connectedness, an agent's basic human needs were satisfied. Experiencing connectedness could occur in silence, through a shared understanding. For Chris, this happened during a synchronous video meeting with classmates for a group project: "I was connected (by video, by time) to all of my group mates, but I only *felt* connected to [John] since we had a similar vision of the task at hand, and a similar ethic to make direct progress on it" (Lived Experience Description, l. 60). Similarly, Jason sat with his classmates in "stunned silence" (Lived Experience Description, l. 1). In each experience, the agent shared a common understanding with a classmate that did not require spoken word to express. Jason explained the comfort and familiarity in the experience this way: "I left with a strange *comfort* in know[ing] I wasn't the only one in our group who couldn't make sense of what we were trying to tackle" (Lived Experience Description, l. 20).

A part of the agent's feeling of safety came from being surrounded by people who the agent could trust. For Jason, a lot of the people that he knew and trusted were on Facebook (Think-Aloud Observation, l. 99) and he used Facebook frequently for learning (Think-Aloud Observation, l. 93) through conversations (Think-Aloud Observation, l. 100). In the evening while winding down and during the day when seeking a mental

break, Jason used his iPhone (Think-Aloud Observation, l. 112) and accessed Facebook (Think-Aloud Observation, l. 199) for comfort and relaxation. In these moments, he found information about his personal interests (Think-Aloud Observation, l. 194, 220) or his affinity for animals (Think-Aloud Observation, l. 225). The experience could be both stimulating and relaxing (Think-Aloud Observation, l. 115). It could pique his curiosity and provide comfort. Along with comfort and curiosity, experiencing connectedness could also bring with it a perceived risk of getting it wrong as Jason described:

> It's actually a little *scary* for me um
> There's that idea of
> what if I get this wrong or what,
> and especially with technology, what if I mess it up
> or break it, right?
> and it's um I don't know why that has hung around with me,
> but it's still there, um
> and then usually I just tell myself to shut up and go do it <laughing>
> and just, it's kinda Nike, right?
> Just do it,
> and It'll be fine and ah
> but it's different between people and technology,
> kind of in a qualitative sense in that um, when talking with people
> It's usually it's face-to-face or over video
> sometimes I introduce myself to people over email but that's always
> that's more superficial stuff and it's usually setting up a deeper interaction
> either through Skype or face-to-face um
> and so for me personally, there's less worry that I'm going to somehow
> like it's not gonna go well, ya know
> 'cause you can always kinda self correct with that,
> with technology it's seems that there are big, deep, long, steep rabbit holes,
> that I may end up having to go down in order to get ah,
> get the finished thing that I want.
> did you ever see...
> there's a… video on Vimeo about him kinda
> becoming a designer and doing creative work, do you remember that?
> um, he talks about in that,
> how it can take you a really long time doing creative work
> to get to the point where you really want to be,
> and that it's okay that it's gonna take a lot of time

> and that you need to do a big volume of work
> um, and I completely agree with that.
> I just need another 10 hours everyday to get where I
> want to be in some sort of timely fashion <laughing>
> (Interview, l. 119)

Jason drew on his own experiences of finding safety and comfort through long-term relationships in his personal learning network and he extended this understanding to his teaching practice in which he could relate to students' feelings in the learning context and how he helped mitigate the risks for students. He described how new experiences could be "off-putting and uncomfortable and anxiety producing and so um by encouraging them and giving them a safe space" (Interview, l. 474). From Jason's experiences, he demonstrated a keen sense of awareness of the feelings of risk that were a part of learning through and with technologies.

Having a feeling of safety by being surrounded by trustworthy people was important to experiencing connectedness. For Michelle, once she found one or two people she could trust, she grew her network by seeking people they trusted. In the beginning it was hard, but once she established a core group it became easier to find more resources for information, ideas, and connections to trustworthy people (Interview, l. 44). She explained that it was hard initially because she was "very picky" (Interview, l. 37). She wanted to connect with quality, trustworthy people and that took time and care in the selection of people to follow on Twitter. While Michelle was comfortable consuming media, she needed to feel a personal connection with people in order to share her information and ideas with others:

> I don't put my stuff out to be consumed on social media.
> I put it out, it's, I feel like, there needs, I don't know,

> I need to have that connection with people
> to be able to share things that I create
> and so for me that's kinda weird,
> but at the same time, it works for me.
> (Think-Aloud Observation, l. 918)

Feelings of credibility and confidence came from having a safe, established network of trustworthy people, as Michelle expressed:

> It feels *safe*, um, because you, and you feel *grounded*
> because you feel like you have resources and people that you can rely on,
> so when other people call on you to speak of ya know, the topic or the context,
> you, because you are confident in the network that you've built
> that when they call on you,
> you know that when you speak of things that others have done,
> you feel *grounded* and kinda *safe*,
> and um like you know what you're talking about
> um, so that's a good feeling,
> it's like when people are talking to you about it,
> and you haven't established it, it's like well,
> this is all me that I'm putting out there
> and I don't quite trust it.
> But when you have other people in your network that you can call on,
> like oh, ya know this person did this,
> and this person did this,
> and so this is why I do this,
> then there's kinda like that back up,
> you have rationale, you have evidence,
> you have, ya know, things that you can show people
> that it's not just you and your opinions.
> you have data and resources to point them to,
> that supports what you're doing.
> (Interview, l. 55)

An agent's comfort level with risk impacted the shape of her network by way of the relationships fostered through experiencing connectedness. When an agent surrounded herself with trustworthy people in her personal learning network, it created a low-risk environment in which she felt safe. This safe, low-risk environment fostered prolonged exposure to feelings of belonging, which then enhanced an agent's self-esteem and

confidence. These feelings of esteem and confidence propelled an agent, like a springboard, to take greater risks in seeking new relationships. In a trajectory towards self-actualization, an agent extended connections to others that she would have previously not encountered, thus growing her connections and expanding the shape of her network. Therefore, the shape of an agent's network and her experiences of connectedness were impacted to the extent that she felt a sense of confidence and a willingness to take risks. These shifting feelings of safety, comfort, and risk were experienced in different ways through different social media technologies. For example, Andrea explained her different experiences using different social media technologies:

> I know everyone in my Facebook,
> I just don't feel comfortable,
> I feel uncomfortable to get connected
> with a totally new person I don't know.
> If I don't know him or her, I just don't get them connected in Facebook,
> but on Twitter I have some people I don't know them,
> But I have some connection with them…
>
> In LinkedIn, it's just my resume and my simple profile
> about myself, about my education, and the previous working experiences.
> Then I don't post my personal life
> and I don't post something related to my courses or some other stuff
> so I feel like it's just to make some connection at events,
> and maybe in the future I can get a real connection,
> but I really just don't focus on this thing.
> I just keep it, and I think maybe in the future
> I will get some connection with the person in my network,
> but for Facebook and Twitter, it's… focused on my study or my life,
> so yes so I know this person face-to-face and ah online.
> (Think-Aloud Observation, l. 674)

Similar to Eric's analogy of the courage it took to enter a pie contest, when an agent engaged in public discourse, it took courage to be vulnerable to criticism and to defend her point, as Nicole expressed:

> This is like the one thing that's kinda burning inside me for my PLN,
> like I really augh, I see these blogs,
> I see what people are putting on Twitter
> and it's nothing mind boggling.
> I'm just not sure I'm ready to like
> put myself out there like that always…
>
> But, ya know, it's like if you're gonna put something out there
> like some of these people do,
> you have to be ready for like the backlash ya know
> of you having to defend your point then,
> as you can see with my lived experience
> that's not my thing.
> Just let me put out my stuff and have it.
> I don't really want to have to answer to anybody about what I think or feel.
> (Think-Aloud Observation, l. 256)

Nicole's excerpt illustrated the importance of the freedom prerequisites of basic human needs: the freedom to speak, to express one's self, and to do what one wishes. In her network, Nicole had observed that scholars in higher education and educational consultants were taking greater risks by posting critical or provocative viewpoints, whereas she found more celebratory viewpoints posted by K-12 teachers or administrators who were representatives of a school or district (Interview, l. 550). Nicole believed educational consultants had more freedom in expression than others in the field:

> I mean if you're a principle of a elementary school
> and you're sitting in there
> getting in Twitter arguments with people,
> people are gonna wonder what the hell you're doing, right?
> Whereas in higher ed, it's almost like you're promoted to be critical
> or even, some of these people aren't necessarily in higher ed,
> but they are educational consultants,
> and they can afford to be a bit more risque I'll say or
> really actually share what they're thinking
> or when they see something that they don't feel is just,
> then really calling it out,
> versus just focusing on the positive
> because they're not necessarily a representative of a school or a district.

(Interview, l. 542)

For an agent, part of the risk of participating in public discourse via asynchronous, text-based social media was the risk of being misinterpreted or misunderstood. This could be construed as a potential perceived risk of not belonging, risk to one's self-esteem, or losing the esteem of others. According to Maslow (1943), belonging and esteem were basic humans needs that all people sought to fulfill once their safety concerns were addressed. Nicole explained her concern about the potential for misinterpretations:

> Because there's not always somebody next to you reading the same thing,
> interpreting that in their own way and sharing, maybe you um,
> it's also kind of a sensitive piece
> because that's probably a lot behind my filters,
> is knowing that I never really know
> how someone will make meaning of this,
> and I would never want them to make the wrong meaning of it, um,
> makes you stop and think I guess.
> (Interview, l. 733)

As part of the experience of connectedness, an agent at times engaged in public discourse that required her to mitigate risks. For Nicole, her personal values guided her interactions with others in her network. Through trial and error, she learned to clean up her digital footprint when entering the workforce (Interview, l. 861) and to protect passwords (Interview, l. 856). Her personal values also guided her activities of being a good digital citizen in that she did not propagate negativity on the web (Interview, l. 870).

From the agents' lived experiences, it was evident that issues of trust, risk, safety, comfort, and freedom ran through connectedness in personal learning networks. These experiences, interpreted through the lens of Maslow's (1943) theory of human motivation, represented the freedoms that were prerequisite to the basic human needs: the

freedom to speak, to do what one wants, to express one's self, to seek information, and to defend one's self. Moreover, humans' basic physiological needs, as well as the needs for safety were evident in the lived experiences.

Esteem through belonging. In his hierarchical theory of human motivation, Maslow (1943) proposed that humans sought love, affection and belonging once their physiological and safety needs were fulfilled. Beyond the need to belong and have a place in his group, Maslow (1943) claimed a person desired a high evaluation of himself, self-respect, self-esteem, and the esteem of others. In his theory, he divided the esteem needs into two categories. The first category included the desire for strength, achievement, adequacy, confidence, independence, and freedom. The second category included the desire for reputation or prestige, recognition, attention, importance, or appreciation.

An agent was motivated by the confidence that came from self-esteem and the esteem of others through the experience of belonging and the satisfaction of accomplishment. It was a positive feeling for an agent to become connected with others online and in person. At times, an agent became connected with someone in person and online in more than one space. For example, it was affirming for Eric when a colleague connected with him: "I just noticed that I have a notification, which isn't all that common. [My friend and former colleague] actually one of the people from the [work] group coincidently just ah followed me, which is kind of cool" (Think-Aloud Observation, l. 327). Belonging to an elite group gave an agent a sense of pride and honor. When Eric belonged to a group identified as a network of leaders or "pillar people" (Interview, l. 35), he felt pride in the

experience and from the connections with others:

> That I can connect with people in that group
> I think makes me not only feel good as a professional,
> but also just makes me feel honored
> to be a part of that group…
>
> I mean it makes me feel like I can take risks
> along with others
> and know that
> they're not going ta, um
> I know that if I ran an idea by the group,
> that they would kind of
> not just say, yah [Eric] that's a great idea,
> they would push me and nudge me
> ta say, have you thought of this or,
> it's a safe group
> ta take calculated risks.
> (Interview, l. 187)

Not only did Eric find support and encouragement through his connections and affiliation in the elite group, but he was also challenged to grow by people he trusted. He admired the people who surrounded him in their passion about a shared content area, their work as practitioners, and their willingness to take risks:

> I make of it as a network where I can bounce off ideas um
> I make of it a place where I can share ideas,
> get some feedback from people that I trust
> and that I know,
> will trust in the sense of
> they're not just gonna say the nice malady, [state expression]
> thing of yeah, that's a great idea [Eric] run with it,
> even though they know that that's not such a wise idea.
> They'll say ya know, they'll challenge it
> and that's good to be challenged as [a practitioner]…
>
> This PLN is a representation of who I am
> because that, those are people that I walk with.
> Those are the people that I would love to have dinner with
> because they would be asking questions like you are today
> that are challenging me

which is a good thing, um
so I would say, I make of it
as kind of who I am
and when someone texts me and says,
hey I notice that you follow so and so,
what do you think of 'em?
or what are ya learning?
or, ya know that people will notice or um
yeah, they're like my people.
There's another, yeah
I just think about my people, my people at the state level
my [specialized practitioners] and people who are presenting
and taking risks as presenters.
(Interview, l. 962)

Similar to the other participant-agents in this study, Chris was passionate about an area of interest related to food and beverage. He was a connoisseur who recorded moments in time when he engaged in his area of interest with people he enjoyed and admired. His voice became louder and more animated as he recalled those fun moments:

A lot of the images I have for Evernote are um of [a beverage].
ah I use Evernote in my own kind of [beverage] journal,
[beverage] index as I call it
so every time that I am drinking a new [beverage]
and there are many, many to have especially in [this state].
Every time I drink a new [beverage],
I write some notes about it.
I give it a grade
and I take a picture of what's going on.
You may recognize the setting here,
this is that [beverage] right there
is precisely where I am sitting right now.
That is the [beverage] I am on right now,
so that's in my home.
As I scroll through I see some friends that I have met just once,
long time friends that I've known for years and years.
Friends where we like to be silly like this.
And all of these memories.
This is family.
This is my brother.
That's another long-time friend.

> Then I'm remembering
> as I go through some of these.
> This is a journal of remembering um times and places.
> So this is a trip to [a city] ah, um at a conference.
> There are a few of these.
> So really I find that my recording of these most of the time
> is me looking at the images and remembering the moment.
> This is the time at the pool.
> This is that great ramen place.
> This is when we dressed up for Halloween
> and it was so funny with the way that they
> ya know, dressed up in their costumes.
> And then from time to time,
> it comes up that I need to use this for reference.
> So I'll be at a restaurant or
> I will need to make a recommendation for a [beverage]
> or someone will ask me, have you tried this [beverage]?
> and I will go [name of beverage], well, yes, absolutely
> and it looks like I was watching ah TV or something like that at the time
> and here are my thoughts. It's a 4 out of 5 and there we go.
> (Think-Aloud Observation, l. 194)

Chris not only experienced a sense of belonging and camaraderie through his personal interests, but also in his academic pursuits, specifically in an online course. He valued the rapport that he developed with a classmate and felt a sense of appreciation for the length of the relationship as it developed over the semester (Interview, l. 584). In his experience, it was important to build rapport at the beginning of the semester so that the relationship had time to develop over the course of the semester through weekly interactions, discussions, and project work online (Interview, l. 552). Beyond personal interests and academic courses, there was also a third space in which Chris experienced belonging with others who shared a common interest and represented trusted voices. It occurred when he was invited to join a small, informal community of practice that transected his drive for personal and professional growth, and his academic interests:

This was a group of colleagues
that with one sort of matriarch
that was the inviter, the convener, she was the convener
and she had a few colleagues that she had worked with.
She does … consultancy,
so she had a few colleagues around the [school]
that she seemed to connect with
and had similar interests
in really pursuing certain types of questions about pedagogy.
A little bit of philosophical
And a little bit of practical
and seemed to enjoy
I'd probably, I would guess that her conversations with them
would go beyond the time they had allotted
just because it was so interesting
and so um she convened this group
and I was,
one of their tasks,
one of the conversations that they had in their meetings,
was "who else should be here?"
It was a very interesting conversation to have.
"This is an interesting group, we enjoy the time,
who else needs to be part of this?
What other voices would we like at the table? to invite to the table?"
Which was really interesting.
I think my [relative] was there,
was invited at some point
I think he was maybe like,
kind of like a first degree invitee,
so he was not an original
but he was one that was invited.
He went to a meeting
and they asked that same question,
"Who else would be interested in this?"
and he thought of me.
And so they were able to kind of
extend the invitation there a little bit,
to a certain point.
And then we get into the point
where we're like, well, we're large enough,
we fill a modest conference room on a regular basis
so we're probably going to stick with this, ya know,
we don't anticipate this getting larger than that.
um, another conversation that that group would have is

“What should we do next month?”
and we called on each of the individuals there
to make a contribution that ah
by the end of a year,
each of us has had some chance to
bring the content for the rest of the discussion,
So of course, there's kind of this opening space
where we have a welcome everyone,
we have some coffee or tea,
help yourself to that.
Here's a couple of little announcements of
What’s kind of happening in this world of [this content area],
Nothing to formal, it was just kind of like
here's what I noticed today
something I saw or some conversation I had,
or something like that
um, just kind of how things come up naturally in conversation
when you're starting
when you're just convening a group
and then you get on into the program,
or ya know, the planned activity
and the leadership of the meeting
would be passed over to the person
that was in charge of the content for that day,
who had volunteered their content really.
It was a volunteer, but it was kind of invited volunteer.
So they would say, "Do you have something to offer next week?"
we would like to hear about this,
do you have something to offer?
ah and so then that person would take the time however they see fit
and they would pose the problem however they would like it to be posed
and engage in that space however they would like it to be engaged
so I had brought up a game that I had been designing.
kind of a gamification task
that I had been designing for a lesson that
I wanted to deliver a lesson through a game
to explore a concept through a game
and it was in its first iteration so it was pretty rough,
but I had at least that concept
and it was able to be played.
so I brought that and we played the game
and then I engaged in conversation about
what feedback would you give?
These were *trusted* voices

> because I had had
> very interesting conversations…
> and I could tell that they were
> operating at a very high level,
> they were very informed on these kind of issues of [content area]
> very well versed in that,
> or at least, if they were not very well versed,
> they were, they sort of had an affinity for these kinds of conversations.
> so I appreciated that insight.
> That's one thing that I did
> and others would bring courses and we would look online
> to see their online course space and then they would ask for feedback on that.
> so it was kind of presentation on something
> that I'm working on and I hope you can give me feedback to make it better.
> (Interview, l. 815)

Frequently the agents described the feeling of being part of an elite group. For example, Jason described his experience this way: "there we sat, the three of us, in stunned silence. Here we were, bright PhD students—the intellectual 1%-ers if you will" (Lived Experience Description, l. 1). As a self-proclaimed extrovert, Jason felt energized by being connected with others. This sense of belonging was exciting for Jason, in part, because it afforded him new ways of being in the world and ideas for the future:

> I kinda recognize that it's,
> and this is just kinda like
> what we've been talking about lately in coursework
> it is process over product,
> ya know sounds cliché
> but it's the journey, not the destination, right?
> so it's, I find in myself,
> energized by being connected
> and feeling connected to other people
> um, some of that is my extroverted nature I know,
> some of that is also kind of looking forward to the next time
> like I try and,
> with any interaction with people or stuff,
> I try and learn something more,
> to figure out some new way of going through the world
> and so I find that looking forward

> to doing that the next time
> is also very exciting
> and, ya know, once that initial connection has been made
> it seems to come easier the more it happens,
> ya know so whether that's people talking,
> whether that's oh I remember how to set up that hunk of javascript
> on this particular web page
> or oh I remember the camera settings that I need for this kind of a shot
> or ya know whatever that is,
> and then, for lack of a better way to put it,
> it just feels good <laughing>
> ya know, like oh I've accomplished something, right?
> (Interview, l. 190)

When the experience of belonging came from someone who the agent admired, then it enhanced self-esteem and confidence. When an agent felt supported and encouraged, they were driven to accomplish their goals and thus gained a sense of satisfaction in the attainment. This experience was like a springboard that perpetuated a vortex of increasing confidence and success. For Andrea, support and encouragement from a professor who shared a common interest helped her to pursue a challenging goal. The professor introduced Andrea to technologies that she could use to build an online presence (Lived Experience Description, l. 13). Inspired by her professor, Andrea worked hard at a challenging task and the professor recognized her accomplishment and responded to her with kind words that "energized and encouraged" (Lived Experience Description, l. 27) Andrea to set more challenging goals. Similar to Chris' experience, Andrea's sense of belonging extended beyond professional and academic communities to her personal connections:

> My network for me is more like I have
> some colleagues and some friends in this network.
> And when I feel frustrated about something
> or maybe I have some issues in my life

just in my life,
I will reach out to my friends
in the network
or maybe they can't give me some professional help
but in my feelings,
it feels good after the talk
so it's also very important to build up my happiness
maybe, sometimes it's not only about the professional part
and sometimes I feel like they can't give me many professional suggestions
but for the feeling part and for the happiness,
this part, it's very important as well,
particularly for … PhD students
yeah for me, sometimes life feels, life is hard…

I have a very good friend, her name is [Kim]…
she doesn't have the professional skills in my major,
But when I feel frustrated
like when I take a course and…
I feel frustrated not because,
maybe it's because of … or maybe it's because…
I transferred from another major to…
so I don't have the background
and so at that time I talked to her a lot
and we are still friends
and we will get together…next Friday
we will talk about a book…
The book is not about [an academic subject] <laughing>
It's about how to embrace yourself
and how to embrace the imperfect parts in yourself.
So this feels like spiritual
like how to build your spiritual health.
It's also very important for me
and I learned a lot from her
and she's always very happy
And [gives me a lot of] courage.
I think, so that's also informal learning
is also a very important person in my network,
not just for professional career or something,
but that part's very important for me.
(Interview, l. 389)

In this experience, it was possible to see how a sense of belonging in more than one context was an important part of the whole lived experience of connectedness. The agent

was not only intellectually stimulated, but also felt emotionally supported and encouraged through experiences of belonging. This emotional belonging led to increased happiness and contributed to satisfaction and success in the agent's life. In contrast to this deep sense of belonging through personal life connections with people, an agent experienced more superficial connections and experiences of belonging that were also motivating. Nicole explained about using Twitter, "Frankly, the 140 characters only allows for superficial answers" (Lived Experience Description, l. 95). Part of the value of using Twitter in her personal learning network was the affordance of an online professional presence, specifically being present in a Twitter chat that was recognized, sponsored, and facilitated by an industry organization. Having a presence and being present was part of belonging, and part of the lived experience of connectedness, as Nicole explained:

> I do not think my objective
> for participating in Twitter chats
> is to get into existential arguments with people
> who I am not sure are even talking about the same thing as me
> in 140 characters-
> especially in conversations that stay at 10,000 feet
> "change takes time".
> It is usually to gain more followers
> and stay active in the conversation
> almost strictly for appearance reasons.
> (Lived Experience Description, l. 131)

Being part of the conversation, knowing the topics of conversation, knowing the viewpoints of others, understanding and speaking the language, and having others in the conversation recognize an agent's presence and engagement was all part of the lived experience of belonging through connectedness. There was value in being present and in having a presence. To gauge this experience, Nicole looked to her number of followers as

a kind of feedback. Her intent was to increase her number of followers in her content area of specialization. Towards this goal, she pushed out information that she believed they would find valuable, as a way of engaging in conversation and belonging:

> I'll admit it out loud, that I am at 520 [followers]
> I want that, I'm always checking everyday
> how many followers I have
> and I'm trying to get it up
> and then it always comes down a little bit
> and then it goes up like 520s up,
> it's been at 517
> and the people that I'm trying to get to follow me
> are [content specialization area] people
> so I'm constantly pushing out,
> the only things I push out are things related to [this area of specialization] really
> um, and problem was as
> I feel like I don't have anything to share all the time.
> I'm not contributing anything
> and so it's like a lot of re-tweets
> um, but then I was shown
> this really awesome platform called Medium,
> which basically takes
> it's like a blog moderator, and so I also
> have this downloaded on my phone
> and I get an email digest everyday
> of the interesting articles,
> and then I go through them
> and if I find them interesting
> or if they directly connect with [my specialization area] in anyway,
> then I'll tweet them out and
> I've gotten a lot of traction that way,
> so it's not necessarily me creating the content
> and I hope to do that at some point,
> but at least it gives me something
> um, and you can get further in with
> just looking for something related
> to [my specialization area] and that's fine.
> Today I tweeted this article out.
> It's all about this man and he was taking pictures of humpback whales
> and this man was sitting there on his phone and
> he didn't realize this giant humpback whale
> who could probably damage his ship is swimming by him

> and the photographer wrote "the sign of the times" and
> then all these news stories picked it up and
> so he talked about how all news stories picked it up and
> originally he didn't care about any of these pictures of just the whales,
> but it was the whales and then the paddle boarder…
>
> So every time I seem to post one of those I get a lot of action, um
> from people, and re-tweets and those pieces.
> The other thing I probably tweet about is just
> when we're in class and
> I always try to tag [the college]
> and they never re-tweet me and
> it always makes me annoyed.
> (Think-Aloud Observation, l. 125)

Social media and communication technologies afforded Nicole a means to engage and interact with others not only in a superficial way that was limited by 140 characters on Twitter, but also in more sustained ways including her use of Slack in the workplace to communicate with colleagues (Think-Aloud Observation, l. 118). Nicole described herself this way: "I am a very interpersonal person, like I thrive off of relationships and conversations" (Think-Aloud Observation, l. 753). She had been using social media since her youth and, given her self-described nature, it was not surprising that she used technologies in a way that extended her innate interpersonal talents in her experiences of belonging and connectedness.

Similarly, through his experiences of belonging in an elite group of recognized leaders, Eric felt pride in his accomplishments, which gave him confidence to try new challenges: "that level of comfort at, in the Facebook group then led to my reaching out at conferences and other… leaders" (Interview, l. 152). He described his sense of pride in the work he accomplished with his group:

> This was also a good way for us to document our work

so that we could come back to it
to say, look at where we've come from,
we came from a, kind of a sketching ideas out on a legal pad
to things like designing Google sites
and creating those handbooks
and rationalizing to a school board about why we did what we did
and it feels good to have this as a community to say
we're proud of what we've done
(Think-Aloud Observation, l. 178)

Expanding on this feeling of pride and honor that grew out of hard work and accomplishments in a small group of professionals, Eric explained:

I feel proud
of what we're doing at [the school],
um honored to be um
considered in a network like that,
like with um,
I'm just thinking of like the go-to [practitioners]
that a principle would say,
hey if I want to see a really quality [practitioner]
ya know, you should go visit a,b, or c and
ta know that I can connect with people in that group
I think makes me not only feel good as a professional,
but also just makes me feel honored
to be a part of that group.
(Interview, l. 177)

Eric illustrated his experience by using an analogy of a pie contest: "I mean if you're willing to showcase something, if you're willing to like put a pie in the baking contest, you're pretty damn proud of that pie" (Interview, l. 419). This analogy pointed to an aspect of the experience of belonging, which was public recognition of an agent's work. As a professional courtesy and a way to be more present at a conference, Eric explained how he used technology in a purposeful way for promotional exchanges:

I think that I'm a little bit more purposeful on Twitter,
that when I'm gonna go to a conference
and I know I'm presenting

> that I'll tweet out about ideas walking in to that presentation
> or that I'm even just I know I'm putting finishing touches on slides or
> um, ya know, you should come to Boardroom 3 on Saturday at 8:00am
> because its gonna be a fabulous talk
> or ya know like talking up the session before the actual conference
> because people will then search that out.
> A lot of well connected younger [practitioners] in particular
> know to be looking for that stuff before a conference,
> to be searching for a hashtag before a conference, um
> so I think I'm a little bit more purposeful
> when I go to a professional conference that um,
> it's almost like a PR, in a PR way to be more present at a conference
> and also to be looking for other sessions
> because my session is one of maybe 200 at a conference
> and I want ta attend awesome sessions too,
> so I wanna make sure that when I hear from someone,
> ya know whether it's them posting the video about what's going on
> or a couple of catch words
> or ideas that I'll come out knowing
> ideas that I'll know better coming out of a session
> um, that's gonna make my conference experience better,
> ya know then taking that to a professional organization level.
> I've done a lot of volunteer work in the past with the [State] council
> on the [specialization content area], which can be shortened to [initials] dot org
> but um, that's how we will search then for like a keynote speaker
> or someone that we want to invite for a talk
> or it's a great way to identify in people in the professional development side
> whether it's at the state level or at the district level too.
> (Interview, l. 227)

This kind of growth and the public recognition that came from belonging to a group at times required courage to participate. However, the outcome of the experience gave an agent a feeling of pride, honor, and satisfaction in the accomplishment of the challenging goal. The feeling of belonging in a group provided the encouragement and support that an agent needed to strive for greater challenges. Some experiences were deep and personal, while others were more superficial. Agents experienced structure around a sense of belonging, as in academic settings, professional meetings, conferences, or workspaces. In

other areas of an agent's life, belonging was experienced in unstructured environments, as in personal relationships. In all of these instances, and to varying depths, belonging was an inherent motivational aspect in the lived experiences of connectedness. The data supported Maslow's (1943) theory of human motivation in which he proposed that people desired to belong, and beyond belonging, they sought experiences that fostered esteem, including self-esteem and the esteem of others, as well as fulfilling their desire for achievement, confidence, independence, freedom, prestige, and recognition.

Self-actualization. According to Maslow's (1943) theory of human motivation, self-actualization is the peak of the hierarchical needs. It is the desire for self-fulfillment. He described it as the desire "to become everything that one is capable of becoming" (Maslow, 1943, p. 382). Self-actualization was evident in the lived experiences of connectedness. An agent was driven by curiosity and relevance in a trajectory towards self-actualization through challenging goals. Core to Malone and Lepper's (1987) taxonomy of intrinsic motivators were goals—both tacit and explicit—set at an optimal level of challenge. Curiosity and relevance were also central to their taxonomy, as well as to Keller's (1987) ARCS model of motivation. An agent's drive, in a trajectory towards self-actualization, was evident in his tacit and explicit challenging goals, his curiosity, and the relevance that he found in his experience.

Eric was driven by a desire for personal and professional growth. After many years in his profession, he was ready for new challenges and to strive for a leadership position, "I was ready to step up… ready for that kind of challenge and to try something different, so maybe it was out of a leadership capacity or component to do that" (Interview, l. 82).

Through connectedness he pursued his goal:

> I think, ya know, more along the sides of, more along the lines of
> me improving as a result of networking with people that are better than me.
> Ya know what I mean?
> Like, I like to play golf with people who are better than me
> because I carefully watch how they play golf
> and how they approach the game.
> (Interview, l. 99)

By connecting with others who played at a higher level, a more advanced or expert level, Eric was able to observe others. Through his observations, he pursued his desire to become all that he could be, to become a better player, to become self-actualized. Michelle described how she experienced freedom and agency to pursue her own goals:

> I think it's really cool
> because I am the one
> that is driving the learning.
> I pick and choose
> what I want to learn,
> what I want to take in as fact,
> and what I want to take in as possibilities.
> And so I think it's kind of refreshing
> um, ya know, because going through education
> and ya know learning,
> its always been, ya know, a teacher is giving you this
> and then you are taking that in,
> whereas here, in my learning network
> it's, I am the driving force
> behind what I want to take in
> and the knowledge that I want to learn about,
> so it's *freeing*.
> (Interview, l. 116)

The freedom to investigate and seek information gave Michelle the freedom to pursue self-actualization. Similarly, Jason also experienced freedom to set his own goals. As he explained, setting meaningful, personal goals that were also professional goals or academic goals could be "very exciting and really scary" (Think-Aloud Observation, l.

38) when the activity required “an extra level of care” (Think-Aloud Observation, l. 45). Freedom to do what one wishes and the freedom to seek information were key differences between informal and formal learning. In formal learning, the teacher set the goals. For example, Jason participated in a class project with a small group who were tasked with working together, but independent from the teacher to solve a challenging task. Jason described his experience: “We sat together, the three of us, in stunned silence. Here we were, bright PhD students-the intellectual 1%-ers if you will—and we couldn’t figure out our answer to the problem” (Lived Experience Description, l. 1).

Alternatively, Andrea pursued a challenging task that she set for herself. While it was a similarly challenging experience installing a difficult piece of software on her laptop, she described her experience: “After over-7-hour-try, it was finally successful installed in my laptop. I felt so happy” (Lived Experience Description, l. 23). The contrast of these two experiences shows the significant importance of freedom in the pursuit of self-actualization, particularly as it related to the differences between formal and informal learning.

An agent’s tacit or explicit challenging goals were born out of his innate curiosity, passions, and interests. Eric explained, “For me, it’s about networking and committing time to things that I’m passionate about” (Interview, l. 56). Curiosity was threaded through the agents’ experiences of being connected. In part, an agent was curious about the activities of others in their network, as Eric described, “I’m curious to find out what other people are doing” (Interview, l. 177). For Chris, his curiosity was piqued to find out more about a content area of interest to him:

> This was an inspiring diagram to me
> because when I got this
> piece of paper
> that I took this image of,
> I had not yet started my PhD program,
> and my only academic background
> my only higher education academic background
> was in [my content area]
> ah and so seeing all of these different theories and
> schools of thought was sooo interesting
> ah and just sooo just fascinating
> and it made me really want to learn more
> about each of these
> ah and oh yeah
> and now as I look back on it,
> I haven't looked for
> I haven't looked at this for a while,
> but I'm recognizing some of the names
> for the very first time
> which is really cool.
> (Think-Aloud Observation, l. 273)

Curiosity was piqued by the activities of others, inspired by images, and provoked through controversial ideas. For example, Chris described an experience when he was confronted with novel, paradigm-shifting ideas. Chris' experience of this shocking, new idea would align with Keller's (1987) notion of the importance of gaining attention as a first step in experiencing intrinsic motivation.

> This is one that [my professor] said, and he says,
> "Important work happens
> when private troubles intersect with larger public impact"
> which I thought, at that time, was pretty powerful…
>
> I found [the author] to be *provocative* and so I wrote
> two essays and throughout those two weeks um
> one essay per week, I found ah my
> *my opinion shift pretty drastically*…
>
> I was a little bit averse to that idea at first,
> there are, ya know,

> it was *controversial* of course
> and I was averse to that idea at first.
> (Think-Aloud Observation, l. 562)

Curiosity led the agent down an interesting path of intellectual discovery. Nicole found fascinating trails to follow as she explicated: “I spend my first half hour to hour everyday, I walk in and I need to just check in with everything, I will follow trails as they come along” (Think-Aloud Observation, l. 41). Jason, too, had a similar experience in which curiosity lead him down an interesting path of inquiry, as illustrated:

> Every so often I end up down these rabbit holes…
> This is a site that was started by petroleum engineers
> looking at motor oil
> which sounds so dumb,
> ya know, like I take a step back from that,
> I'm just "why in the hell am I here?" <laughing>
> and yet ya know,
> one of the reasons my old car got to
> 174,000 miles is because of modern oil
> and so I find sometimes that there’s, ya know,
> I jump in to look for something
> really specific and then I end up reading oil spec histories
> at a reeaally niche sites and learning about very interesting stuff.
> (Think-Aloud Observation, l. 308)

Along with tacit or explicit challenging goals and an agent’s curiosity, finding relevance in the experience propelled the agent in the trajectory of self-actualization. Relevance was evident in the present worth or future usefulness of information, ideas, discussions, or connections with people. For example, Eric engaged in a Twitter chat in which he expounded, “I would want to contribute more on Sundays if I were a principal. I get a sense of how that community helps support other educators” (Lived Experience Description, l. 27). In another instance, his challenging goals were born out of necessity and immediate relevance:

Five years ago [the high school] was asked by its school board
to begin an initiative with [content area].
After the district office consulted with a tech committee,
they moved forward with an option to outsource instruction
to an educational co-op
against the advice from our team and a feasibility study.

After connecting with like-minded professionals from the building,
we chose to propose another idea to the school board.
We suggested to take the dollars to be allocated for courses
designed from instructors outside of our building,
what if instead we collaborated [on] a grassroots efforts
to design [content area] options in-house for our [high school] students.

When we first began collaborating
one of the staff members created a Facebook group
and included the 7 instructors.
This new online space served as a meeting ground for ideas,
an opportunity to share names, resources, links and documents
as we teamed up together.
What impressed me the most
was that people were willing to put in extra time
after hours and on weekends
to help this newly-formed team.
It was a chance for us to chat "off the record" and not on school email.
Our group was now
a new *engaging* part
of my school community at [the high school].
Now our ideas, resources and knowledge has multiplied by 7,
taking our enthusiasm to another level.
We were sharing resources from the newspaper,
these resources from M.S. and M.Ed. programs.
We collaborated on conference session proposals
and working hard to challenge ourselves
to consider other options about student learning
outside of our classroom rules.
A common post to the FB group for the connected teachers
was about policies and contacts.
We were asking each other about who we might contact with specific questions.
Our network had expanded to connect us with some pretty extraordinary.
(Lived Experience Description, l. 31)

This experience of engaging with others on content that had immediate relevance

was a common thread that ran through Eric's experiences of connectedness in his personal learning network. He pursued his passions in other content areas in a similar way. Also, the relevance that Chris found related directly to his pursuit of a challenging goal, which was a graduate degree. To that end, connectedness in his personal learning network took the shape of GRE vocabulary words (Think-Aloud Observation, l. 229), inspiring quotations about leadership and teaching (Think-Aloud Observation, l. 244), images related to future work and academic life (Think-Aloud Observation, l. 252, 260), useful actionable verbs related to Bloom's taxonomy (Think-Aloud Observation, l. 300), and a content area in which he had a personal passion (Think-Aloud Observation, l. 308). Interestingly, the content area of food and beverage was a personal interest area shared by all of the participant-agents in this study.

When an agent engaged in a project in a content area that transected personal, professional, and academic interests, it took on a particularly powerful characteristic of outstanding, supreme relevance—an *uber-relevance*. For example, Jason took a research course in his graduate program and used a personally relevant content topic that had immediate relevance for him, as well as future relevance: "I'm in a… research course right now and one of the things that I'm working on is trying to build up the next version of this website…. I'm trying to figure out how to do this" (Think-Aloud Observation, l. 4). In his process of completing an assignment for a research course, he was simultaneously using his personal learning network to draw on his own experiences and the expertise of others while digging into theoretical underpinnings to advance his ideas and project that he was developing (Think-Aloud Observation, l. 17). Michelle, too,

found immediate, direct, real-life relevance in her experiences. For Michelle, being connected meant finding value in the information and ideas that she could apply to her work-life and academic interests:

> I started by following people I knew
> and organizations that interested me.
> My interests mainly with [content areas].
> This is when I started to feel more connected.
> I started looking for people
> who were interested in the same things
> that I was interested in.
> And then look to see who they followed.
> I was following people who provided tips
> that I could use with my [work] right away.
> I started to see and use Twitter for professional development.
> (Lived Experience Description, l. 33)

Similar to Jason's experience, Michelle's personal learning network contained many content topic areas of relevance. This was evident in the expertise of the people that made up her personal learning network. For example, she found information on a content area that had deep and immediate relevance, and at the same time she found information and ideas related to content topics that are simmering on the back burner that hold relevance for future usefulness (Think-Aloud Observation, l. 192, 202). Keller (1987) outlined the value of content that held present worth and future usefulness in his strategies for promoting relevance as part of his ARCS model of motivation. Intriguingly, interesting, silly, fun content topics floated amidst these content topics that held immediate and future relevance for personal, professional, and academic goals for agents (Michelle, Think-Aloud Observation, l. 735). Jason described how information and ideas about hobbies streamed with formal learning content topics in "close proximity to each other temporally" (Think-Aloud Observation, l. 246). This illustrated how streams of

relevance flowed together from disparate tributaries—personal, professional, and academic—to create *uber-relevant* experiences.

Relevance, both for the value of present worth and future usefulness, was inherent in lived experiences of connectedness in a personal learning network. As with Jason, Andrea, too, experienced a kind of uber-relevance when she applied an academic topic to her personal life, which inspired ideas for future professional work (Lived Experience Description, l. 23). Andrea was "energized and encouraged" (Lived Experience Description, l. 27) by kind words from a professor, which gave her confidence to share her new expertise with others (Lived Experience Description, l. 47). The outcome of this kind of relevance was powerful, as Andrea explained:

> Two days later, one of my classmates…
> sent me an email and compliment
> [on my topic of expertise].
> She then mentioned
> that she wanted to learn
> how to [use the program] with me.
> And we set up a time to discuss it.
> This was the first time
> in my PhD journey
> *that I felt being needed….*
>
> I have done my best in my coursework
> and I know I have done a good job
> in all my courses.
> I also got some oral compliments
> from my advisor
> and other colleagues.
> But this is the first time
> I really felt
> that I could *offer something practical and useful to others*.
> This connection really has pushed me forward
> on my work and study….
>
> I can always do my best

> on what I am good at
> and try [to] not let the barrier
> get in my way of success.
> (Lived Experience Description, l. 47)

Andrea, Jason, Michelle, and Eric each described moments in which their personal, professional, and academic pursuits transected in uber-relevant experiences. For all agents, it was a powerful experience. It some instances, this experience of uber-relevance also coincided with growth and recognition through promotion to new, challenging professional positions. Achievement, confidence, recognition, and appreciation were core attributes of Maslow's (1943) theory of human motivation in the hierarchical level of the need for love, affection, and belonging. As an example, Michelle was recognized as someone with a propensity for her area of expertise, which led to opportunities to showcase her knowledge, skills, and abilities. Success in this endeavor led to a promotion in her area of expertise in a trajectory of self-actualization: "I am excited, just because it's like, I'm getting my PhD in this and now I actually get to do that as an official job title whereas before or now I'm just doing it on my free time <laughing>" (Think-Aloud Observation, l. 302). Achievement, recognition, and promotion in the direction of self-actualization followed Michelle's freedoms to do what she wished (in her free time), to investigate and seek information about topics she was innately curious about, and to express herself about her interests.

For Nicole, staying connected to trends was important to her professional success. She described how leading a professional development workshop provided motivation: "that will be the impetus for me to freshen up my skills" (Think-Aloud Observation, l. 819). Nicole elucidated how she enjoyed the practice of spending time surfing "probably

more than I ever realized before this reflection" (Think-Aloud Observation, l. 864). The intrinsic motivation of tacit and explicit goals in the pursuit of curiosities played out in the lived experiences of connectedness in personal learning networks. The findings confirm the importance of freedom, curiosity, and relevance to the pursuit of self-actualization as proposed by scholars (Keller, 1987; Malone & Lepper, 1987; Maslow; 1943) in their theories of motivation.

Being-in-the-know. Maslow (1943) postulated an additional human need beyond self-actualization, which was the desire to know and to understand. Maslow (1943) wrote that the need to know and understand were considered part of the need to organize the universe to feel safe and to express self-actualization, as well as part of the freedoms that were preconditions for basic human needs. However, he wrestled with the role of curiosity, learning, philosophizing, and experimenting as human motivators. He proposed that even when humans know and understand, they continually want to know more and understand more. Therefore, he postulated "a basic desire to know, to be aware of reality, to get the facts, to satisfy curiosity" (Maslow, 1943, p. 385). He went on to explain:

> The facts that we acquire…inevitably get theorized about, and either analyzed or organized or both. This process has been phrased by some as the search for 'meaning'. We shall then postulate a desire to understand, to systematize, to organize, to analyze, to look for relations and meanings. (Maslow, 1943, p. 385)

Maslow's (1943) notion that humans seek a desire to know is similar to the ideas put forth by Siemens' (2005) in his connectivist model of learning. Siemens (2005) integrated principles of chaos, network, complexity, and self-organization to theorize a

connectivist model of learning in which currency—accurate, up-to-date knowledge—was the goal of all learning activities. In his principles of connectivist learning, he proposed that learning and knowledge were supported by diversity of opinions, and that the ability to see and make connections between fields, ideas, concepts, and sources of information was essential (Siemens, 2005). He believed, "Nurturing and maintaining connections is needed to facilitate continual learning" (Siemens, 2005, para. 23). The findings showed that agents pursued a state of being-in-the-know, much like Maslow's (1943) notion of a desire to know and Siemens' (2005) notion of currency.

For Eric, being-in-the-know was useful and important for his professional success. By following a particular hashtag on Twitter, Eric engaged in conversations about his content area. At times, he would search a hashtag to find out what people discussed when he wasn't able to participate in a chat. Eric provided this example:

> Every time [the Twitter chat] comes up,
> then I'm trying to figure out,
> okay, well what are people that are [content area] educators
> what are they talking about?
> Because then I'm going to want to incorporate that into my classes
> that I teach in the summer time,
> which are directed specifically at teachers of [this content area].
> So this kind of helps me *stay current* as a first year out of the classroom;
> out of the K-12 classroom.
> This helps me stay/feel a little bit more current
> as I sometimes now feel disconnected from what's happening
> in the K-12 classroom.
> So I think I get a little sneak peek
> of what's going on with [James] out in [a Midwest state] for example
> to find out what he's presenting at for the [organization].
> (Think-Aloud Observation, l. 597)

Akin to Eric, Jason also used social media to "see what's going on" (Think-Aloud Observation, l. 218). He's "on late night and maybe once during the day" (Think-Aloud

Observation, l. 217). He found information and ideas that piqued his curiosity. These included topics about his personal interests and hobbies, as well as topics he felt passionate about that had an emotional appeal (Think-Aloud Observation, l. 220). He described these diverse topics as being "in close proximity to each other temporally" (Think-Aloud Observation, l. 246). In this way, the experience of learning through connectedness by being-in-the-know took the shape of small doses of emotional feel-goods and cognitive curiosity stimulation, peppered with ideas and information for learning so that the agent felt he was privy to current and timely happenings.

Similarly, Andrea used her cell phone and laptop a lot everyday (Think-Aloud Observation, l. 154). She sent email and text messages to classmates in order to schedule times they could meet and discuss studying or research. She used social media applications through her cell phone. She liked to see what was happening (Think-Aloud Observation, l. 142). Andrea was interested in connecting with others who shared similar interests, which was the impetus for her creation of a blog (Think-Aloud Observation, l. 328). In this way, her aim was to be-in-the-know around a specific topic of interest that was professional or academic-related. Andrea used various technologies to be-in-the-know. For example, she used Facebook for personal connections, Twitter for academic interests, and LinkedIn for introductions to others for potential closer connections in the future (Think-Aloud Observation, l. 702).

Being-in-the-know was also important to Nicole. She had first begun to use Twitter, to follow entertainment news such as celebrity and comedians for fun. Soon after she began to use it "to keep in touch with the larger 'educational' world" (Lived Experience

Description, l. 16). She explained: “Everyday, I get the latest educational news from Twitter-savvy educators from across the country. Some is junk but some is worthy. All the information comes to me” (Lived Experience Description, l. 17). Being-in-the-know was a part of her daily routine: “I feel like I spend my first half hour to hour everyday, I walk in and I need to just check in with everything. I will follow trails as they come along” (Think-Aloud Observation, l. 41). Nicole described how it was important for her to “keep fresh” (Think-Aloud Observation, l. 441) of the latest ideas and information in order to be effective in her job (Think-Aloud Observation, l. 441). Knowing a lot of useful technologies to share with others for their work was essential to her job success (Think-Aloud Observation, l. 448). She explained:

> If I didn’t spend
> thirty minutes to an hour
> at least
> every day
> just surfing,
> just like putting my tentacles out there
> and making sure I’m on tap with everything,
> I would have so much more time,
> but I could never really just do that.
> (Think-Aloud Observation, l. 800)

This illustrated the desire to know and to have continual currency—up-to-date information. Part of the value of being-in-the-know was relatability to others and being prepared to engage in universal conversations around pop culture. This ability to relate to others directly supported Nicole’s professional success. Nicole viewed this knowledge as part of being a well-rounded person:

> I've always felt like being a well-rounded person,
> in that sense of information,
> because you could be a really awesome, raging academic,

> but if you don't have any social skills
> or you can't make conversation
> ‘cause you're not up to date on current events,
> even if there are current events that don't matter to most people,
> like the roast of Justin Bieber, right?
> Like, ya know, a lot of people don't care,
> but if it gets brought up in conversation, um
> and I suppose working with young people as well
> those types of things that maybe like,
> could be categorized as junk,
> or like when I go through the Buzzfeed,
> like that’s important for me to know,
> in order to be the best practitioner that I can be
> That’s, ya know, pretty much my role, too.
> (Interview, l. 590)

The experience of being-in-the-know, desiring to know and understand, and having the currency of accurate, up-to-date information was an aspect of the tentative manifestation of being connected as motivation in a personal learning network. The close temporal proximity of bytes of emotional support and interesting, relevant information was highly motivating to agents. Maslow’s (1943) theory of human motivation and Siemens’ (2005) connectivist model of learning informed an interpretation of being-in-the-know as a highly motivating state for agents.

Summary of connectedness as motivation. Experiencing connectedness was motivating. When an agent experienced connectedness in her personal learning network, she was motivated by the desires for safety, freedom, and belonging towards self-actualization and a state of perpetually being-in-the know. Through curiosity, relevance, and challenging goals, the agent experienced freedoms to speak, to do what one wished, and to investigate, which led to confidence and satisfaction in belonging and recognition. These motivations drove agents in the trajectory of self-actualization. Motivation theories

and models (Keller, 1987; Malone & Lepper, 1987; Maslow, 1943) and the connectivist model of learning (Siemens, 2005) informed the interpretation of the tentative manifestation of connectedness as motivation including the needs for safety and freedom, esteem through belonging, self-actualization, and the desire to always be-in-the-know.

Tentative Manifestation: Connectedness as Learning

Agents learned through connectedness. Learning through connectedness in a personal learning network was experienced in a dynamic process of inter-related activities. Like a groundswell, connectedness afforded conditions and interactions for learning, which took shape in multiple ways. Connectedness afforded: (1) conditions that fostered agency, (2) interactions that informed tacit and explicit goal formation driven by curiosity, (3) opportunities for observations and modeling, (4) experiences of reciprocity, (5) access to multiple perspectives for creative and critical thinking, (6) fortuitous chances of serendipity, and (7) internal syntheses of ideas and information that involved organizing, reflecting, writing, and producing. Primarily, the theories of Dewey (1938/1997) and Bandura (1986) were helpful for interpreting the data related to how learning took shape through connectedness in a personal learning network.

Agency. In his discussion of an agentic perspective of social cognitive theory, Bandura (2001) defined agency as "acts done intentionally" (p. 6). He discussed three kinds of agency including personal agency, proxy agency through others, and collective agency through interdependent groups. In Piaget's (1964) child development theory of cognitive constructivism, he described four factors that led to the development of schemas between the four stages of growth—sensory/motor, pre-operational, concrete

operational, and formal operational. The four factors included maturation, experience, social transmission, and equilibration or self-regulation. In discussing the factor of experience in the development of cognitive structures, Piaget (1964) defined physical experience as "acting upon objects and drawing some knowledge about the objects by abstraction from the objects" (p. 179). He also described a second kind of experience in which knowledge was drawn, not from the objects, but from the actions taken upon and with the objects. Likewise, for Dewey's (1938/1997) philosophy of educative experience, agency was an inherent part of an educative experience through the principle of individual freedom. To Dewey (1938/1997) freedom was power and self-control, which he viewed as the basis for intelligence, specifically the formation of purposes and the organization of means to carry them out through a pattern informed by the experimental method of science involving idea generation, actions, observations, and organization.

In his experiences through connectedness, Eric took action. His lived experiences were agent-driven. He connected with people in his field through social media and scanned his Twitter timeline of forward thinkers (Think-Aloud Observation, l. 419) to see which conferences they attended, to access their latest publications, and to gather ideas of hashtags to follow (Think-Aloud Observation, l. 427). He scanned his timeline to find out the topics of conference sessions that thought leaders were attending, the people in their networks, and the people they knew in common (Think-Aloud Observation, l. 454). These shared connections provided interesting topics of conversation for when they met in person (Think-Aloud Observation, l. 456). In another instance of agentic action, technology afforded Eric a private online space, which afforded communication with

people and access to information, specifically content resources that generated new ideas through creative thinking with others, which in turn supported the groups effort to create a new, innovative curriculum, which was an explicit shared goal (Interview, l. 40). Extending beyond the successful accomplishment of the group's explicit shared goal, they also "collaborated on conference session proposals" (Lived Experience Description, l. 47). From Eric's experiences, it was possible to see a pattern beginning with agency and ideas, followed by observations and social interactions.

Dewey (1938/1997) understood that education was a social process and the quality of the experience was, in part, the extent to which individuals participated in groups. Furthermore, he observed that when education was based on experience there would be greater—"more multiplied and more intimate contact" (p. 21)—not less, interaction with others who guided development. Moreover, Dewey (1938/1997) liked the structure of the experimental method for the pattern it provided—not the techniques used by specialists in a lab—but rather the focus and value of ideas and idea generation, actions, observations, and organization, that was the experimental method in a general sense.

Michelle began using social media, Twitter specifically, for her own personalized professional development: "I started to see and use Twitter for professional development" (Lived Experience Description, l. 36). For Michelle, the agency that was afforded through connectedness created a learning experience that felt cool, refreshing and freeing:

> It's really cool because
> I am the one that is driving the learning
> um, I pick and choose what I want to learn,
> what I want to take in as fact,
> and what I want to take in as possibilities
> um, and so I think its kind of refreshing

> um, ya know, because going through education
> and ya know learning, it's always been,
> ya know, a teacher is giving you this
> and then you are taking that in,
> whereas here, in my learning network
> It's, I am the driving force
> behind what I want to take in
> and the knowledge that I want to learn about,
> so its freeing.
> (Interview, l. 115)

Dewey believed "The only freedom that is of enduring importance is the freedom of intelligence, that is to say, freedom of observation and of judgment exercised in behalf of purposes that are intrinsically worthwhile" (1938/1997, p. 61). Freedom was a strong intrinsic motivator for Michelle and the other agents as well. For Dewey (1938/1997) freedom was power.

Nicole described the experience of agency and freedom as a "tipping point for people when they're just about ready to jump in" (Interview, l. 57). They may be guided to join social media "and then it kind of, if it catches, and it doesn't always, then it kind of flows" (Interview, l. 62). Once an agent was driven by curiosity, they formed tacit or explicit goals and sought information and ideas. Dewey (1938/1997) knew that a genuine purpose began as an impulse and a desire. He remarked, "Desires are the ultimate moving springs of action" (p. 70). As an illustration of this point, Nicole used Google to search for a list of hashtags for education to use for seeking new information, ideas, or answers through Twitter. By using a public forum to ask a question with a hashtag, she reached new people that were following the hashtag (Interview, l. 69). By reaching new people, she also reached new ideas and information. Demonstrating how agency related to identity, Nicole explained how an agent had power to shape and re-shape her network for

learning, which at times required “patience and persistence” (Interview, l. 83):

> I don't pull up Twitter everyday and, like, am blown away by what I see, um
> just like when you go to class,
> every class is not this enlightening moment,
> and it may not be until you get offline
> or you reflect on your own,
> that anything makes any sense
> um, and, just remembering ta re-engage with it,
> but there’s some days where you’re scrolling through hundreds of tweets
> Or scrolling through your LinkedIn feed
> and nothing relates to you
> and, or maybe you take the time to click on something
> and you read it
> and you don't find that it’s interesting.
> It doesn't mean that you have to quit the whole thing together um
> yeah, continuing ta follow people,
> to build your list
> figure out what you want your identity in that platform to be as well,
> um, so that you kind of stay consistent.
> You could be everything,
> but then just know that you won't
> you may not,
> you may be too much for somebody,
> maybe they are just looking to you for one thing,
> you sharing about celebrity gossip
> at the same time you’re sharing ed tech news,
> at the same time you're sharing your political views
> may be a turn off to some people
> but it’s your network.
> (Interview, l. 83)

The agent’s online presence then influenced the kind of people who would want to follow the agent, which in turn impacted the people in the agent’s network, when the agent followed back those who followed her. In this way, an online identity and the content that one shared influenced the shape of the network, the experience of connectedness, and the opportunity for learning through exposure to new ideas and information for creative and critical thinking. This connection between identity and

learning was agent-driven. It was the reason the agent, when not finding interesting information, sought to re-shape her online identity, and consequently her network, in order to be perceived by others as someone worth following, that is, who others found interesting. It was a way of attracting like-minded people who shared common interests. In this way, an agent's lived experience of connectedness, and the shape of her personal learning network in particular, was uniquely idiosyncratic based on her own personal interests, formal and informal learning experiences, her own unique lens for interpreting new ideas and information, the people in her network who influenced her thoughts, and the way the agent organized, synthesized, and shared content. As Nicole explained:

> There's not always somebody next to you reading the same thing,
> interpreting that in their own way and sharing,
> maybe you, um, it's also kind of a sensitive piece
> because that's probably a lot behind my filters,
> is knowing that I never really know
> how someone will make meaning of this,
> and I would never want them to make the wrong meaning of it
> (Interview, l. 734)

Piaget (1964) observed that while development of knowledge was spontaneous, learning was "provoked by situations—provoked by a psychological experimenter; or by a teacher, with respect to some didactic point; or by an external situation" (p. 176). Through agency, actions, observations, experiences, and interactions with others—what Piaget (1964) would identify as social transmission—the agent developed and learned by advancing through a process that included what Piaget (1964) referred to as equilibration, or self-regulation.

Goal formation. Active participation and cooperation in the formation of purposes that guided plans and directed actions and activities was a hallmark of Dewey's

(1938/1997) philosophy of educative experience. According to Dewey (1938/1997), a purpose was a moving force born out of impulses and desires, which picked up momentum through observation, information, and judgment to evolve into a plan of action. He viewed a purpose as a cooperative, reciprocal give-and-take between an expert and novice. The purpose, thus, was the starting point to develop progressively and orderly into an expansion and organization of information in a cycle of perpetual, life-long growth through continuity of experiences. Similar to Dewey's (1938/1997) notions of impulses and desires, Bruner's (1961) discovery learning theory placed curiosity at the fore of goal formation as an intrinsic motivator for learning.

Eric was curious about diverse viewpoints on current events and trends (Think-Aloud Observation, l. 288). He was curious about programs (Interview, l. 1173), conferences (Think-Aloud Observation, l. 114), curricula (Think-Aloud Observation, l. 104), and technology integration (Think-Aloud Observation, l. 419) at different schools led by diverse educators and administrators. Led by his curiosity, Eric formed tacit goals and pursued multiple perspectives for creative thinking through idea generation, and critical thinking by considering his position or stance in light of new information from others. As he generated new ideas and learned new information, this informed new tacit goals, for which he sought new perspectives. In this way, learning through connectedness took the shape of burgeoning roots driven by curiosity and agency to form tacit or explicit goals to seek new perspectives. The cycle of growth through a continuous path of meaningful experiences was reminiscent of Dewey's (1938/1997) experiential continuum. Eric described it this way:

> To find out what others are doing
> and then to be able to ask questions of those people
> or to be able to network with those people um
> whether its face to face at a conference
> or its um purely online that you interact with somebody
> to find out more about their knowledge
> (Interview, l. 20)

Eric created pathways for his own personalized professional development through goal setting, which he continually monitored: “always kinda setting the target, it’s a little bit different each month or each year” (Interview, l. 111). Through following, observing, and reading forward thinkers in his interest areas, he found information, ideas, and multiple perspectives for creative and critical thinking. He learned about conferences, which supported his pathways of professional development (Think-Aloud Observation, l. 114). He collaborated on conference proposals with the goal to present his work with others at conferences (Lived Experience Description, l. 47). In part, Eric’s goals were sometimes formed by influence from his professors and the content in his formal classes as a graduate student (Interview, l. 650). The conceptual ideas and theories that he learned in a formal class environment provided a frame and direction for his informal pursuits of more information and ideas; these formal influences were core to Eric's experience and served as a backbone for what he wrote in his blog and other social media platforms, particularly Twitter. He explained this experience as follows:

> In particular, things like TPACK and how technology integration happens,
> not necessarily a specific tool that I showed you in the blog post,
> but something like conceptual or how to frame it is
> serves as the backbone of what I share.
> So that when people,
> here's what I hope that people would talk about
> when they come to my session,
> that he's practical.

> He's pragmatic.
> He knows how to use purposeful technology integration
> and I think that the reason for that is because of the lenses that I use
> when I look at tech integration.
> (Think-Aloud Observation, l. 708)

While Eric was attending a conference session, he had research methodologies at the fore of his mind from a recent conversation with a professor. It was this lens of methodologies that he used to see and hear the conference presentation; looking for input that would inform his research study (Interview, l. 608). In this way, the formal learning informed his goal formation, which was to seek more information about research methodology. The informal learning experience provided input for creative and critical thinking, which helped shape his thoughts and ideas for the direction of his research methodology.

Similarly, when a goal for a formal course coincided with a personal goal, the experience was powerful. Learning and motivation came together in a powerful way for Jason when he was able to work on a personally relevant and meaningful project in the context of a formal class (Think-Aloud Observation, l. 22). He described it as "very exciting and really scary" (Think-Aloud Observation, l. 38) to be working on a meaningful project that would be important for his future endeavors. Both Eric's and Jason's experiences illustrated Dewey's (1938/1997) principles of continuity of experience—how the quality and effect of present experiences influenced future experiences—and interaction among objective and internal conditions. Through objective conditions from social contacts, information, and ideas through formal and informal learning avenues, along with internal conditions of curiosity, interest, and intellectual

stimulation, the agents were propelled forward in an expanding and opening into new fields, ideas, and future growth. These experiences resembled what Dewey (1938/1997) identified as the longitudinal and lateral aspects of experience.

For Michelle, her interest in using social media for professional development and for connecting with others to learn, intensified when she had a real-life, relevant reason to use it for her own professional success, which was to learn more about mobile technology integration:

> So I didn't think about Twitter again till the next semester
> when one of the assignments was to sign-up on Twitter
> and tweet out something.
> I dreaded it.
> I didn't want to do anything with it,
> but I did the assignment.
> That was all I did, nothing more.
> Then this year, things started to change.
> My school was getting [mobile technology] for the whole [grade-level].
> That would impact me.
> I started looking for resources to help prepare.
> I took a class this semester specifically aimed at this.
> As part of our assignment, I had to re-tweet 10 articles out.
> Luckily I remembered I had created an account.
> Having to use it more than once made me investigate it a little more.
> I started by following people I knew and organizations that interested me.
> my interests [were] mainly with interaction design and 1-1 initiatives.
> This is when I started to feel more connected.
> I started looking for people
> who were interested in the same things that I was interested in.
> And then look to see who they followed.
> I was following people who provided tips
> that I could use with my class right away.
> (Lived Experience Description, l. 22)

Michelle pursued her goal to learn more about mobile technology integration and initiatives. To this end, many of the people in her network were classmates and professionals who shared a common interest in this topic (Think-Aloud Observation, l.

19). Most of the content that she shared publicly on social media related to this topic of interest (Think-Aloud Observation, l. 16). Michelle was taking on a new professional role and her goal was to learn as much about the topic area in order to feel prepared for her new role and the new challenges it would bring:

> The first one that I really first started following was
> [this tech integration leader].
> So let me show you him, ah lets see, where are you?
> Maybe its easier if I search, huh,
> So this is [the tech integration leader] and he does that … website
> and so I follow him a lot because he does a lot of articles
> on how to integrate technology within the classroom or
> he also does a lot of just how to,
> and so I do a lot of my problem solving using his site
> and so I'm not even sure how I stumbled upon him to be honest
> I just kind of, I think I might have seen his name
> on another teacher that I followed
> and so, then from there I kept on getting stuff from him through my news feed,
> like a lot of stuff, and then I noticed that I would always go to his site for stuff
> and then from there on, that's why I would always then,
> I knew automatically if he posted something,
> I would want to see what he has to offer,
> and so that's why he's been at the top of my, ya know,
> who I'm following,
> who I look at the most
> just because the information I get from him is the most relevant
> to what I'm doing right now.
> So like I said, next year I'm going to be [in a new role]
> and this is really important for me
> to get as much knowledge as I can for myself right now
> so that I can kinda help teachers next year
> as they are going through that process
> and so he's helped the sources,
> the resources he's put out has helped me a lot on that.
> (Think-Aloud Observation, l. 232)

Dewey (1938/1997) explicated how it was insufficient for a goal to simply have an impulse or a desire, but that an agent would have to also have a plan of action in order to have a genuine purpose. In the excerpt above, Michelle had a plan of action to seek out

multiple perspectives for ideas and information that would help her own learning, development, and growth. Michelle's goal was to differentiate instruction for teachers and to that end she curated information in order to be able to meet their needs:

> For me it's about curating the information
> so that I can later on share
> and say this person did it this way or
> they have this resource,
> so that teachers have choice in terms of
> where they're getting the information,
> if they prefer to be like, "oh I just need somebody ta look at an example",
> then I can just say go here.
> Or if they need, if they're like,
> "no, I need you to walk me through it and show me how to do it",
> then I can, ya know do theirs, so I can kinda differentiate for teachers
> And the need that they have in terms of
> how to integrate tech,
> how to do tech integration
> because for me,
> I'm not a person that needs someone telling me
> how ta follow through,
> ya know, go through it.
> I just need the resource and then I like ta play by myself.
> (Think-Aloud Observation, l. 938)

Dewey (1938/1997) expounded how the pattern of the experimental method begins with an idea, which is followed by actions, observations, and organization. The excerpt above illustrated Michelle's purpose, her plan of action, and her organization of ideas and information towards an end-view of differentiating instruction for teachers to help them integrate technologies in a meaningful way that was personalized to meet their needs. Similar to Michelle and Eric's experiences, Andrea's goals were also formed through influences from a formal class environment.

Andrea applied what she had learned in a graduate level course to her personal life (Think-Aloud Observation, l. 30). Akin to Jason's experience, her goals and topics were

personally relevant and meaningful to her life, which made it a powerful learning experience. From goal through synthesis, Andrea pursued her interest, practiced using a new technology, and wrote about her experience in a public forum, her personal blog (Think-Aloud Observation, l. 42). Her experience exemplified Dewey's (1938/1997) notion of using an experimental method for extracting meaning from experience. Through agency, actions, observations, and organization using analysis, reflection, judgment, and synthesis, the agent embodied intellectual freedom as power and self-control or self-regulation. This powerful learning experience had the potential to become a transformative growth experience. For example, Andrea pursued her interest in data visualization and applied what she had learned about analytics to a personally relevant and meaningful project with the aim to, not only learn about data visualization, but also to make her life happier and more successful based on the content of the project (Think-Aloud Observation, l. 255). In this way, Andrea was able to systematically extract meaning from her experiences by creating an orderly organization of knowledge, which helped her to entertain more creative thoughts.

Nicole found interesting news on Facebook from friends and colleagues who worked in the same field as she did (Think-Aloud Observation, l. 25). These interesting links, along with trending news and information (Think-Aloud Observation, l. 12), served as launching points for Nicole to learn about a topic. In this way, news and information became the impetus for generating new goals. At times, Nicole received news links through push notifications or message alerts in an email, from LinkedIn for example. She would be driven to the site to learn more about the topic (Think-Aloud Observation, l.

64). Nicole's experiences with push notifications from social media sites could be interpreted as a tacit goal of openness to multiple perspectives for the purpose of expanding her knowledge through new ideas and information for creative and critical thinking. She surrounded herself with like-minded people who shared her passion and set up alerts to be notified when new information was posted. In this way, she acted with agency to shape her network and information inputs, and then her network shaped her through the content that flowed to her and drove her to the social media site to learn more (Think-Aloud Observation, l. 56). Her tacit goal, then, in organizing her personal learning network in this particular way, was to be shaped by her network: "I feel like everything is coming at me so I don't always have to search for it" (Think-Aloud Observation, l. 67). Nicole's experiences revealed the epitome of Dewey's (1938/1997) principle of interaction in which the environment and the agent shape and are also shaped by one another. This shows the lateral aspect of experience—the depth, thickness, and richness of educative experience.

Akin to Eric and Andrea's experiences, formal classes informed Nicole's goals. Once she had learned about new ideas and information in her formal learning experiences, she then began to see connections to these ideas in her informal news feeds. She described her experience this way:

> As I learn more things formally,
> things that would have never caught my eye,
> that come across informally
> I am starting to stop and think,
> 'oh, that relates to what I'm learning.'
> It may be very different
> or maybe just an article like that in practice,
> but before I probably would've never given it two thoughts.

> Or I don't understand that
> so I'm just going to move on from it,
> but now I'm starting to grasp that
> (Interview, l. 584)

Dewey's (1938/1997) philosophy of educative experience was grounded in the notion that learning should be of, by, and for experience in order for the experience to be educative. He theorized and operationalized his philosophy and used the pattern of an experimental method of science to illustrate how an agent could extract meaning from experience. The quality and effect of experience influenced what kinds of future experiences would be made possible and probable. The quality of the experience should be agreeable and the effect should be that it led to an interest or drive towards more experiences, not less. Forming tacit and explicit goals born from impulses, desires, and interests with a plan of action is the starting point of Dewey's notion of using the experimental method as a pattern for educative experience. The agents' experiences embodied Dewey's (1938/1997) philosophy of educative experience. Likewise, Bruner (1961) claimed that a learner's attention was attracted to puzzles, because they were uncertain, unclear, or unfinished. He proposed that a learner's attention would stay focused until the puzzle was resolved—until there was clarity. He believed the search for clarity and the satisfaction of the learner's innate curiosity was a self-rewarding experience for the learner.

Observation and modeling. Bandura (1986) wrote extensively about observational learning through modeling in discussing his social cognitive theory. He expounded the subprocesses involved in observational learning from an observer's selective attention of a modeled event, through how information is retained by vivid

imagery and cognitive rehearsal, then finally how actions were produced to form a matching pattern of the model. He described motivational subprocesses involved in observational learning including social reactions, material benefits, and efficacy experienced from exercising control. Likewise, in Dewey's (1938/1997) philosophy of educative experience, he advocated for using a pattern of scientific discovery that involved a component of observation. In his principle of interaction between internal and external conditions, Dewey (1938/1997) highlighted the relevance of both external environmental conditions and interpersonal factors for promoting educative experiences.

Observation and modeling were experienced through connectedness in the learning process. For example, Eric observed, "a lot of well-connected young teachers in particular know… to be searching for a hashtag before a conference, um so I think I'm a little bit more purposeful when I go to a professional conference" (Interview, l. 239). He explained: "That um, it's almost like a PR [public relations], in a PR way to be more present at a conference" (Interview, l. 243). Eric observed the way his colleagues engaged with social media at a professional conference. He viewed their actions as leading to a greater presence. He modeled his behavior and actions to elicit a similar experience. Behaviors and actions could be observed and modeled in person, such as at professional conferences, or online as in social media.

By observing the public forums and networks of like-minded professionals, Eric discovered that many people were following a particular liberal educator. He thought it would be fun to find out more about what the liberal educator thought and wrote about, so he followed him on Twitter (Think-Aloud Observation, l. 450). In that way, he had

topics of conversations to discuss with common connections, which were people who also followed the same liberal educator, among others (Think-Aloud Observation, l. 455). For Eric, the experience was “about knowing what they’re thinking about, what they’re doing, what they are, what’s on their agenda, and also about who they know” (Think-Aloud Observation, l. 461). Eric cultivated diverse connections for greater breadth of viewpoints. He connected with people from his past and present, from local teachers to well-known national figures, from professors to colleagues and peers to students. He explained, “I guess mostly when I follow somebody, I just wanna know of course about what they are thinking about what’s going on” (Think-Aloud Observation, l. 286). Eric observed the thoughts and actions of experts in his network by reading their formal and informal writing through publications and social media chats and posts. Bandura (1986) would view these multiple, diverse viewpoints observed by the agent as an environment ripe for creative innovation through a synthesis of ideas.

Through connectedness, agents observed model behaviors, actions, activities, language, conversations, as well as thoughts and ideas written by professors, professionals, and peers. Eric sought innovative leaders and forward thinkers as models for growth and improvement. He used the analogy of golf to explain: "improving as a result of networking with people that are better than me…I like to play golf with people who are better than me because I carefully watch how they play golf and how they approach the game" (Interview, l. 100). This experience of observing and modeling exemplified Bandura’s (1986) social cognitive theory in which observational learning occurred through modeling beginning with an attentional subfunction followed by

retention, production, and motivation.

Similarly, as a teacher and technology user, Jason understood and empathized with his students regarding how using new technologies could feel unsettling or a little off putting (Think-Aloud Observation, l. 172). Therefore, he provided students with access to exemplary models of work from former students (Think-Aloud Observation, l. 159). This helped students find other perspectives and models to emulate. In this experience, Jason enacted the tenets of observational learning by providing models for his students. This demonstrated how observational learning could occur in a formal learning environment among peers fostered by an experienced educator.

When Andrea attended conferences and learned of a new interesting idea, such as a new technology, she wrote a note in her laptop to capture the thought for generating ideas. Once the thought was captured, she would return to her notes at a later time to organize them (Think-Aloud Observation, l. 580). Her process for capturing ideas evolved from observational influences of how others had used technologies. For example, she was inspired to use a voice memo when she observed a professor using it to give students feedback. This experience prompted her to consider using audio to record her thoughts in the future (Think-Aloud Observation, l. 638). In this instance, the agent's attentional processes were tuned to technology in learning. She retained the information by organizing her data for later synthesis. From professional conferences to social media, agents had access to multiple, diverse models, which pointed to the great potential for innovative, creative ideas.

Twitter chats gave Nicole an opportunity to observe other professionals in her

field, model an online presence, and stay active in the professional conversation (Lived Experience Description, l. 135). She observed how other professionals replied, re-tweeted, agreed, and challenged one another (Lived Experience Description, l. 100). She practiced professional netiquette (Lived Experience Description, l. 131). In these moments, the discussions were superficial to Nicole, staying on a surface level with more breadth than depth (Lived Experience Description, l. 95). These exchanges held opportunities for misinterpretations and generalizations that, at times, frustrated and annoyed Nicole (Lived Experience Description, l. 98). She described how her earliest experiences with social media were not focused on learning, but rather on communicating and connecting with friends. Through those early experiences, she learned about netiquette and developed digital literacies, but they were "life skills and social skills and… unintentional learning pieces" (Interview, l. 253) formed through informal experiences of observation and modeling. These cognitive and enactive rehearsals would be considered part of retention and production in Bandura's (1986) social cognitive theory. The agent's experiences of engaging with multiple models for observational learning epitomized social cognitive theory and creative modeling for innovation in particular.

Reciprocity. As a core tenet of his social cognitive theory, Bandura (1986) advocated for a model of triadic reciprocality in which thoughts, actions, and environmental conditions—including other people—influenced one another interactively as an explanation of human functioning. By analyzing behaviors, cognitive personal factors, and environmental conditions, Bandura (1986) theorized how these three

deterministic factors in his triadic reciprocality model were influencers of, and influenced by, one another. He discussed how beliefs shaped behavior in an interaction of cognition and action. He considered how modeling by people in an individual's social environment could modify the individual's thoughts. In his theory, he proposed that actions, thoughts, and the environment reciprocally influenced one another bi-directionally in a triadic fashion. Agents experienced reciprocity through connectedness, often in a kind of pay-it-forward reciprocal experience in which recipients of good will helped others. Applied to observation and modeling, pay-it-forward reciprocity occurred when agents observed experts, learned from them, then modeled thoughts and actions for novices. Likewise, Dewey (1938/1997) advocated for an understanding of the important impact of the interplay between external environmental conditions and interpersonal factors for supporting educative experiences in the principle of interaction that he outlined in his philosophy of educative experience. He believed internal and external conditions determined the quality and effect of an experience.

Similarly, Vygotsky's (1978) sociocultural theory of learning focused on the reciprocal interaction among society and the individual, what Bandura considered cognitive factors and environmental conditions. Vygotsky (1978) believed individuals constructed meaning socially from their sociocultural environments and then internalized meanings and beliefs. In an enduring cycle, cultural tools in the environment influenced an individual's cognitive processes, and reciprocally, the cultural environment—including tools and technologies—were influenced by the thoughts and actions of individuals in the society.

Additionally, the theory of situated learning (Lave & Wenger, 1991) and communities of practice (Wenger, 1998) foregrounded the valuable experience found in cognitive apprenticeships and the influence of contextual, situational (i.e., environmental) factors in the learning experience, particularly in the social experience of learning. Cognitive apprenticeships, a concept closely linked to Bandura's (1986) notion of observational learning through modeling, were methods applied to formal schooling in which the expert demonstrated thoughts and actions explicitly for novices to view, retain, practice, and produce. Situativity theory was grounded in environmental contexts, dynamic relationships, and reciprocity inherent to interconnected relationships for learning (Schuh & Barab, 2008).

Eric sought to connect with other teachers in his building for several reasons. He was interested to find out what others were doing as a way of generating ideas for creative thinking for professional development in his own teaching practice. He described it as "me improving as a result of networking with people that are better than me" (Interview, l. 101). In this way, the tacit goal was his desire to improve his practice. To this end, he sought feedback from others through connectedness by observing what others were doing in their practice and evaluating his own practice. This input from others would either validate his work or point him to areas and ways of improvement. Eric explained: "ta kinda do some validation in terms of what am I doing in comparison to other people to say that I think that yeah, we're at a good place or I could step it up in this area" (Interview, l. 128). Bandura (1986) would likely interpret this experience as feedback information to improve production processes, which illustrated the interactive

reciprocality of cognitive process and environmental factors. Furthermore, epitomizing pay-it-forward reciprocity, Eric wanted to help others as an experienced teacher and leader. He stated: “I could lend a hand to somebody in the building with x, y, z” (Interview, l. 138). This illustrated pay-it-forward reciprocity in that the agent, as a recipient of good will or good deeds from more knowledgeable leaders, offered to help less experienced teachers. For example, Eric not only followed scholars who he admired, emulated, or aspired to engage on a national level, but he also provided scaffolding for others by modeling personal agency in learning and facilitating opportunities for his students to experience connectedness in the learning process by integrating social media into his teaching (Think-Aloud Observation, l. 300). In other moments, the reciprocity was one-to-one; that is the learning was reciprocated in kind between two people. Eric described this professional learning exchange at a conference in which the conversation was extended through social media and email:

> It was another [content area] conference
> and I, I didn't know this person before the session.
> So I looked her up during the session…
> found out a little bit more information about her during her session
> and then offered my business card to her um, at the session
> because she was talking about …
> learning [with technology in my content area]
> and I thought that she was a really strong [content area] educator,
> that maybe um, could benefit by like
> thinking about other frameworks in technology integration.
> I felt like there would be resources
> that maybe other people in [this content area of]
> teaching and technology might,
> may be able to offer.
> So then I did connect with her on Twitter,
> and then we did follow that up with um a question that I had
> about why she chose the design of the research study that she presented on,
> and then that kind of helped inform me

> about how I was working on a project at the time.
> So, yeah, I would say that it did get kind of personal that way
> in the sense that,
> conference session connected by Twitter,
> but then followed it up with a personal email.
> She gave me her business card too at the time.
> So, yeah, that kinda helped.
> I think it might have helped both of our work
> because she had asked me about specific,
> she didn't yet, she wasn't familiar with TPACK,
> and I think that could've helped shape the rationale behind her work
> um, a little bit stronger on the IT side, but um, or the instructional side.
> So then she ended up kind of helping me with methodology a little bit.
> So it was, it was like, it was a give and a take.
> (Interview, l. 527)

Similar to Eric's experience of reciprocity, albeit in a formal learning environment as opposed to informal, Chris' experience of connectedness with a classmate in an online course began when they each commented on each other's profiles in the beginning of the semester and then continued to comment on each other's work, discussion posts, and projects throughout the semester. He described this initial connection as follows:

> There is something important about creating your own profile,
> as an online representation of yourself.
> It is the first step you take at making yourself available for connection,
> or to tell people—perhaps indirectly—that you may be in the course
> just for the sake of the course, and not so much to gain friends.
> It's the first step to make the possibility of a connection,
> but the first connection happens
> when I actually navigate to another person's profile,
> that she curated as a representation of herself,
> and I express interest in what she has created,
> what she has done,
> and what she has posted.
> Connection begins there,
> and after that we see the results:
> I found myself often responding to her forum posts the most.
> She was, anyway, someone I was particularly connected to
> from the very beginning of the course
> when we were all curating our own online identities.

(Lived Experience Description, l. 81)

Chris and his classmate followed each other's work throughout the semester. The conversations continued beyond the required coursework. They built rapport over the semester that was "a friendly, academic, professional kind of commenting on each other's work" (Interview, l. 332). This was a valued experience. Chris appreciated the reciprocal relationship. He described it as a kind of investment of time and emotion, and "an appreciation of [his classmate's] work" (Interview, l. 525), much like reading a series of novels:

> I had kind of seen a progression of her work.
> I knew a history of her work.
> A very brief history of, ya know,
> four weeks of posting a couple of times a week.
> but I knew what she had talked about
> and what she had been interested in before and so ah
> um it was ah maybe a little bit like reading um
> ah, a little bit like reading a series of novels that in book five
> you can remember some of things that happened in book one.
> You can kind of appreciate,
> I appreciate the length of the relationship that I've had with the story
> or the relationship I've had with this person.
> (Interview, l. 527)

This valued reciprocal relationship also felt empathic through a shared understanding or work to be accomplished and similar ideas about how to pursue a goal. In this experience, Chris felt a shared work ethic, philosophy, and vision of how to complete the work (Interview, l. 189). He explained: "it felt like there was someone that, ah, worked in a similar manner to me on the other side of the line, also there experiencing the same thing that I'm experiencing" (Interview, l. 134). From student to peer to expert, Chris experienced the value of reciprocity in formal learning environments.

Chris taught in an online environment. He planned, designed, developed, and facilitated learning experiences for students by using a variety of interactive technologies (Think-Aloud Observation, l. 83). This online teaching experience was an important part of Chris' connectedness with others in his personal learning network. By way of pay-it-forward reciprocity, he used his own learning experiences as a student and class peer to inform his teaching practice as an expert in his field (Think-Aloud Observation, l. 86).

Similarly, Jason valued process over product in his own learning and as a teacher. He designed his curriculum to support student autonomy and encouraged the students to "chase things that are of interest to them" (Interview, l. 440). He guided learners to set goals, find resources, and report on their findings (Interview, l. 451). Jason explained: "I always learn new stuff from my students…. I get excited by that stuff, by the cyclical nature and the reciprocity that's happening" (Interview, l. 451). Jason not only learned from his students, but also learned from and about the experience of teaching through direct and indirect feedback from students:

> This is Canvas I'm running.
> This is my online course
> and I'm using a little bit of this
> as a way to test occasionally some of the ideas that I'm doing.
> So what does it mean to do user testing?
> How do you get collaboration from students?
> How do you get input and buy-in from students?
> And ya know, every time I teach this course,
> I learn a little something about that.
> It's not the goal of the course per se,
> But definitely comes through and so this
> I'm actually using my experience teaching to sort of
> experientially guide, what does it mean to do iterative design?
> um, I have the affordance in Canvas that every single time I teach
> and even sometimes more often, right?
> That I'm making little tweaks as I go.

(Think-Aloud Observation, l. 67)

In a similar kind of reciprocity that occurred in the teaching and learning process, Michelle found memes on Pinterest (Think-Aloud Observation, l. 773) that were relevant for teaching her students. When she shared them with her students, they told her that the memes were "weak" and "lame" (Think-Aloud Observation, l. 790). She challenged her students to create better memes, and they rose to the challenge by creating their own memes using a free online meme generator (Think-Aloud Observation, l. 888). Michelle described the students' memes as "super funny" (Think-Aloud Observation, l. 807). She explained how the students were "super excited" (Think-Aloud Observation, l. 806) to see their meme, which she programmed to rotate every five minutes in their learning management system. With her students and work colleagues, Michelle engaged in a pay-it-forward reciprocity when she gathered resources from experts and leaders through her informal social network connections and shared the information in a relevant and meaningful way with her students and colleagues in person. Michelle described her experience this way:

> Within my personal learning network
> I feel like I'm a receiver, um
> but because I'm receiving all this,
> outside of that specific learning network,
> maybe my work context in that network there,
> then that's where I'm giving
> what I've been receiving from my personal learning network
> through social media
> and so even though, within the,
> within that personal learning network I'm not giving out,
> I feel like it's okay because for me,
> I, my sharing has to be more personal, more connected,
> I need to feel like I know you in order to share out with you
> and so it's okay that I use that as a curation,

> that learning, that curation process
> whereas then when I share out,
> it's in a different context in a different network
> and it's in the context of,
> I know these people, I work with these people,
> so I'm gonna share what I've learned
> and what I do with the knowledge I've had with them,
> so ya know, right now I'm working really closely with our media specialist
> and a lot of the resources and
> a lot of these I've learned
> from my personal learning network,
> I've kind of pulled out and kind of shared with him.
> (Interview, l. 135)

For Andrea, the experience of reciprocity felt rewarding when she was able to offer practical and useful information to her classmates. After sharing her knowledge in one particular class session, a classmate sought her out to ask her for more information and guidance on the topic of her presentation. Andrea felt needed for the first time (Lived Experience Description, l. 55). According to Bandura's (1986) social cognitive theory, Andrea's feelings could be interpreted as part of the motivational processes that occur in observational learning in which positive social reactions and self-efficacy incentivize the learner when she experiences success and mastery of a difficult task. This instance illustrated the moment in which a learner developed from a novice to an expert who could help others to learn and grow. In a discussion of creative modeling, Bandura (1986) described how experts continue to learn and grow, evolving their craft by learning from others and incorporating the information to give their practice new dimensions. While this was one of Andrea's first experiences of feeling needed as an innovative expert, it would likely be the first of many similar experiences.

As part of her professional position, Nicole used pay-it-forward reciprocity when

she shared what she had learned with others in the context of a professional development workshop (Think-Aloud Observation, l. 773). She modeled how to use technologies after finding them through Internet resources (Think-Aloud Observation, ll. 775, 790). When she thought about sharing ideas and information in a public forum such as Twitter, she thought about the needs and interests of her audience—the people in her network that read her tweets. She knew something about them, their interests, and their professional roles. She aimed to "contribute something that's worth their time" (Interview, l. 451). This was the lens she used when sharing new ideas and information in a public forum (Interview, l. 452). She estimated that 75% of the time she consumed ideas and information and 25% of the time she contributed ideas and information, which had increased with the help of a new blog moderator, Medium, because it curated information for her to share (Interview, l. 460). She valued the "raw, or real" (Interview, l. 517) content that was critical and provocative. She admired those people who were willing to defend their ideas (Interview, l. 523). She found their content interesting and thought-provoking to read. These were the people whose ideas she consumed. These were often professionals in higher education or educational consultants (Interview, l. 506). On the other end of the critical to creative thinking spectrum, were K-12 teachers who were more likely to be celebratory about new ideas, rather than critical. Nicole explained her experience this way:

> There are a few people now,
> after doing this for a few years
> that I know
> that I find their stuff interesting.
> I generally find their tweets interesting
> and sometimes I like them

because they are willing to be a bit more pushy with education.
I think that the difference between
K-12 people and higher ed people
is higher ed people aren't afraid to challenge something
or to dissect something,
with the hope that they want to make it the best it can be,
and K-12 people are way more celebratory.
Let's celebrate everything,
every thing's great,
rose-colored glasses,
and then, but really it's not.
And even when you go to a conference,
It's like the higher ed people will just rip something to shreds
at the same conference that the K-12 people are like starry-eyed
um, and so in that way,
people who are willing to be a bit more
I don't want to say aggressive, or raw, or real,
It's interesting
but then, as you know from previous interviews,
I don't really want to get into it with people,
where these people are willing to sit there and defend their point,
if that's what they truly believe.

If you're a principle of a elementary school
and you're sitting in there
getting in Twitter arguments with people,
people are gonna wonder what the hell you're doing, right?
Whereas in higher ed,
It's almost like you're promoted to be critical
or even, some of these people aren't necessarily in higher ed,
but they are educational consultants,
and they can afford to be a bit more risque I'll say
or really actually share what they're thinking
or when they see something that they don't feel is just,
then really calling it out,
versus just focusing on the positive
because they're not necessarily a representative
of a school or a district or those things.
(Interview, l. 501)

The juxtaposition of higher education and K-12 audiences in Nicole's experience highlighted how pay-it-forward reciprocity worked for promoting creative and critical

thinking. Through the critical thinking of those in higher education, she learned about new, interesting information that piqued her interest and supported her growth as an educator and scholar. Whereas, the celebratory nature of the K-12 audience was useful for creative thinking and new applications, which Nicole shared through professional development workshops in pay-it-forward reciprocal relationships.

Reciprocity among agents and the people in their environment illustrated Bandura's (1986) model of triadic reciprocality. In the way sociocultural factors in the environment impacted agents, and how the agents reciprocally interacted with their environment supported Vygotsky's (1978) sociocultural theory of learning through reciprocity. Reciprocal cognitive apprenticeships (Lave & Wenger, 1991; Wenger, 1998) in which the agent shifts between novice and expert, apprentice and master, demonstrated situativity and situated learning in practice.

Multiple perspectives. In a discussion of creative modeling, Bandura (1986) wrote about his view of originality and innovation. He believed "creative achievements do not spring from a vacuum" (p. 105). Rather, creativity and creative endeavors were born from multiple sources as models for different styles of thoughts and actions. An observer, taking these diverse viewpoints, synthesized them to create a new, original work, thought, or action. Thus, from Bandura's (1986) perspective, the value of multiple perspectives was in the potential for multiple, diverse modeling influences. Moreover, in an extension of his model of triadic reciprocality among actions, thoughts, and environmental conditions, Bandura (1986) proposed a fourth determinant of human functioning, which was fortuity. He put forth the idea that chance encounters could have

a profound impact on life paths and the human experience. Through powerful interactive forces between personal and social factors, Bandura (1986) claimed human encounters involved varying degrees of fortuitiveness. He explained how personal attributes could lend themselves to serendipitous discoveries. He pointed out that ingenuity, personal interests, perseverance, an inquisitive mind, along with specialized skills and knowledge could positively impact the potential for discovery of unique syntheses. Taking advantage of an opportunity brought by fortuity favored an individual with a curious, inquiring mind with a strong sense of personal agency who could take action on their observations. Chasing new experiences increased exposure to new people and through them, novel ideas and information that could propel agents in new directions.

Chris was invited to participate in an informal professional group on a topic of interest. This group provided Chris with timely announcements about "what's kind of happening in this world of development and pedagogy" (Interview, l. 819). He engaged with people who "were operating at a very high level, they were very informed on these kinds of issues of pedagogy and of teaching and instructional design" (Interview, l. 851). Furthermore, they were "very well versed, … they had an affinity for these kinds of conversations" (Interview, l. 853). Chris appreciated the insight from these viewpoints for creative and critical thinking (Interview, l. 820). They would help one another improve their work (Interview, l. 861).

Likewise, to move a project forward, Jason sought input from multiple perspectives including professors, advisors, and peers (Think-Aloud Observation, l. 30). He approached goals both logically and emotionally, both critically and creatively. When

Jason wanted to find specific information, he would use a targeted, efficient online search. For example, to find specific information about his vehicle (Interview, l. 264), Jason used a surgical-strike approach to target a specific website for the information. On occasion, an idea or information captured his interest and he pursued it. In these moments, Jason ended up down a rabbit hole learning really interesting information that generated new, creative ideas:

> It's usually that I'll go seek out specific bits of information.
> So maybe, as a way to think about it,
> I'm trying to find the densest, most specific bit of information I need.
> So it's kind of an efficiency model in a way that I get in,
> I read what I'm going to look for,
> ya know I'm a big fan of good search tools
> and the one on this forum sucks. <laughing>
> But ah um, to just be able to get in, figure it out,
> and then get out and go do what I need to do.
> So a lot of times it's, ya know, I'm gonna,
> it might be something as simple as like
> I'm gonna go change the oil on the truck or something.
> How d', ya know? What do I need to know about that?
> Is there anything that is a catch 22?
> Or a ooh-gotcha, or ooh-look for this, don't do this.
> Ya know, whatever it is, um, I, and
> every so often I end up down these rabbit holes…
>
> This is a site that was started by petroleum engineers looking at motor oil
> which sounds so dumb, ya know,
> like I take a step back from that,
> I'm just "why in the hell am I here?" <laughing>
> and yet, ya know,
> one of the reasons my old car got to 174,000 miles is because of modern oil
> and so I find sometimes that there's, ya know,
> I jump in to look for something really specific
> and then I end up reading oil spec histories at a reaaally niche sites
> and learning about very interesting stuff
> that I then share out either directly with some of my friends,
> in this case, I'm in a car club so I was talking to guys about this
> and actually posted a couple of articles on our website, um
> just to kind of talk about, ya know,

> I learned about this, you may not know this, let me share it with you.
> (Think-Aloud Observation, l. 293)

On other occasions, Jason took a less focused approach for creative thinking. These moments were a "richer experience" (Interview, l. 289) for Jason, in which there was "more of that connectivity… in my head with the learning that's taking place, not only the task at hand" (Interview, l. 290). He was intrigued and fascinated by the duality of approaching goals with both a Spock-like logical Vulcan ideal and also allowing emotions to play a part in the experience (Interview, l. 296). For example, Jason was working out the language to use to describe his research and choosing which theories to support his work. It was not yet fleshed out and Jason thought deeply about this innovative idea. He believed he needed more input from others, more connectedness, to work it out. Jason anticipated reaching out to a professor, attending a major national conference to "work through it a little more" (Interview, l. 799), or meeting with colleagues informally over drinks to flesh out a solution (Interview, l. 800). He explained, "the kind of relationship you have drives that interaction you can have" (Interview, l. 31). The connection to others afforded a unique, idiosyncratic learning experience because he learned different ideas and information in different ways from different people:

> I've kinda thought from time ta time
> what role social capital might play in that ya know,
> that if you have a really good, relation, well,
> like just any, whatever kind of relationship you have
> kind of drives that interaction you can have,
> sort of akin to the great media debate, right?
> I'm kind of Kozma of social capital if you will…
>
> um, ya know, for example, I learn things in a different way
> from colleagues and peers…
> versus the [professors]

> and some of that is the nature of that social capital.
> That, um, there is I guess we're on a more equal footing
> and then, ya know, try as they might,
> there is still something of a power dynamic present with faculty
> who are overseeing students right?
> Even, and, to their credit I think
> they've done amazing work trying to de-emphasize that, uh
> but it's still there though, um, and then beyond that um, ya know,
> kind of navigating through the world, ya know,
> you and I might have a different relationship
> than the friends of mine that I've had since high school.
> Even though I learn by interacting through each of you,
> it's still just a different experience
> um, and I swear a lot more around my friends <laughing>
> I mean let's be honest, right?
> (Interview, l. 28)

Jason's experience illustrated the idiosyncratic way the interacting forces in the triadic reciprocality model—actions, thoughts, and environment—could exert varying degrees of influence on an individual. As Bandura (1986) noted, "The relative influence exerted by the three sets of interacting factors will vary for different activities, different individuals, and different circumstances" (p. 24). Jason was influenced by different groups of people—friends, family, colleagues, peers, professors, and experts—through different activities and in different contexts. Jason described learning through connectedness as finding connections among new information and ideas that were related to his existing knowledge (Interview, l. 889). If new information and ideas were unrelated, then he would simply perceive it as noise that would fizzle away (Interview, l. 896). Jason explained that on other occasions information and ideas would come back around in an organic process, when they were presented or constructed in a new way that made clearer sense to him; ways that made a more obvious connection to his existing beliefs or knowledge more evident (Interview, l. 901). Bandura (1986) would likely view

this experience as a representation of the functional value (i.e., personal relevance) in the attentional process of observational learning through modeling.

Likewise, Michelle searched for information and followed sources on social media to find interesting content that she could use for her practice and also for professional development (Think-Aloud Observation, l. 27). These kinds of sources she called a "purposeful follow" (Think-Aloud Observation, l. 35) because the source was specific to her content area and specialty. There were three main experts that Michelle followed for content-specific information and ideas for immediate problem solving (Think-Aloud Observation, l. 241). These were valuable sources that helped Michelle to be successful in her practice (Think-Aloud Observation, l. 264). Michelle not only followed classmates on Twitter, but also followed professionals who she had met at a conference who presented work that interested her (Think-Aloud Observation, l. 101). Additionally, she followed interesting industry-related organizations (Think-Aloud Observation, l. 103) for ideas and information for creative and critical thinking. In conjunction with these sources, Michelle also looked to work colleagues for ideas, information, and discussions related to her topics of interest (Think-Aloud Observation, l. 174). Having access to multiple perspectives helped Michelle when she was brainstorming a solution with her work colleagues:

> A lot of what I do share,
> I've actually used before,
> I've tried it out,
> I've actually, there's been some, something that I've done with it.
> So maybe [an online source] put something out about
> how you can use the autocrat plug-in from Google
> in order to send out, um data from your spreadsheet into a merged Google doc
> and so, right there, it doesn't seem applicable to my teacher cohort,

> but then we started collecting data
> and having students turn stuff in through Google forms,
> which then puts into a Google format, ah, into a spreadsheet
> and so then our, my colleagues were like,
> “how do we send out this data back to kids?”
> or else we just sit with data
> and they don't get any feedback on how they did
> and how we process that information
> and that’s when it was like,
> DING!
> Oh, Autocrat,
> we can use that because then that automatically sends it out to them,
> so then we collect data
> we don't have to do a lot of manual work on our end
> and it makes it easier for us and so then,
> when there was that connection,
> then I, ya know, went back to that source that I saw,
> I practiced it, and saw if it worked
> and then I shared out.
> The funny thing is once that happened
> now, my team has been using that
> as a way to give feedback back to students.
> (Interview, l. 191)

In multiple ways, Michelle used her personal learning network to generate ideas that had immediate personal relevance for her work-life and academic success. Through creative thinking, Michelle found an innovate use for Google slides from her connections. By adapting the technology to meet her needs, she created a new, innovate use for the technology, which epitomized Bandura’s (1986) notion of creative modeling:

> Sometimes I use a tool that they present out,
> and I use it in um, ah, different ways
> than what it has traditionally been used for,
> so ya know, um, Google slides
> it, a lot of it is, intention of it is for presentation,
> But I use that as a way for students then
> To create visual vocabulary words
> that they all have access to,
> giving one student one word,
> so every student has a different word,

> but they all put it together
> and now they all have
> through collaborative efforts
> created a stack of visual vocabulary.
> (Interview, l. 484)

Multiple perspectives from formal and informal experiences informed Andrea's goal formation, learning, and creative syntheses. In some instances, an idea piqued her interest and a goal was generated from a formal course. Her thoughts on the topic were influenced by discussions with classmates. She applied the new idea through a personally relevant project and wrote about her experience. She received feedback from classmates and her professor in order to evolve the idea and submit a conference proposal. At the conference, she aimed to receive feedback from conference attendees and use the input to write a manuscript (Interview, l. 554). She described this experience as such: "This looks like I build it and re-build it and re-shape it" (Interview, l. 574). To facilitate connections for ideas and information Andrea used LinkedIn, a professional social network site, among other technologies, to connect with professors, classmates, and conference attendees (Think-Aloud Observation, l. 664). Andrea preferred to meet new people in person, such as a formal class or professional conference, before connecting digitally through email or social media to share ideas and information or discuss potential collaborative activities (Think-Aloud Observation, l. 824). When Andrea reached out to others to discuss her thoughts and ideas, it helped her to think more broadly about the topic (Interview, l. 174). The process of talking with others helped her to articulate her thoughts on the issue she was trying to solve (Interview, l. 189). Through this process, she was also able to garner input from others as they talked through possible solutions

(Interview, l. 195). When Andrea wanted to learn more about a topic, she looked to Internet sources and also to the input from friends, colleagues, and classmates to help her learn more or resolve an issue (Interview, l. 305).

Nicole found that Twitter was useful for two kinds of professional conversations: conferences and Twitter chats (Lived Experience Description, l. 27). When Nicole followed a conference hashtag on Twitter, she learned new insights from participants (Lived Experience Description, l. 32). She described it as a "double experience" (Lived Experience Description, l. 42) in which she learned once from conference participants in person and she learned a second time from the backchannel chats (Lived Experience Description, l. 42). Through this experience, conference attendees shared links to resources that would help Nicole to "build a library or a toolbox" (Lived Experience Description, l. 40) that would support her work. Engaging with others through social media during a conference gave Nicole a greater sense of interaction that was less passive than simply watching a lecture, and included more active learning experiences. For example, when she re-tweeted a post from the person sitting next to her in the conference presentation, it made her feel like they were interacting (Lived Experience Description, l. 46). The value for Nicole in participating in Twitter chats, as opposed to participating at conferences using a hashtag, was less about garnering new ideas and information, but rather for observing and modeling how professionals interact, learning the language, showing an online presence, and practicing professional netiquette (Lived Experience Description, ll. 95, 135).

Nicole was "constantly connecting" (Think-Aloud Observation, l. 118) with work

colleagues through technology. They shared similar interests and her colleagues sent her information that she could dig into (Think-Aloud Observation, l. 114). At times, a colleague would share a "random story" (Think-Aloud Observation, l. 116) or a healthy recipe (Think-Aloud Observation, l. 110), but at other times, colleagues would share specific information that helped Nicole learn more about topics of interest (Think-Aloud Observation, l. 112). In this way, her colleagues provided her with both breadth and depth for creative and critical thinking, as well as support, incentive, meaning, and worth to her actions. These experiences exemplified the strength and value of social ties to influence the power of chance encounters and subsequently impact an individual's life path (Bandura, 1986). These multiple perspectives were useful to Nicole in both her professional and academic roles. The multiple perspectives she found through her personal learning network helped her to better understand new concepts in her formal learning experiences by reading about real life examples (Interview, l. 766).

The agents' experiences showed the vast number of perspectives encountered in myriad ways. Multiple perspectives for creative and critical thinking from diverse sources—both formal and informal—supported Bandura's (1986) concept of creative modeling. The personal attributes of the agents—particularly their strong sense of personal agency, ingenuity, and exceptionally inquisitive minds—lent themselves to the ability of capitalizing on fortuitous events.

Serendipity. Bandura (1986) posited that all human encounters contain some degree of fortuity and that fortuitous events interact with the factors in his triadic reciprocality model—actions, behaviors, and environmental conditions—to explain

human functioning. He postulated that creative modeling stemmed from agents who synthesized multiple sources to create innovative ideas. In order to capitalize on fortuitous events, it required agents to possess ingenuity and a curious mind, along with specialized knowledge and skill to perceive a fortuitous opportunity when it arose, and then a strong sense of personal agency to be able to take advantage of the chance moment. In moments of their lived experiences of connectedness, agents described instances of chance encounters when fortuitous events occurred. These moments, at times, seemed to manifest a quality of synchronicity in which a meaningful coincidence was not easily explained by causation. At times, these moments also came with a feeling of surreality, particularly when online experiences blended with in person events.

Eric experienced surreal and synchronistic moments online and in person at a professional conference. The technology he used afforded conversations with groups of people around a given content topic. In one instance, Eric joined a Twitter chat that involved 20 to 30 active participants who were favoriting, re-tweeting, and following back (Lived Experience Description, l. 15). It was an immersive experience in the language of the content topic in a rapid conversation (Lived Experience Description, l. 13). In this experience, Eric described a moment that resembled characteristics of synchronicity in which related events occurred coincidentally:

> On a Sunday evening
> while the kiddos were watching a cartoon before bed,
> I decided to jump online and log into Twitter.
> It was near 7pm and I had 25 minutes
> to see what was new in my Twitter feed.
> What I found when I logged in was a friend,
> who is a principal,
> having a conversation with other administrators

> from around the state.
> Prior to the picking up on this conversation,
> I had been invited by an administrator that I follow on Twitter
> to join in an online chat called #[stateleaders].
> I noted it but never really investigated much more into.
> That Sunday, I happened to walk right into the conversation.
> (Lived Experience Description, l. 6)

In this moment, Eric stumbled upon a friend in a chat to which he had previously been invited to participate. These two separate, yet related, coincidental events pointed to an element of synchronicity in the lived experience of connectedness. On another occasion, Eric serendipitously met a colleague in person at a conference who he had previously only met and knew in an online context. He described his experience this way:

> I did have a unique experience at a regional conference
> when someone recognized me at the conference
> because they follow my twitter feed.
> Someone I had never met face to face
> and they said “Hey [Eric]! How are you?"
> and I said "I'm great!”
> and I happened to remember
> that’s [Joe Nelson], a teacher of [a content topic area]
> and I had never met [Joe] before,
> but I had this very first time experience
> of having a connection with somebody on Twitter
> before I 'd even met them face to face,
> but yet I felt like I knew them
> and I knew what his work was going to be about so
> a kind of a fun experience!
> (Think-Aloud Observation, l. 361)

This blending of meetings that crossed both real life and online environments felt surreal to agents. Jason described this as “strange to be physically disconnected and emotionally connected” (Think-Aloud Observation, l. 146). Nicole described it as:

> A weird point of awkwardness,
> sometimes I see people at the conference
> that I just re-tweeted or engaged with online.

> It is almost like 'Where's Waldo?' when I find them.
> Oh there is @jerry12345!
> So that is what they look like in real life.
> In a way you kind of met them
> so you should walk up to them.
> But I never really do
> (Lived Experience Description, l. 54)

When there were perceived forces at play that were outside the control of the agent, it seemed like a pinball game as Eric described when he related how his research study was shaped by input from a scholar at a conference who he had met serendipitously (Interview, l. 641). Related to goal formation, serendipity tended to occur while the agent sought an explicit goal and happened upon unexpected or fortuitous ideas or information. For example, Jason sought information about his vehicle and was led down a "rabbit hole" (Think-Aloud Observation, l. 308) of links to a niche site about motor oil that he found fascinating (Think-Aloud Observation, l. 328). Similar to receiving a push notification, when unrequested content came to an agent and it was rich content with fascinating ideas or information from an unexpected source, then the agent experienced a serendipitous moment. For Michelle, serendipitous experiences occurred on several occasions. For example, one moment in particular occurred when she "stumbled upon" (Think-Aloud Observation, l. 243) a valuable source of information:

> I follow him a lot because he does a lot of articles
> on how to integrate technology within the classroom
> or he also does a lot of just how to,
> and so I do a lot of my problem solving using his site
> and so I'm not even sure how I stumbled upon him to be honest.
> I just kind of,
> I think I might have seen his name on another teacher that I followed
> and so, then from there I kept on getting stuff from him through my news feed.
> Like a lot of stuff,
> and then I noticed that I would always go to his site for stuff

> and then from there on,
> That's why I would always then,
> I knew automatically if he posted something,
> I would want to see what he has to offer,
> and so that's why he's been at the top of my, ya know,
> who I'm following,
> who I look at the most
> just because the information I get from him
> is the most relevant to what I'm doing right now.
> (Think-Aloud Observation, l. 238)

Michelle attended a professional development workshop and learned about a good resource for ideas and information for her particular content area (Think-Aloud Observation, l. 509). A year later, at a training session, sponsored by a different organization, but covering a related topic, facilitators again mentioned this same person as a good source of information and ideas on the topic. For Michelle, this moment of synchronicity, or meaningful coincidence, cemented her belief that this person was a "go-to kinda guy" (Think-Aloud Observation, l. 531) that she valued for the resources he provided.

Resources with real-life relevance for problem solving came to Michelle serendipitously in many ways. In one instance, she was surfing Pinterest, which she had primarily used only for personal topics unrelated to her work or academics, when she serendipitously found memes that were useful for her practice. Through her informal learning, she learned more about what it was that she needed in order to support her formal learning as a graduate student and teacher (Interview, l. 343). She described how the experience felt surprising:

> It really kind of opens my eyes to the different ways that can be connected
> and the funny thing is,
> sometimes I'm not even searching for the connection

> and I'm just out there purely like
> I just want to read an article
> and all of a sudden
> I'm searching like BBC on my app
> and there's a story that talks about how ya know
> Russia is implementing this day where people can go home early
> and ya know try to create more babies
> 'cause their birth rates are low
> and I'm like, oh my gosh,
> this connects right to my… class about population
> and so it's quite interesting when things like that happen
> 'cause what you don't expect to find,
> that piece is the most interesting part is,
> when you don't expect to find something specifically for it
> you find it there,
> and its like
> WOW!
> This is really good!
> This is real interesting!
> (Interview, l. 378)

Serendipitously finding these real-life relevant examples and other gems for learning was highly valued by Michelle:

> That's what I love about my personal learning network
> is being able to find these things
> that makes things applicable
> and makes things richer
> for the students,
> um to make the connections of these concepts
> that they feel like,
> 'oh, we're just learning this in this class and it's all self-contained',
> but then they start to see if there are other connections to it
> outside of school in different ways.
> (Interview, l. 404)

From Bandura's (1986) social cognitive theory, these serendipitous, synchronistic, and surreal events could be interpreted as fortuitous, chance encounters. These events occurred particularly in the process of observational learning through creative modeling. Agents who possessed an open, inquisitive mind explored new ideas

through multiple sources of people in a network. Agents, who possessed specialized knowledge and skills, were able to identify the meaningful coincidences when they occurred, and then, through personal agency, they were capable of connecting the thoughts and ideas into creative, new syntheses. They were physically and cognitively capable of taking action to capitalize on the serendipitous moments.

Syntheses. A significant aspect of Dewey's (1938/1997) philosophy of educative experience was that intelligent activity stemmed from patterns of experiences based on the experimental method of science that required an individual to analyze and synthesize information to create orderly organization from observations during experiences. In order to promote the expansion of ideas and continuity of experiences, Dewey (1938/1997) proposed, through a pattern based on the experimental method, individuals would be required to document and keep track of ideas and information. Intelligent activity called for individuals to organize, reflect, and summarize new ideas and information. He explicated how the information, ideas, actions, observations, organization, reflection, summaries, analyses, and syntheses would differ for each individual given their unique experiences and perspectives. Likewise, Bandura (1986) also advocated for the importance of syntheses of multiple perspectives in observational learning through modeling, particularly in creative modeling. He believed individuals who were exposed to divergent ways of thinking and observed problems being approached in diverse ways were more likely to be versatile and innovative. By synthesizing observations from multiple models, individuals demonstrated their creativity through novel innovations.

Eric demonstrated organization, reflection, and synthesis of thoughts, ideas, and

information in multiple ways, particularly through his personal blog, which was focused specifically on technologies for teaching in his content area. He used this personal online blog space to showcase technologies he explored and used (Think-Aloud Observation, l. 650), as well as to document events, activities, and ideas (Think-Aloud Observation, l. 680). Showcasing his work through conference proposals, publications, presentations, and public dialogue was his unique way of demonstrating his synthesis of ideas and information (Interview, l. 19).

From professional to personal pursuits, agents demonstrated creativity in the way they organized and synthesized their individual learning. For example, Chris was inspired to cook in his new kitchen and chose to document recipes of national dishes using Evernote (Think-Aloud Observation, l. 318). The activity involved experimentation that included organizing, reflecting, writing, and producing. This personal endeavor was not shared in a public forum and he attributed this preference for privacy of his personal interests to his introverted personality (Think-Aloud Observation, l. 397).

While Jason engaged in formal and informal learning, he gathered resources, organized them topically, and stored them within course or project folders on his computer. His process for organizing content was evolving and he had begun to use a reference management system to create his own database of resources. He anticipated that the new organizational process would be more efficient and less frustrating (Think-Aloud Observation, l. 653). Jason experimented with various technologies in his evolving process of organizing, capturing, storing, and synthesizing ideas and information. On one occasion he experimented with a new technology for audio recording, but found that it

was not sufficiently flexible for his needs (Think-Aloud Observation, l. 598). This experience epitomized Dewey's (1938/1997) philosophy of educative experiences in which the learner experimented and learned from the experience.

Jason described himself as "a very tactile, hands-on, kinesthetic learner" (Think-Aloud Observation, l. 392) who preferred "the actual work of things" (Think-Aloud Observation, l. 569) because he was "able to remember experiential learning much better than… direct instruction" (Think-Aloud Observation, l. 571). He preferred project-based learning in which he could produce evidence of his learning in a creative way. An example of one of these creative endeavors was displayed on his personal website. He publicly shared his photography project that was organized around a specific theme (Think-Aloud Observation, l. 709). He included detailed specifications of the photo so that others could learn how the picture was taken (Think-Aloud Observation, l. 724). In a formal learning environment as a graduate student, given the option to express himself freely, he created memes as part of his response and reflections on course content (Think-Aloud Observation, l. 826):

> I find something like a meme
> to be more easily provoking of dialogue
> than wading through somebody's two pages of text.
> And that's not to disparage the value of text,
> It's just, depending on what I'm looking at, ya know,
> like I've mentioned in the last hour,
> I'm willing to just drop it out there
> and I'm not trying to upset people
> but I'm okay with it being more challenging
> and I feel like often times the power of ya know,
> this image with
> ya know, his gesture and the red text,
> and that it's a loaded ya know, kinda context
> that's much more provocative

> And maybe even efficient
> ya know, like, you'll have a bigger reaction more quickly
> than if you read the two pages of drivel that I have right here.
> (Think-Aloud Observation, l. 879)

Jason's experience illustrated the kind of vivid imagery that supported retentional processes in Bandura's (1986) observational learning through modeling. Synthesizing ideas and information through engagement and discussions with others was a social aspect of learning important for Jason in both his formal and informal learning experiences. He found discussions with course colleagues to be "very engaging and very interesting" (Think-Aloud Observation, l. 581). He also belonged to clubs around his personal interests and hobbies (Think-Aloud Observation, l. 330, 746). He shared information with colleagues either through a common website (Think-Aloud Observation, l. 331), blog (Think-Aloud Observation, l. 350), or an email (Think-Aloud Observation, l. 368) to a small group of people who were part of one of the clubs in which he was a member. For Jason, "learning on a day-to-day basis happens by interaction with people" (Interview, l. 94).

The way an agent organized content was unique to each agent, but it was always an evolving process. Michelle, for example, used the like button in Twitter to save a Tweet to her list of favorites as a way to archive content for later use (Think-Aloud Observation, l. 74). She anticipated that this process would change in the future, as her needs changed, and that it would likely impact her experience (Interview, l. 232). Michelle's experience could be interpreted from the principle of interaction of internal and external conditions as Dewey (1938/1997) proposed. Michelle observed that the external conditions of her network, technologies, and methods were likely to impact her experience as they evolved.

In Michelle's process of synthesizing new ideas and information, she explained that she loved to create and share in person:

> I do love to create,
> but I don't like to share, not in terms of
> Like, I don't want people to see what I do,
> because I actually share a lot of it
> outside of these social learning networks,
> I actually um, I mean social media,
> I share it in person or ya know, like that,
> but I don't put it out on social media
> and so, that's, for me, that's kinda interesting
> because I consume a lot of stuff
> and I create a lot of stuff,
> but I don't put my stuff out to be consumed on social media.
> I put it out, it's, I feel like, there needs, I don't know,
> I need to have that connection with people to be able to share things that I create
> and so for me that's kinda weird, but at the same time, it works for me.
> (Think-Aloud Observation, l. 907)

The processes and methods for analysis and syntheses were unique and idiosyncratic for each agent. As Bandura wrote about the interacting factors in his reciprocality model: "The relative influence exerted by the three sets of interacting factors will vary for different activities, different individuals, and different circumstances" (1986, p. 24). An important part of Andrea's process included capturing ideas and information. She used a Notes application and a To-Do list on her computer desktop so that she could capture the ideas and information in the moment and not lose them (Think-Aloud Observation, l. 189). This process not only helped Andrea to record and organize her thoughts, but also worked as a constant visual reminder to remain focused on her goals (Think-Aloud Observation, l. 218). In addition to the Notes application and To-Do list, she also used a reference citation manager and digital folders to organize readings in preparation for writing (Think-Aloud Observation, l. 479). Andrea had several avenues for sharing

information publicly—both formally and informally. For example, she posted information on her personal website and also used a blog to record her academic interests. She used Twitter to post academic-related ideas and information from her formal, graduate-level courses and professional conferences that she attended (Think-Aloud Observation, l. 67). She presented her original work at conferences to elicit discussion and feedback from her professional colleagues (Interview, l. 554). The outcome of synthesizing experiences was, as Dewey (1938/1997) would describe, a continuity of experience and continual growth. The learner's experiences should always be moving, progressing, and opening up to new directions, dimensions, or fields. Dewey (1938/1997) identified this process of continuous educative experiences as "connectedness in growth" (p. 75), which propelled the learner forward.

Driven by personal goals, each agent pursued her own unique path of development that was evident in the creative syntheses produced. Nicole aimed to write more of her own content (Think-Aloud Observation, l. 151). In the interim, she used a blog moderator, Medium, to post content to Twitter that her followers would value (Think-Aloud Observation, l. 141) and she tweeted pictures she took during her graduate classes (Think-Aloud Observation, l. 172). She wrote a blog that combined her personal and professional interests (Think-Aloud Observation, l. 244). She enjoyed thinking about topics to write about on her blog (Think-Aloud Observation, l. 247). Similar to Jason and Michelle, Nicole's process of organizing ideas and information was evolving. She had tried re-tweeting as a reminder to read content at a later time and she had also tried using lists (Think-Aloud Observation, l. 203, 211). Nicole read blogs and liked the idea of

writing blogs, but felt hindered by the potential backlash that would require her to defend her professional opinion (Think-Aloud Observation, l. 267). She aimed to be more of a contributor to the public discourse (Think-Aloud Observation, l. 280). To that end, she scrolled through new feeds to find something worth sharing. She tweeted several times a day (Think-Aloud Observation, l. 293), whether it was a news article or a photo from her academic or professional work (Think-Aloud Observation, l. 308). She aimed to synthesize her ideas and information more thoroughly and consciously (Think-Aloud Observation, l. 740). She was aware of her tendency to quickly skim content, breezing through a high volume of content without thinking critically about it (Think-Aloud Observation, l. 738). The content she read was mainly used for idea generation, in particular for creative thinking about ways to use technologies in the classroom, which had an immediate impact on her professional success. Nicole described her viewpoint this way:

> When I go to class,
> I noticed that these people have dissected the readings.
> I mean they've highlighted,
> they've written notes,
> they come up with these questions,
> like I would never think to ask that
> or to analyze that
> or to deconstruct that point
> and I feel like I'm just kinda taking it in
> and then maybe
> because I am a very interpersonal person,
> like I thrive off of relationships and conversations
> that I can come up with something intelligent to share,
> but it’s nothing that I like sat in bed that night and was crawling over
> because some article somebody sent me,
> and maybe that’s just due to the sheer amount that we're reading,
> and the sheer amount online.
> Like how could anybody dig so deeply into one thing?

> You would miss out on a million other things if you did
> (Think-Aloud Observation, l. 747)

While each agent organized and synthesized content in a unique way, all of the experiences shared a common thread of an evolving, progressing process that influenced experiences by way of environmental conditions. Dewey's (1938/1997) principles of continuity of experience and interaction between internal and external conditions ran through the experiences of synthesis described by the agents. Furthermore, the inquisitive, curious minds of the agents were evident in the multiple sources in their networks that influenced their experiences. The way the agents uniquely synthesized the diverse multiple perspectives epitomized creative modeling for innovation as described by Bandura (1986).

Summary of connectedness as learning. Each agent possessed a strong sense of personal agency and the cognitive skills to set and pursue meaningful goals. By observing multiple sources and engaging in reciprocity, the agents were able to capitalize on fortuitous moments, organize information and ideas, and produce creative, new syntheses. The educative experiences of the agents epitomized Dewey's (1938/1997) philosophy and Bandura's (1986) social cognitive theory of observational learning through modeling.

Tentative Manifestation: Connectedness as Identity

The cultivation of identity was experienced through connectedness in the lived experiences of participants. An agent's unique identity and self-concept were shaped through connectedness, including aspects of her self-image and ideal self. An online persona, as a representation of the ideal self, was presented to others for the purpose of

participating in the active practice of learning, both formally and informally, through engaging with others. The theories of Rogers (1959) and Wenger (1998) were useful for interpreting the data related to how self-identity was shaped through connectedness in a personal learning network.

Self-concept. In his theory of personality, Rogers (1959) proposed that an individual's self-concept was composed of three elements: a positive self-regard, self-awareness, and a self-ideal. These constructs were shaped, he believed, through self-experiences, which consisted of events or entities that informed self-perception and self-concept. The personal constructs of self-image, self-esteem, and the ideal self evolved through connectedness in the agents' lived experiences.

Through connectedness with others in his network, Eric strove for continual growth: "If I look at it from the selfish side I think of people that will make me a better educator and thinker and writer, um, it goes back to this continuous improvement model" (Interview, l. 951). Eric thought of his network as a representation of his unique identity because it included people he trusted to challenge his ideas and support his learning process (Interview, l. 976, 1044). He was mindful about the content that he posted and the language that he used when he communicated in a public forum, such as social media, in order to cultivate a professional, respected online persona (Think-Aloud Observation, l. 61). For example, when sharing personal news on social media Eric shared the information privately with family and close friends only. However, in a separate, closed working group on social media, he posted relevant professional news and information with like-minded professionals with whom he was actively engaged on common goals

and tasks (Think-Aloud Observation, l. 97). Eric's professional approach to practicing technology integration was influenced by the lenses he developed from professors in formal learning settings. When he gave conference presentations, he hoped that his way of looking at technology integration came across to others as a practical, pragmatic, and purposeful approach:

> I would say that, in particular,
> things like TPACK
> and how technology integration happens,
> not necessarily a specific tool that I showed you in the blog post,
> but something like conceptual or how to frame it is
> serves as the backbone of what I share
> so that when people,
> here's what I hope that people would talk about
> when they come to my session,
> that he's practical
> he's pragmatic
> he knows how to use purposeful technology integration
> and I think that the reason for that is
> because of the lenses that I use
> when I look at tech integration…
>
> I'm thinking about sitting in a class like
> [this professor's] classes or [that professor's] classes
> about how I integrate technology as
> affected by classes that I've taken.
> (Think-Aloud Observation, l. 707)

From these experiences, Eric was working out his self-concept through activities and interactions—events and entities—in his personal learning network, what Rogers (1959) would define as self-experiences. He presented his ideal self at conferences to portray the kind of professional that aligned with his self-image. Representing one's ideal self was also important to Chris. He noted a particular experience in which he was keenly aware of consciously choosing how to present his academic persona in an online course.

Chris created an online profile to introduce himself to classmates. It was a foundational step in the experience of learning with others in a formal class setting. Thus, part of experiencing connectedness included decisions about how to represent one's self. Belonging and participation was, in part, influenced by the way one would be perceived by others. Chris explained his experience of building an online profile:

> I took an online course about
> teaching and learning with the Internet.
> We used Ning to increase connectedness,
> and make profiles for ourselves.
> My first task was to populate my own profile,
> and I felt compelled to create a profile that was authentically me,
> and to show some things that I am genuinely interested in.
> I didn't want to make a profile that was too pretentious, too arrogant.
> I wanted the people in the class to see me, as I am, not how I want to be.
> I uploaded some of my favorite pictures from recent travel
> (I suppose I saw my peers doing similar things),
> and I spent a considerable amount of time writing the text of my profile.
> The question I asked myself throughout was "Is this true about me?".
> If yes, and I thought it to be an important part about me,
> I included it in the profile. If not, I didn't.
> (Lived Experience Description, l. 5)

In this experience, Chris illustrated how he made a conscious effort to present an ideal self that was aligned with his self-image. His aim was to portray a genuine, authentic self-ideal to others. Chris explained that the practice of creating the profile was an important first step in making connections with classmates. Forging his online persona at the beginning of the semester influenced his experiences of connectedness:

> There is something important about creating your own profile,
> as an online representation of yourself.
> It is the first step you take
> at making yourself available for connection,
> or to tell people—perhaps indirectly—
> that you may be in the course
> just for the sake of the course,

> and not so much to gain friends.
> It's the first step to make the possibility of a connection,
> but the first connection happens
> when I actually navigate to another person's profile,
> that she curated as a representation of herself,
> and I express interest in what she has created,
> what she has done, and what she has posted.
> Connection begins there,
> and after that we see the results:
> I found myself often responding to her forum posts the most.
> She was, anyway,
> someone I was particularly connected to
> from the very beginning of the course
> when we were all curating our own online identities.
> (Lived Experience Description, l. 81)

The language that Chris used to describe his lived experiences, particularly the word "curate" demonstrated that he perceived the activity as a conscious decision to portray certain aspects of himself that would facilitate engagement, participation, and belonging with others in the class. Thus, his language indicated that he understood that his profile was a representation of his self-concept. Chris described the online profile he created to participate in the online class, as a "projected identity" (Interview, l. 355). He explained:

> Curate, in this sense was about ah, ah
> creating the image of myself
> that I would want other people to see via distance
> um, it's a, it's a little bit of a ah projected identity I think yeah
> of at least that's what I was feeling,
> that this was a little bit of a projected identity,
> so I put my, what I wanted for people to see in me,
> those were the images that I chose
> and I saw that, at least I interpreted that
> in some of the other profiles as well,
> so I mean, and understandably so
> I don't put snapshots of just my everyday life, ya know,
> here's my desk, who cares? <laughing>
> ya know, right, here's my email inbox, no.

It’s just not very interesting.
It’s, it’s maybe the most genuine
because I spend a lot of time on that
ah, but it’s ah, it’s not any different.
It’s not any uniquely me thing.
It’s ah one thing that I do,
but I think its one thing that a lot of people do.
However, my travel experiences are one thing that not everybody does.
So here’s a photo of me in some foreign location doing some work.
um, it also shows a picture of me at a high point in my life too.
ya know I picked out the ones where I'm really at my best,
where at that time I was really feeling very happy that day
and the situation was really enriched,
really exciting place to be.
um, again, I didn't show a photo of me just mundane,
just my baseline.
This was me at a high
and it was not a picture of me at a low either, ya know.
I don't really want to portray.
I don't really want to project an image of myself
of the sadness that I feel at some points.
I wanted to project the happiness that I feel.
And I saw that um in the other profiles too, ya know.
There were no mundane photos, so to speak.
It was, it was um, photos of events,
that the people seem to really care.
Moments that the people really seem to care about
and ah people and things
people and animals,
ya know, pets, really
that people really seem to care about or
particularly beautiful photos,
ya know, landscapes, or something like that,
they went hiking in the mountains and
here’s a lovely landscape of the mountain that they were in
and something along those lines.
So it’s a, it’s the, we curate a projected identity
for what we would like to be seen as
There’s, they, it’s not a vulnerable identity either.
It could be, but that doesn't seem like it’s a good space for that,
um because it’s kind of a
it’s a snapshot
and a vulnerability happens at some point in our lives but
and I think that’s really where some deep connections happens,

> through vulnerability
> um, but ah, that doesn't seem to be
> the appropriate space for that, um
> at least in my initial projected identity in these profiles.
> um that happens more in conversation,
> that would happen more in synchronous space
> and actually I would think the physical space that I'm in makes a big difference.
> So I would not likely, if we were in a conversation,
> I would not likely expose vulnerable parts of my identity
> if I was in a public space,
> but I would more likely if I'm in my home.
> Yeah.
> (Interview, l. 345)

Chris' experiences illustrated how the activity, or event, of forming an online profile was an enactment of what Rogers (1959) would identify as a self-experience that shaped one's self-concept including one's self-image and self-ideal. For Michelle, her self-image was more of a consumer of information rather than a producer (Think-Aloud Observation, l. 440, 905). As an information consumer, she identified with one of the content experts that she followed on social media because they shared common interests, lived in the same city, and worked in the same facility, albeit at different times. It was motivating to have these kinds of connections with a leading expert: "That's kind of cool to know that" (Think-Aloud Observation, l. 364). Michelle believed she was "very late to the social media game" (Think-Aloud Observation, l. 751) and "really slow to get on board" (Think-Aloud Observation, l. 904). She explained:

> I think the most important thing that you need to know
> about myself and social media and my learning networks is,
> I'm really slow,
> I was really slow to get on board and
> a lot of it is just,
> I am more of a consumer versus a producer of it, um
> and for me a lot of the
> if there are things that I create, um,

I do, love to create,
but I don't like to share,
not in terms of like
I don't want people to see what I do,
because I actually share a lot of it
outside of these social learning networks,
I actually um, I mean social media,
I share it in person or ya know, like that,
but I don't put it out on social media
and so, that's, for me, that's kinda interesting
because I consume a lot of stuff and
I create a lot of stuff,
but I don't put my stuff out to be consumed on social media,
I put it out, it's, I feel like, there needs, I don't know,
I need to have that connection with people
to be able to share things that I create
and so for me that's kinda weird,
but at the same time, it works for me…

For me, it's about curating the information
so that I can later on share
and say this person did it this way
or they have this resource,
so that teachers have choice in terms of
where they're getting the information,
if they prefer to be like
oh I just need somebody ta look at an example,
then I can just say go here.
Or if they need, if they're like no,
I need you to walk me through it
and show me how to do it,
then I can, ya know do theirs,
so I can kinda differentiate for teachers
And the need that they have in terms of
how to integrate tech,
how to do tech integration
because for me,
I'm not a person that needs someone telling me how ta follow through,
ya know, go through it.
I just need the resource and then I like ta play by myself.
(Think-Aloud Observation, l. 901)

Michelle's experience shows the dynamic nature of an evolving self-concept that is

shaped by internal and external loci of evaluation through self-experiences. Similar to Michelle, Andrea also identified with an expert in her field because they shared common interests and a common cultural heritage (Lived Experience Description, l. 5). Andrea was encouraged and inspired by the expert (Lived Experience Description, ll. 27, 34) to pursue a topic of common interest, which she presented to classmates (Lived Experience Description, l. 46). Classmates sought out Andrea to learn more about her topic, which positioned her as an expert in her field and subsequently boosted her self-esteem (Lived Experience Description, l. 51). This cycle of learning and teaching, and consuming and producing information ran through agents' lived experiences of connectedness. Andrea's self-experiences illustrated how connectedness impacted all aspects of an agent's self-concept, including her self-image, self-ideal, and self-worth.

Andrea described herself as a little bit introverted (Think-Aloud Observation, l. 838), and thought it might influence her approach to connecting with others in that she would often begin by sending an email, which she found to be the best way to make connections with classmates (Think-Aloud Observation, l. 844). Technologies were intertwined with an agent's self-concept, self-image, and portrayals of an ideal self, as she engaged with others for learning. For example, while Nicole questioned the value of engaging in Twitter chats, she still participated in them, as she explained:

> I actually hate Twitter chats,
> I feel the interaction is very superficial,
> the questions are never very in depth or interesting,
> and I always leave feeling like I have not gained much.
> Yet I still do them periodically because
> I feel like I have to in order to be a true Tweeter…
> especially in the ed tech world.
> (Lived Experience Description, l. 60)

For Nicole, participating in conversations through Twitter chats was a vehicle for representing her professional online identity, her ideal self, through her professional persona:

> I do not think my objective for participating in Twitter chats
> is to get into existential arguments
> with people who I am not sure are even talking about the same thing as me
> in 140 characters-
> especially in conversations that stay at 10,000 feet
> "change takes time".
> It is usually to gain more followers
> and stay active in the conversation
> almost strictly for appearance reasons.
> (Lived Experience Description, l. 131)

At times for Nicole, the brevity of the Twitter posts in the chat led to frustration around misunderstandings or miscommunication with others:

> So this person responded directly to me.
> Yet from my perspective
> I don't see how his response is actually responding to what I said?
> His response also assumes I don't agree with his sentiment…
> I do but that wasn't really what I was talking about.
> I was talking about change and embracing change.
> Do I respond to him? How do I respond to him?
> Yeah duh? Okay? How does this relate to what I just said?
> I chose not to.
> Am I getting defensive?
> Just favorite my post like everyone else and get along with your day.
> (Lived Experience Description, l. 110)

These excerpts from Nicole's Lived Experience Description illuminated how an agent's self-concept was shaped by her self-experiences. These excerpts seemed to show the moments in which she had self-experiences that were shaping and evolving aspects of her self-concept. She was working out, in these moments of self-experiences, her ideal self, aligning her self-image, and tuning her self-awareness. Through connectedness in

the public forum of the Twitter chat, Nicole made decisions about how to best represent her professional persona by choosing when and how to engage with others and respond to posts, in order to express her true ideal self to others. She also used LinkedIn as a way to manage and control her professional image: “I don't really use LinkedIn because I haven't been without a job, but at the same time, it means a lot to me to still have a persona out there and be connected with people” (Think-Aloud Observation, l. 50). Nicole’s unique identity and her self-concept was expressed through her personal and professional interests that included following celebrities on Instagram: “Something that I think is a little bit personal, but I follow a lot of celebrities. I find myself everyday going through my Instagram and see what everyone’s saying… sometimes it’s inappropriate stuff too, but it’s funny” (Think-Aloud Observation, l. 85). An exemplary illustration of how the uniqueness of one’s self-concept is played out in the networked environment.

Nicole shared similar self-awareness as Andrea, Michelle, Chris, Eric, and Jason. She described herself as follows: “I am a very interpersonal person, like I thrive off of relationships and conversations” (Think-Aloud Observation, l. 753). She found it interesting to see a shift in her peers’ perceptions of her when she advanced from the masters program to the doctoral program. The majority of her peers that she interacted with on a daily basis became a new group with different perceptions of her based on the program she pursued. She felt there was an expectation to be more technologically savvy and to be more of a proponent of technologies that others perceived as new, but she perceived as passé (Think-Aloud Observation, l. 595). She sensed fear and jealousy from other people in her new, academic peer group that included students from diverse

programs of study (Think-Aloud Observation, l. 615, 619). With her new advanced academic position as a doctoral student, she needed to re-shape her professional persona within her new academic group of peers, which she accomplished through her actions and practice during engagement in classes and outside of class (Think-Aloud Observation, l. 614, 657). This necessity to re-establish or re-shape one's persona in relation to others and new experiences was relevant for both offline and online interactions. Nicole explained that being connected required both patience and persistence:

> I think it's both patience and persistence.
> I don't pull up Twitter everyday and like
> am blown away by what I see, um
> just like when you go to class,
> every class is not this enlightening moment,
> and it may not be until you get offline
> or you reflect on your own,
> that anything makes any sense
> um, and, just remembering ta re-engage with it,
> but there's some days where you're scrolling through hundreds of tweets or
> scrolling through your LinkedIn feed
> and nothing relates to you
> and, or maybe you take the time to click on something and you read it
> and you don't find that its interesting.
> It doesn't mean that you have to quit the whole thing together um
> yeah, continuing ta follow people, to build your list
> ***figure out what you want your identity in that platform to be*** as well, um,
> so that you kind of stay consistent.
> You could be everything,
> but then just know that you won't
> you may not, you may be too much for somebody,
> maybe they are just looking to you for one thing,
> you sharing about celebrity gossip at the same time
> you're sharing ed tech news,
> at the same time you're sharing your political views
> may be a turn off to some people
> but it's your network.
> (Interview, l. 82)

Identity impacted the experience of connectedness, including engagement,

participation, and belonging because the practice of introducing one's self to others required awareness of one's own self-concept, that is one's self image and one's ideal self, in addition to understanding the context, and deciding on how one wants to be perceived in order to belong and participate.

> I think creating your profile is a very,
> I don't wanna say ***therapeutic***,
> but it's a foundational element
> of getting yourself engaged in any community.
> I don't know how many times I spent way too long
> on like a profile picture, or background picture,
> or what my, um, my LinkedIn profile,
> what that should say um,
> what my FaceBook profile should say.
> It's almost like ***you have to figure out who you are*** in that network
> before you build I guess.
> (Interview, l. 127)

It was telling that Nicole used the word "therapeutic" since Rogers' (1959) theory of personality was based on his thirty years of therapeutic experience. Here, again, the excerpt from Nicole's interview seemed to illuminate the active, dynamic, evolving nature of self-experiences. It would indicate that one's self-concept was not static, but a continually evolving, dynamic construct. Building a profile to engage with others was a core experience for Nicole who grew up with America Online (AOL):

> That's when AOL started, right?
> And you'd get those CDs in the mail and you,
> and I know people,
> even older generations,
> I don't know if this is as core to them as it was for me,
> that's how we originally got online,
> like you'd create a screen name,
> you'd create a profile,
> you'd go into chat rooms,
> you would find people.
> I mean,

> ***I was so good at finding people***.
> That was what you did.
> You went into chat rooms, um,
> send emails to your friends,
> and you'd find pictures.
> I mean that was when I was like 10 years old.
> That was before there were, I think, any laws,
> and I would create a profile that said [Nicole]14 when I was 12,
> so I could seem older.
> And then AIM, the messenger, became a really big thing, and
> if you were home, I mean, you were online.
> (Interview, l. 157)

Since Nicole had grown up with this experience of creating online profiles, when she had to create a profile in the process of using new technologies, particularly social media applications, it was familiar to her. As such, she did not feel anxious about creating new profiles and was not adversely affected by the experience (Interview, l. 183). She described how it was important to her online image—her self-ideal—that she only posted positive messages online:

> I have like a pretty strong rule
> that I don't ever put negative things out onto the Internet.
> So I, you will never see a negative post from me on Facebook…
>
> I can be a pretty cynical person.
> I just like to tell jokes,
> and I know for a fact that
> my um humor probably wouldn't come across the same way.
> Um, sometimes, actually,
> and this may be also the way my brain works,
> I think about if I was gonna send a post or a message,
> or something about a situation I just had,
> what would it be?
> but I rarely go through the point of putting it on there
> and it's not because I don't see other people posting the same exact thing,
> but because ***I'm filtering myself*** to only put positive things out there, um
> and so no, it's not the real me
> because not everything is rainbows and butterflies all the time.
> (Interview, l. 215)

Nicole presented her ideal self online to engage with others in social media. While she held a personal self-image that was cynical and humorous, she filtered this aspect of her identity when she was online so that others would not misinterpret her jokes. While she liked to keep the personal and professional aspects of her identity separated by technologies—Twitter for professional use and Facebook for personal use—they were beginning to overlap as she advanced in her academic studies: "As you become a M.Ed. student and a Ph.D. student, gradually people are gonna friend you and all those things" (Interview, l. 302). When her professor and classmates saw personal pictures, she was concerned it would influence their perception of her as a serious academic: "I didn't want everybody to see that, but at the same time, I wanted some people to see that, and so it was hard because you have to let some things go… you have all these filters of what you want people to know and to see" (Interview, l. 310). Nicole explained that, as a connected, tech-savvy person whose job was embedded in technologies, she couldn't afford for somebody to see something that she didn't want them to see on social media (Interview, l. 384). These self-experiences illuminated how her self-concept was in an active state of evolving because her high school friends would potentially view any academic posts as "annoying or pretentious" (Interview, l. 266) if she posted them on Facebook. However Facebook was more interesting to Nicole than other professional social media applications, such as LinkedIn where it may be more appropriate to post academic topics, but the interactions were lacking since it was her perception that "everyone there has a giant filter out cause that's like your online resume" (Interview, l. 420). The agents' lived experiences illuminated an active, dynamic, evolving self-

concept—self-awareness, self-regard, and self-ideal—shaped by self-experiences that were afforded through connectedness in each personal learning network.

Identity through practice. In his social theory of learning, Wenger (1998) drew a parallel between practice and identity. He perceived them as mirror images. Just as with practice, he construed identity as negotiated experience, as community membership, as learning trajectories, and as a nexus of multimembership that required the continual reconciliation of converging and diverging trajectories.

Blogging was a common practice shared by professionals in Eric's field. In his blog, Eric wrote about topics related to his academic and work experiences as a way of documenting and sharing important and interesting information (Think-Aloud Observation, l. 643). In this experience, the act of blogging could be interpreted as presenting one's ideal self for the purpose of engaging with others through active participation in a professional community of practice. In this way, identity in practice could be understood as a construct inter-related with the self-ideal of an agent's self-concept.

Eric also participated in a professional working group in which the experience of a successful, shared practice had a transformative impact on his identity. His self-esteem and, consequently his self-concept, were enhanced as a recognized active participant and contributor in "a network of leaders or the pillar people in [technology-related] learning in our building at the time" (Interview, l. 35). This lived experience epitomized Wenger's (1998) notion of the duality of practice and identity as mirror images in which shared practices of mutual engagement, joint enterprises, and shared repertoires informed

identity through the competence and confidence garnered from the mutuality of engagement, accountability to an enterprise, and the negotiability of a repertoire.

Eric used the analogy of a pinball game (Interview, l. 630) to describe the experience of multiple influences from formal and informal learning that helped to shape his own unique identity as a professional by impacting his work and practice. For Eric, being in the experience of having these connections from formal to informal learning was impactful on his identity: "It's great because then you get to have your own identity in the research and your work as an educator" (Interview, l. 688). He expanded on this experience:

> The office where I work is diverse because
> people have interests that are so unique and different from mine
> and that's what kind of makes us our own little ***expert in the office***
> but um, ya know, your own
> we each have our own agendas as researchers
> and we try to stay as impartial as we can
> to what we read and what we write about,
> but in the end we kind of have ideas,
> assumptions walking into
> writing about what we think will happen
> or what the data will tell us, um
> so I think it, for me, its about ***becoming this individual***
> or this, that you're a ***unique writer***,
> and your a ***unique professional***
> as a result of it because you have
> I've got 15 years of K-12 teaching and that helps shape,
> I think practically I tend to be a pragmatic research writer
> in the sense that my audience
> is not this national/internationally known conference.
> my people at my conferences
> tend to be in [my state] or regional
> in terms of [specialty] teachers in particular,
> I think that those are kind of like my people there,
> the people that think like I do are the people who have the same needs
> as I remember as a K-12 educator…

> I think that just ***having the ability to create who you are***
> through your writing
> and through your network
> is telling of who you are.
> Like if I were to look at someone's Twitter feed or their Twitter profile,
> I would be able to identify probably what they are like,
> what they value,
> after just spotting who they follow
> and who follows them.
> (Interview, l. 690)

The visual of a pinball game pointed to Wenger's (1998) notion of chaordic experiences, which entail both chaos and order. These conditions are ripe for creative practice. Through perturbability and resilience, both communities of practice and individuals adapt in an ongoing process of negotiating meaning through cycles of participation and reification. Moreover, this lived experience illustrated the duality of the social and the individual, in which the reconciliation of converging and diverging learning trajectories in a nexus of multimembership in communities of practices created a deeply personal dimension of individuality.

Informal learning was agent-driven and, as such, afforded authenticity of identity in practice when one's self-image converged with one's public persona, or ideal self. The formal and informal learning influences in his network shaped Eric's scholarly interests, beliefs, and choices. His unique, authentic identity positioned him to belong and become an active participant in a collective of diverse experts in his place of practice. In a cyclical fashion between formal and informal learning, Eric's unique identity as a practitioner, his training, and his beliefs shaped the kinds of people he sought to include in his network, and these connections influenced his exposure to new ideas, which further shaped his learning experiences and his identity: "My experience in a formal setting then

had an impact on what I looked for in the informal setting in the conference" (Interview, l. 904).

Likewise, Chris engaged in a variety of different formal and informal learning practices within his own unique network. He connected with peers on Twitter to find new information (Think-Aloud Observation, l. 829), he taught students using Moodle (Think-Aloud Observation, l. 15), he learned in an online class using Ning (Lived Experience Description, l. 5), and he documented reflections about personal interests privately in digital journals using Evernote (Think-Aloud Observation, l. 195). These experiences illustrated Wenger's (1998) notion of identity in practice through the reconciliation of trajectories at a nexus of multimembership. The context of each of these practices influenced the content he shared, and different aspects of his own unique identity. For example, Chris preferred to keep a private digital journal rather than a public blog for his personal interests (Think-Aloud Observation, l. 401). He attributed this preference to his introverted personality (Think-Aloud Observation, l. 396). In contrast, he was proud that his flagship, foundational academic publication was publicly accessible on the Internet (Think-Aloud Observation, l. 456). He understood how he worked best and he brought this self-awareness to group work. For example, in one group activity he described himself as follows: "I'm the kind of person that um ah likes getting tasks done. I mean I'm kind of an executor when it comes to some group projects. That's how I find I've interacted in group projects and in work" (Interview, l. 34).

Similarly, Jason expressed self-awareness of his extroverted nature (Think-Aloud Observation, l. 144) and learning practices that worked best for him:

> One of the things that I personally struggle with is
> I'm a very tactile, hands-on, kinesthetic learner
> and one of the challenges for me
> working on the technology side
> is if it's all virtual you can't interact with it, right?
> You can't see what's going on as you're building
> or you can't experience it in the same way
> as working on a bike or a car or something else.
> So I do have a little bit of a challenge methodologically
> going from, "I just found information, how do I incorporate this
> and get it more solidly ah remembered?"
> But ah, ya know it's like a lot of things
> you just got a jump in and do it,
> so it's been a couple years re-wiring in my brain,
> but that's fine <laughing>
> welcome to PhD work. <laughing>
> (Think-Aloud Observation, l. 391)

Eric, Chris, and Jason describe the kind of tension that Wenger (1998) pointed to in his social theory of learning. He proposed, "The work of reconciliation may be the most significant challenge faced by learners who move from one community of practice to another" (Wenger, 1998, p. 160). Akin to Chris' experience, Jason, too, engaged in a variety of practices, in both formal and informal, private and public realms. Jason described his experience in the nucleus of his network:

> There's a little different version of me,
> that probably comes out or gets perceived there um,
> just because I'm more comfortable, ya know,
> these are long lasting enduring deep relationships
> that I've had with people for a long time, so I'm
> I'm not filtering constantly, ya know,
> It's, it's just a little bit more natural, um,
> and sometimes they are very intense
> but that's pretty rare um
> but an example of that is when something gets added,
> when my daughters were born,
> that fundamentally changed my relationships
> within the nucleus with many people, um…

> But the, it's still, I can anticipate and expect
> that people will be okay with however I am
> at that given point in time.
> So, kind of speaking again to that safety and
> comfort level of things at that level
> (Interview, l. 380)

Safety, comfort, and privacy could be a concern when engaging in multiple practices, both personally and professionally. Similar to Eric, Chris, and Jason, the construction of identity entailed reconciling trajectories in diverse communities of practice, which involved a process of negotiating meaning through participation and reification. For Michelle, her concern related to students wanting to be her friend on social media:

> I really didn't want my students
> to find me on Facebook
> and try to friend me.
> This was the same reason for why I didn't want to get Twitter.
> It was another avenue through which
> my personal and professional life could merge
> and I wanted to keep them separate…
>
> Because I was using Twitter for professional reasons,
> I didn't care if students found my profile
> and wanted to follow me.
> (Lived Experience Description, l. 15)

Michelle used different technologies for different practices, similar to Chris. For example, she used Pinterest for personal interests and Twitter for professional development (Think-Aloud Observation, l. 586). While she preferred to keep her personal and professional interests separate by using separate technologies (Think-Aloud Observation, l. 598), she occasionally used Pinterest for her professional practice by saving, finding, and sharing resources for work (Think-Aloud Observation, l. 612).

Akin to Michelle and Chris' approaches, Andrea, too, used technologies for different practices. For example, she used the simple resume and profile of LinkedIn for making professional connections that would likely be useful in the future (Think-Aloud Observation, l. 696). Likewise, Nicole used various technologies in her practices. She designated Twitter for professional use and chose to filter herself, thereby sharing a particular part of herself, as she explained:

> Despite how many followers I have
> or how many tweets I share,
> I still cannot incorporate Twitter
> into my daily social media obsession.
> This might be because I have chosen to keep Twitter strictly professional.
> I filter myself on all of my social media
> but I choose [to] share a different part of myself
> depending on the platform.
> To me, the Twitter platform is how I want
> the [content area and] larger education field, research fields,
> and work-related colleagues to see me.
> I want them to see me as educated, informed, and engaged.
> So that is what I choose to share with them.
> (Lived Experience Description, l. 3)

Nicole kept her LinkedIn profile current and set alerts to be notified when there was interesting news related to her professional practice:

> So I try to keep it pretty up to date,
> and I always have to have lots of alerts,
> and these alerts are what's driving me here
> of people friending me or different messages being sent
> whether they're spam or not,
> but I feel like when people Google you
> your LinkedIn is the first thing that comes up, so, …
>
> one of the other things that drives me in here
> is there's always really interesting emails that pop up
> with um, like this email three things I learned at Target
> that popped up through an email alert earlier this morning
> so I read that article about Target on LinkedIn, um,

> but it's kinda nice, I feel like everything is coming at me
> so I don't always have to search for it
> (Think-Aloud Observation, l. 54)

Nicole's previous work practice was core to her identity, as she explained:

> This isn't something that I regularly visit anymore,
> but I feel like it's something core to my identity.
> This is the online community that I used to manage
> and so I learned a lot about just even interacting in an online network
> and I just left that job [recently]
> um and I still volunteer,
> like next weekend I'm going up to Washington, DC
> with this organization and so I will be involved with lots of stuff
> related to, this is like a [content area] online community, um
> and I got really engaged.
> It has 5,000 members, almost 6,000 really, youths and adults,
> and that's how I can stay connected,
> and there's a giant clearinghouse of resources
> um, it's less a part of my identity now,
> but it does bring up some of the foundations I would say.
> (Think-Aloud Observation, l. 69)

Like Eric and Andrea, Nicole was engaged in blog writing, a common practice in their field. Similar to Eric, Chris, and Michelle, Nicole expressed concern with the potential vulnerability that could come from documenting one's thoughts in a public forum like a blog:

> This is like the one thing
> that's kinda burning inside me…
> I see these blogs.
> I see what people are putting on Twitter and
> it's nothing mind boggling.
> I'm just not sure I'm ready to
> like put myself out there like that always…
>
> But, ya know, it's like if you're gonna put something out there
> like some of these people do,
> you have to be ready for like the backlash ya know
> of you having to defend your point then,
> as you can see with my lived experience,

> that's not my thing.
> Just let me put out my stuff and have it.
> I don't really want to have to answer to anybody
> about what I think or feel…
> Someday I dream,
> I wish to have
> to truly be a contributor
> to my PLN
> because it is about reading.
> It is about learning.
> It is about connecting.
> But I also feel like you have to contribute
> and that's the one thing I'm not doing.
> (Think-Aloud Observation, l. 256)

This excerpt epitomized Wenger's (1998) notion of identity in practice. It illustrated Nicole's continual ongoing reconciliation of diverse trajectories of learning and the duality of the social and the individual. As a true contributor, her sense of competence and confidence would likely grow in a way that would impact her identity, as Wenger (1998) described in his concept of identity as community membership. While there are likely multiple converging and diverging trajectories in Nicole's experience of a nexus of multimembership, her desire to be more of a contributor may indicate an inbound learning trajectory in this instance.

Summary of connectedness as identity. Experiencing connectedness involved cultivating a sense of self and identity. Agents formed identities and negotiated meaning through lived experiences of connectedness. Through identity in practice, agents fostered self-concepts of competence and confidence in a continual, on-going process of participation and reification in a nexus of multimembership in communities of practice.

Chapter 5: Summary and Conclusions – An Opening

> "The question is not: is it true? But: does it work? What new thoughts does it make it possible to think? What new emotions does it make it possible to feel? What new sensations and perceptions does it open in the body?" Brian Massumi, *Translator's Foreword: Pleasures of Philosophy* (1987)

This final chapter provides a summary of the study including a brief overview of the literature, methodology, and findings. The research questions are answered in the conclusions section. Finally, the implications of the research are addressed along with the limitations of the study and recommendations for further research.

Summary of the Research Study

This research into the lived experiences of connectedness in personal learning networks was situated in the field of learning design and technologies, and more specifically in distance and mobile learning, and emerging technologies in the field. After an extensive review of literature and research that encompassed the context, phenomenon, conceptual frameworks, and philosophical commitments, it was evident that there was a need to fill the lacuna in the corpus related to connectedness in personal learning networks through a post-intentional phenomenological lens. Therefore, the primary research question driving this inquiry was: How might connectedness take shape in personal learning networks? Furthermore, what is it like to experience connectedness with people, ideas, information, and technologies in a personal learning network? In what ways might a learner experience connectedness between formal and informal learning? What are the processes and products of meaning-making through connectedness in

personal learning networks?

From the review of literature and research, it was shown that the research in the field of learning design and technologies was maturing, not only beyond media comparison studies, but also beyond descriptive research designs and beyond quantitative research. From the review of phenomenological research in the field, it was evident that phenomenology was a growing trend. Scholars had not only drawn on post- and post-intentional phenomenological research philosophies and methodologies (Aagard, 2015; Benson, 2012; Pazurek, 2013; Valentine, 2014), but had also written about the value and importance of a move to the "post" for the future of the learning design and technologies field (Cilesiz & Spector, 2014; Hlynka, 2004; Solomon, 2000; Yeaman et al., 1996).

After IRB approval (see Appendix A), individual email requests to participate (see Appendix B) were sent to 44 graduate students who were enrolled in a graduate degree program and identified as likely to provide access to the phenomenon in the form of rich, thick raw data. Of the 44 students, 13 responded to the email request to participate in the research study. After the initial response, 4 of the 13 students determined they had scheduling conflicts and were unable to participate in the study. Nine students were scheduled for a synchronous video meeting in which the study was explained and questions answered before they completed the consent form (see Appendix C). At that time, participants were asked to begin writing a lived experience description, based on the protocol (see Appendix D) provided, and return it within two weeks. Six of the 9 participants completed the written lived experience descriptions (and all subsequent data moments), which constituted the first data moment of the study. This was followed

by the second data moment of the study, which was a 60-minute Think-Aloud Observation conducted with each participant individually via a synchronous video conferencing meeting and recorded using audio and screen capturing software. The third wave of data gathering consisted of a 60-minute in-depth interview with each participant. The whole-part-whole analysis and synthesis process began during the first wave of data gathering with a holistic reading of the text, followed by holistic listening of the think-aloud observation and in-depth interviews, along with phenomenological walks and post-reflexion journaling. The whole-part-whole analysis and synthesis process continued through a series of readings, analyses, and syntheses of each data moment for each participant, then combined data moments for each participant, followed by reading across all data moments for all participants. The tentative manifestations were interrogated using the post-intentional data analysis technique of chasing lines of flight developed by Vagle (2014) and informed by Deleuze and Guattari (1987).

The post-intentional whole-part-whole analysis and convergence process produced four tentative manifestations of the phenomenon: connectedness in context, connectedness as motivation, connectedness as learning, and connectedness as identity. In the tentative manifestation of connectedness in context, the findings included immersiveness and characteristics of complex adaptive systems: emergence, self-organization, adaptive co-evolution, self-similarity, dynamic nonlinearity, and systemic interconnectedness. This tentative manifestation was interpreted through the theory of complexity. In the tentative manifestation of connectedness as motivation, the findings included needs for safety and freedom, esteem through belonging, self-actualization, and

the desire to know and to understand. This tentative manifestation was primarily interpreted through the theories of Maslow (1943), Malone and Lepper (1987), and Keller (1987). In the tentative manifestation of connectedness as learning, the findings included agency, goal formation, observation and modeling, reciprocity, multiple perspectives, serendipity, and syntheses. This tentative manifestation was primarily interpreted through the theories of Dewey (1938/1997), Bandura (1986), Lave and Wenger (1991), Duffy and Cunningham (1996), and Siemens (2005). In the tentative manifestation of connectedness as identity, the findings included an evolving self-concept and identity through practice. This tentative manifestation was interpreted through the theories of Rogers (1959) and Wenger (1998).

Conclusions

The conclusions of this research study comprise a description of the shape of connectedness in personal learning networks. Additionally, the conclusions include an explanation of what it is like to experience connectedness with people, ideas, information, and technologies in a personal learning network. Moreover, the conclusions contain an elucidation of the ways that a learner might experience connectedness between formal and informal learning. Finally, the conclusions entail a depiction of the processes and products of meaning making through connectedness in personal learning networks.

Primary research question. *How might connectedness take shape in personal learning networks?* Connectedness took the shape of four tentative manifestations: connectedness in context, connectedness as motivation, connectedness as learning, and connectedness as identity. The context in which connectedness was studied—the personal

learning network—illuminated the multiple contexts in which the phenomenon existed. From the participant data, the phenomenon appeared to exist within an immersive complex adaptive system that displayed characteristics of emergence, self-organization, adaptive co-evolution, self-similarity, dynamic non-linearity, and systemic interconnectedness. Connectedness as motivation was depicted through needs for safety and freedom, esteem through belonging, self-actualization, and the desire to be-in-the-know. Connectedness as learning was illustrated through experiences of agency, goal formation, observation and modeling, reciprocity, multiple perspectives, serendipity, and syntheses. Connectedness as identity was evidenced through an evolving self-concept and identity through practice.

Secondary research questions.

The secondary research questions helped to further focus the inquiry. The first sub-question related to the experience of connectedness with people, ideas, information, and technologies in a personal learning network. The second sub-question related to experiences of connectedness between formal and informal learning. The third sub-question related to the processes and products of meaning making through connectedness in personal learning networks.

Experiencing connectedness.

What is it like to experience connectedness with people, ideas, information, and technologies in a personal learning network? To experience connectedness in a personal learning network with people, ideas, information, and technology was to be immersed in a complex adaptive system that was emerging and self-organizing. The network

adaptively co-evolved along with the participant-agent. Also, the network showed signs of self-similarity with the participant-agent. The network and the agent reflected one another, akin to mirror images. The networks were dynamic and nonlinear, and exhibited systemic interconnectedness that immersed the participant-agent. Beyond immersion in this complex adaptive system, to experience connectedness was to be motivated by the needs for safety and freedom, motivated by the desire for esteem through belonging, motivated to self-actualize, and motivated to know and to understand, to be-in-the-know. To experience connectedness was to learn through agency, forming goals, observing, modeling, reciprocating, seeking and finding multiple perspectives, being surprised by serendipitous discoveries, and generating syntheses. To experience connectedness was to become, to evolve one's self-concept and identity through practice.

Connectedness between formal and informal learning.

In what ways might a learner experience connectedness between formal and informal learning? Connectedness between formal and informal learning was experienced in multiple and varied contexts that ran through all four tentative manifestations: connectedness in context, connectedness as motivation, connectedness as learning, and connectedness as identity. Formal and informal learning could be likened to threads that ran through the fabric of connectedness. Connectedness between formal and informal learning was evident in systemic interconnectedness in which agents used multiple and overlapping systems for both formal and informal learning. Connectedness between formal and informal learning provided the contexts in which participants-agents experienced motivating forces. For example, they sought freedom in informal learning

and safety in the structure of formal learning. They sought esteem and belonging in both formal and informal learning contexts. The trajectories towards self-actualization were enmeshed in both formal and informal learning contexts, each informing the other in a kind of cyclical vortex that gave the participant-agents momentum and propelled them forward toward their goals. The desire to know and to understand, to be in a perpetual state of being-in-the-know was fulfilled in the interplay of both formal and informal learning contexts. The formal and informal learning contexts were essential to the rich, learning process from informing goal formation to observation and modeling, to reciprocity, multiple perspectives, serendipity, and syntheses. Agents experienced connectedness as identity in both formal and informal learning contexts through the impact of both on an evolving self-concept and identity through practice. Formal and informal learning acted as dual impactors that not only shaped the contexts of connectedness, but also the experiences of connectedness as motivation, learning, and identity.

Meaning through connectedness.

What are the processes and products of meaning making through connectedness in personal learning networks? Meaning was negotiated through connectedness by way of the people, ideas, information, and technologies in the network. An agent was motivated to negotiate meaning by desires for safety and freedom, esteem through belonging, self-actualization, and being-in-the-know. The processes by which agents negotiated meaning entailed agency, goal formation, observation and modeling, reciprocity, multiple perspectives, serendipity, and syntheses. The products of negotiated meaning through

connectedness with people, ideas, information, and technologies in a network were the participant-agent's evolving self-concepts and identities transformed through practice.

Implications

This is the first known study that has used a post-intentional methodological approach to explore lived experiences of connectedness in personal learning networks. The three waves of data gathering allowed access to rich, thick descriptions of the phenomenon. The post-reflexive journal and post-intentional data analysis technique of chasing lines of flight (Vagle, 2014) opened up the phenomenon in ways that were unexpected and surprising. The implications of this research study are three-fold. First, this research study began to fill the lacuna in the corpus related to online, networked, and connected learning in the field of learning design and technologies, particularly from the participant-agent-learner perspective. Second, this research study advanced the use of post-intentional phenomenological philosophy and methodology in the field of learning design and technologies. Third, this research study provided a foundational understanding of experiences of connectedness, from which the field could build upon in the development of strategies for empowered, transformative learning.

Limitations

This post-intentional phenomenological research study contained several inherent limitations. First, the 6 participants self-selected from the network of 44 graduate students and therefore self-selection bias could be a factor that impacted the findings. Second, validity was not addressed through triangulation or member checking, but rather validity was addressed by the researcher's sustained engagement, which required "the researcher

to be open and sensitive to the phenomenon under investigation throughout all phases of the study" (Vagle, 2014, p. 66). According to Vagle (2014):

> Many qualitative methodologists emphasize the importance of triangulation in order to more fully justify claims, and therefore increase the validity of any themes, assertions, categories, etc. The term triangulation appears to be rooted in celestial navigation of the seas. That is, triangulating coordinates would help guide a ship as it sails. In qualitative research methodologies, triangulation has been used as a metaphor to represent how you might find the 'coordinates' from multiple data sources in order to 'find' findings. Although I think this concept has some applicability to phenomenological research, I am concerned that such a practice might make the analysis more mechanistic than I prefer. For me, in phenomenological research, when we have multiple data moments such as interviews, writings, and observations from a number of participants, over a period of time, I do not think one needs to triangulate across these moments in order to say something meaningful. (p. 97)

Third, the analysis and synthesis was subject to researcher interpretation. To minimize the potential for bias, the researcher interrogated interpretations using a post-intentional data analysis technique known as chasing lines of flight (Vagle, 2014), which was informed by Deleuze and Guattari (1987), along with a post-reflexive journal (Vagle, 2014). Fourth, the participants represented a small, homogenous group of doctoral students. Thus, the findings were not generalizable, but rather intended to begin to fill the gap in research, literature, and methodology, as well as generate questions for further

research.

Recommendations for Further Research

A hallmark of post-intentional phenomenology is that is resists finality: “a Deleuzo-Guattarian vocabulary privileges how things connect rather than what things are…. As such, the concept, lines of flight, does not assume that any thing, idea, belief, goal, phenomenon, person … can be thought of as stable, singular, and final” (Vagle, 2014, p. 118). Thus, it is a goal of this research study to be generative in creating new ideas and questions to explore and embedding new, generative ideas in the minds and hearts of the readers. Some potential avenues that could be explored include: how connectedness and nomadic thinking might foster activism and civic engagement; design-based research of a gamified personal learning network strategy based on experiences of connectedness; a greater, more intense focus on philosophies of technology in the literature as foundational to research and pedagogical strategies in the field; advancing the use of post-intentional phenomenological research with diverse participant groups in diverse contexts; growth of phenomenological research beyond traditional Husserlian transcendental-descriptive studies towards a move to the “posts” informed by Ihde (2003) and Vagle (2014); and new avenues for publishing qualitative work, such as a peer-reviewed journal dedicated to qualitative research in learning design and technologies to advance the field.

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Appendices

Appendix A: IRB Approval

UNIVERSITY OF MINNESOTA

Twin Cities Campus

Human Research Protection Program
Office of the Vice President for Research

D528 Mayo Memorial Building
420 Delaware Street S.E.
MMC 820
Minneapolis, MN 55455

Office: 612-626-5654
Fax: 612-626-6061
E-mail: irb@umn.edu or ibc@umn.edu
Website: http://research.umn.edu/subjects/

February 23, 2015

Jolie Kennedy
Curriculum and Instruction 4301A
Room 125 PeikH
159 Pillsbury Dr SE
Minneapolis, MN 55455

RE: "Connectedness in Personal Learning Networks"
IRB Code Number: **1501P60041**

Dear Jolie Kennedy:

The Institutional Review Board (IRB) received your response to its stipulations. Since this information satisfies the federal criteria for approval at 45CFR46.111 and the requirements set by the IRB, final approval for the project is noted in our files. Upon receipt of this letter, you may begin your research.

IRB approval of this study includes the consent form and recruitment materials received February 17, 2015.

The IRB would like to stress that subjects who go through the consent process are considered enrolled participants and are counted toward the total number of subjects, even if they have no further participation in the study. Please keep this in mind when calculating the number of subjects you request. This study is currently approved for 12 subjects. If you desire an increase in the number of approved subjects, you will need to make a formal request to the IRB.

For your records and for grant certification purposes, the approval date for the referenced project is January 26, 2015 and the Assurance of Compliance number is FWA00000312 (Fairview Health Systems Research FWA00000325, Gillette Children's Specialty Healthcare FWA00004003). Research projects are subject to continuing review and renewal; approval will expire one year from that date. You will receive a report form two months before the expiration date. If you would like us to send certification of approval to a funding agency, please tell us the name and address of your contact person at the agency.

As Principal Investigator of this project, you are required by federal regulations to inform the IRB of any proposed changes in your research that will affect human subjects. Changes should

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not be initiated until written IRB approval is received. Unanticipated problems or serious unexpected adverse events should be reported to the IRB as they occur.

The IRB wishes you success with this research. If you have questions, please call the IRB office at 612-626-5654.

Sincerely,

Clinton Dietrich

Digitally signed by Clinton Dietrich
DN: c=US, st=Minnesota, l=Minneapolis, ou=Human Research Protection Program, email=dietr006@umn.edu, o=University of Minnesota, cn=Clinton Dietrich
Date: 2015.02.23 14:56:00 -06'00'

Clinton Dietrich, MA
Research Compliance Supervisor
CD/bw

CC: Charles Miller

Appendix B: Email Request for Participation in Research Study

Jolie Kennedy <kenn0158@umn.edu>

Research Study on Connectedness in Personal Learning Networks

Jolie Kennedy <kenn0158@umn.edu> Thu, Feb 26, 2015 at 4:57 PM
To:

Hi

I am conducting a research study that explores the lived experiences of connectedness in personal learning networks. The purpose of the study is to better understand what it is like to experience connectedness in personal learning networks; how learners connect with people, ideas, information, and technologies; how learners connect formal and informal learning; and the processes and products of meaning-making in personal learning networks.

A personal learning network is "the sum of all social capital and connections that result in the development and facilitation of a personal learning environment" (Couros, 2010, p. 139). A personal learning environment is "a combination of devices, applications, and services within what may be thought of as the practice of personal learning using technology" (Martindale & Dowdy, 2010, p. 180). Experiences of connectedness in personal learning networks may emerge from connections that are afforded and facilitated through networking sites (e.g., LinkedIn, Facebook, Twitter, or Ning).

The study involves completing the following three tasks over the course of four weeks:

- **Weeks 1-2.** Write a lived experience description based on a prompt provided by the researcher. You will have two weeks to complete this task. It is a brief, informal writing exercise in which you are asked to write a detailed description of moments in your experiences.
- **Week 3.** Narrate an online tour of your personal learning networks using a think-aloud method. More information will be provided along with a guided protocol to structure the online tour. The researcher will record this task during an online video meeting.
- **Week 4.** Participate in an in-depth interview conducted in an online video meeting.

The tasks will take place in the order listed above. It is estimated that each task will take approximately 60 minutes to complete. One week following Task 1, the online tour and in-depth interview tasks will be scheduled to occur on separate days approximately one week apart. As a token of appreciation for your voluntary participation in the study, I will send you a $50 gift card after the completion of the three tasks.

If you are interested in learning more about this research study to determine if you would like to participate, please contact me at kenn0158@umn.edu or 619-987-5654.

Thank you!

Jolie Kennedy

You have received this message because you are enrolled in a Learning Technologies program. The Department of Curriculum & Instruction grants permission to contact students for research purposes only. This study is approved by the IRB.

Jolie Kennedy, PhD Candidate
Learning Technologies
College of Education + Human Development
University of Minnesota

Jolie Kennedy / http://www.joliekennedy.com
Skype / jolie.kennedy
Mobile / 619.987.5654
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LinkedIn / http://www.linkedin.com/in/joliekennedy

Appendix C: Consent Form

CONSENT FORM

Down the Rabbit Hole: A Phenomenological Exploration into Experiences of Connectedness in Personal Learning Networks

You are invited to be in a research study of connectedness in personal learning networks. You were selected as a possible participant because you are a current or former college-level student. The researcher asks that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by Jolie Kennedy, Department of Curriculum and Instruction, University of Minnesota.

Background Information: The purpose of this study is to learn more about your experiences of interactions and connections in your personal learning networks. This includes how you form your networks and connections; how you interact and connect with people, ideas, information, and technologies; how you connect formal and informal learning; and how you make meaning from the experiences in your personal learning networks.

A personal learning network is "the sum of all social capital and connections that result in the development and facilitation of a personal learning environment" (Couros, 2010, p. 139). A personal learning environment is "a combination of devices, applications, and services within what may be thought of as the practice of personal learning using technology" (Martindale & Dowdy, 2010, p. 180). Experiences of connectedness in personal learning networks may emerge from connections that are afforded and facilitated through networking sites (e.g., LinkedIn, Facebook, Twitter, or Ning).

Procedures: If you agree to participate in this study, you will be asked to complete the following three tasks over the course of four weeks:

1. **Weeks 1-2.** Write a lived experience description based on a prompt and example provided by the researcher. You will have two weeks to complete this task. It is a brief, informal writing exercise in which you are asked to write a detailed description of moments in your experiences. A more detailed explanation of the task will be provided.
2. **Week 3.** Narrate an online tour of your personal learning environments and networks using a think-aloud method. A description of this method will be provided along with an example, practice, and guiding questions. This researcher will record the think-aloud online tour using screen capture during an online video meeting.
3. **Week 4.** Participate in an in-depth interview during an online video meeting that will be recorded by the researcher. During the interview, the researcher will ask questions about your experiences of connectedness in personal learning networks, your connections between formal and informal learning, and how you make meaning from your experiences.

The tasks will take place in the order listed above. It is estimated that each task will take approximately 60 minutes to complete. One week following Task 1, the online tour and in-depth interview tasks will be scheduled to occur on separate days approximately one week apart.

Risks and Benefits of being in the Study: There is minimal risk associated with participating in this study, as the researcher will be asking you about your personal learning networks. It is reasonable to assume that you may express or wish to express information of a personal nature. Please be assured that you may choose not to answer any particular questions that make you uncomfortable. The data collected through the lived experience description, the online screen capture video, and the interview will be kept completely confidential. Your responses will be stored on the researcher's password-protected computer. A backup of the data will be stored on NetFiles, which is a secure online storage tool at the University of Minnesota that has been approved for storing private and protected data. The data will be used for research purposes only and will be erased after 7 years.

With regard to benefits in participating, you may find responding to the questions regarding your personal learning networks helpful as it can further give you the opportunity to reflect on your experiences. In addition, your participation will allow the researcher to better understand the experience of connectedness in personal learning networks.

Confidentiality: The records of this study will be kept private. In any sort of report the researcher might publish, the researcher will not include any information that will make it possible to identify you. Research records will be stored securely and only the researcher and the researcher's academic advisor will have access to the records. Study data will be encrypted according to current University policy for protection of confidentiality.

Video recordings of the online tour and the interview will be transcribed and statements you make may be included, confidentially, in published reports of the study findings. However, your name will not be associated with any statements you make and will not be included in any report or publication of the study findings.

Compensation: You will receive a $50 gift card in appreciation for your time following your full participation in the study, which will include writing one description of your experiences, narrating an online video tour of your personal learning networks, and participating in one in-depth interview. If you decide to withdraw from the study early, which you may do at any time, you will not receive a gift card.

Voluntary Nature of the Study: Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

Contacts and Questions: The researcher conducting this study is: Jolie Kennedy. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact her at 619-987-5654, kenn0158@umn.edu. Advisor: Dr. Charles Miller, 612-625-0534, charlesmiller@umn.edu

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher or the advisor, **you are encouraged** to contact the Research Subjects'

Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

You will be given a copy of this information to keep for your records.

Statement of Consent: I have read the above information. I have asked questions and have received answers. I consent to participate in the study.

Signature of Participant: _____ Date: _____

Signature of Investigator: _____ Date: _____

References:

Couros, A. (2010). Developing personal learning networks for open and social learning. In G. Veletsianos (Ed.), *Emerging technologies in distance education* (pp. 109-128). Edmonton, AB: Athabasca University Press.

Martindale, T., & Dowdy, M. (2010). Personal learning environments. In G. Veletsianos (Ed.), *Emerging technologies in distance education* (pp. 177-193). Edmonton, AB: Athabasca University Press.

Appendix D: Lived Experience Description Protocol

Lived Experience Description (LED) Protocol:
Guiding instructions and prompts for writing the lived experience description

Introduction
The purpose of writing a lived experience description is for you to describe in detail a specific moment when you experienced interactions or connections with people, ideas, information, media, or technologies in your personal learning networks. Think of this as an informal writing activity, much like a "free write" in which fancy grammar or length is not important. Set aside an hour or so in which you write what comes to mind based on the prompts below. The goal of this activity is to think of a specific moment. You can choose a normal, everyday experience. It does not have to be a significant, life-changing experience. An example is provided below.

My intention, by providing these guiding instructions and writing prompts, is to gather a detailed description of your experiences. My objective is to better understand what connectedness is like for you, as it is revealed through your experiences. You may want to consider sharing a specific situation, event, or moment when you felt connected through online environments, technologies, or media; connected with online networks of people including classmates, teachers, experts, peers, or others; or connected to content, ideas, or information. You may want to discuss your thoughts or feelings about your experience of these kinds of connections.

Guidelines
The following guidelines for writing a lived experience description are drawn from Vagle (2014):

> Once you have chosen a specific moment to describe, consider the following guidelines (adapted from Van Manen, 2001) as you write:
>
> 1. Think about the event chronologically.
> 2. Describe what you saw, what was said, what you heard, how you felt, what you thought.
> 3. Try to describe the experience like you are watching it on film.
> 4. Describe the experience as you lived through it. Try to avoid causal explanations (this happened because…), generalizations (this typically happens early in the morning), or abstract interpretations (I wonder if…).
> 5. Write in a straightforward manner. Try to avoid beautifying your account with fancy phrases or flowery terminology.
> 6. If you want to use names in your description, please assign each person a pseudonym.
> 7. Read the example for guidance.
>
> With these suggestions in mind, please write a description in response to the following prompt. (p. 88)

Prompts

Describe what it is like for you to experience connectedness (interactions and connections) in your personal learning network.

To help you get started or to spark memories of your personal experiences of interactions and connections, you could refer to the questions below, although there is no need to answer these questions directly in your written response. You may also choose to include an image that speaks to your experience.

- At what moment did you feel connected? What is it like to feel connected with others in your personal learning network?
- What is it like to be connected to a person, group of people, ideas, information, media, or technologies in your personal learning network?
- What does it mean to be connected in your personal learning network?

Type your lived experience description in a document. When you are finished writing your lived experience description, **please email it to me at kenn0158@umn.edu**. Aim to complete it within 2 weeks, but if you need more time or have questions, please contact me at any time.

Thank you for sharing your experiences. Your effort and energy are very much appreciated!

Example

Below is an example of a written lived experience description. A mother wrote it about her experiences of being a mom and mothering. This example is an excerpt from Van Manen (1990).

> Lately I have been wondering if I expect too much of my son. He gets all mixed up in his homework, is overtired, can't think straight, and spends hours doing one straightforward assignment when he should just be relaxing and enjoying family life like all the other kids in his class; he has misread the instructions and has to do the whole thing again; he has a thousand ideas for a report on gorillas, but can't seem to get it together to write even the opening sentence. So yesterday I looked at Robbie's cumulative-file at school. I felt guilty in a way, resorting to that, especially since those numbers have so little to say about a person. And my love and hopes for him are unconditional of course, they don't depend on his achievement or IQ scores. But the numbers weren't supposed to tell me whether Rob is special or not—they were supposed to tell me what to do: whether it is alright for me to tease, prod and cajole him about his homework, and say, "Hey, you lazy schmuck, get some of this work finished in school instead of fooling around," or maybe, "Of course you can't think straight when you're so tired. You'll have to get home earlier and do this homework before supper." (p. 65)

References

Vagle, M. (2014). *Crafting phenomenological research.* Walnut Creek, CA: Left Coast Press.

Van Manen, M. (1990). *Researching lived experience: Human science for an action sensitive pedagogy.* Albany, NY: SUNY Press.

Appendix E: Think-Aloud Protocol

Think-Aloud Protocol:
The procedure and script for conducting the think-aloud session

Procedure for Conducting the Think-Aloud Session

Before the Think-Aloud Session

1. Prepare for the think-aloud session. Test computer equipment and recording software.
2. Schedule and prepare the participants. Send a reminder email to the participant that confirms the meeting time and describes the think-aloud session including the introduction and instructions. Confirm that the participant has access to a computer and video chat program.
3. Review the script for conducting think-aloud protocols.

During the Think-Aloud Session

4. Introduce and explain the purpose of the session. Refer to the **Script** for conducting the think-aloud session.
5. Allow time for the participant to practice and ask questions.
6. Begin recording the session.
7. Ask the participant to begin with the initial task. Ask follow up questions as appropriate.
8. Prompt the participant to continue to think aloud after more than 15 seconds of silence.
9. Allow 10 minutes for the participant to share concluding thoughts at the end of the session.
10. Briefly review the session with the participant.
11. Thank the participant for her or his time and energy.
12. End the recording. Save the recording.
13. Explain the next steps.

After the Think-Aloud Session

14. Make a back-up of the recording.
15. Transcribe the recording.
16. Review the transcript.
17. Select video clips to review with the participant in the follow-up in-depth interview.

(adapted from Jonassen, Tessmer, & Hannum, 1999)

Script for Conducting the Think-Aloud Session

(Note: The researcher will use the following script **During the Think-Aloud Session**. *The italic font indicates an action by the participant or researcher.*)

Introduction and Instructions
Researcher: I am interested in how you experience connectedness in your personal learning network including connections and interactions with people, ideas, information, and technologies. To help me better understand your experience, I will ask you to use a think-aloud method, which is a way of verbalizing thoughts as you complete an activity or task. It will be like creating an informal narrated tour or bringing me along on a walk-about of your personal learning environments and networks.

The purpose of this think-aloud session is to create an online tour that walks through a typical day in the life of connecting and learning within your personal learning network. To accomplish this, I will ask that you think aloud as you navigate online. Describe what you are thinking as you are viewing and reading the screen. This activity will take no more than 60 minutes.

I will demonstrate the think-aloud method so you can see what it is like to think aloud as you navigate online. I will model the think-aloud method with Twitter. I'm going to say everything that goes through my mind.

The researcher shares the screen and models the think-aloud method while opening Twitter, reading tweets, navigating the site, and retweeting.

Practice
Researcher: Before we get started, try practicing the think-aloud method while using your mobile phone.

The participant uses her or his mobile phone while practicing the think-aloud method.

Questions
Researcher: What questions do you have about the think-aloud method?

The participant asks questions about the think-aloud method as necessary.

Recording
Researcher: What you say and describe in this think-aloud session is really important. I want to be sure to capture everything so I can review it later. Therefore, I will be recording audio and video of this activity. I will let you know when I start recording. Okay?

The participant acknowledges that she or he understands the session will be recorded.

Researcher: We will begin with an open-ended task in which you will freely roam and engage in your personal learning network. You can spend as much time as you want on this initial task. I

will not interrupt you except to remind you to think aloud when you stop talking for longer than 15 seconds. After this initial task, as time permits, I will ask you follow-up questions based on events that arise during the think-aloud activity.

When you feel ready, I will begin recording and you can start. Would you like to take a break or get something to drink before we start? Let me know when you are ready.

The participant indicates that she or he is ready to begin.

Researcher: I am going to start recording now. *Begin recording.*

Initial Task
Researcher: You first task is to access and use your personal learning network as you normally do in everyday life. You may want to think of this task chronologically. For example, what is the first thing you typically do? You may want to think about how you access devices, technologies, media, or social media, people in your network, or information and ideas. Remember to think aloud and describe what you see, read, and think.

The participant completes the initial task using the think-aloud method.

Follow-up Questions
As time permits, the researcher follows up with the questions below based on the participant responses in the initial task. The researcher reminds the participant to continue to think aloud if the participant is silent for more than 15 seconds. The researcher ends the follow-up questions to allow 10 minutes for concluding thoughts.

Optional Follow-Up Task 1. Connecting Parts
Researcher: Can you share with me more about how you connect with technologies (e.g., devices, media, apps, or social media), people, or ideas and information? Talk me through how you connect to technology, people, or information in your personal learning network. Please remember it is important to say everything you are thinking including what you are seeing and reading.

The participant completes the task while thinking aloud.

Optional Follow-Up Task 2. Process of connecting
Researcher: Thinking chronologically about your experiences in using your personal learning network, what happens first, how are connections initiated? For example, how does information come into your personal learning network? How are connections established in your personal learning networks? Then what happens next? You may want to share about how you process information, make connections, make meaning, or produce something. Remember to think aloud and describe what you think, see, and read.

The participant completes the task while thinking aloud.

Optional Follow-Up Task 3. Lived Experience Description

Researcher: Can you share with me more about the kinds of connections you experienced and described in your lived experience description? What does that look like in your personal learning network? *Ask a follow-up question based on information from the participant's lived experience description (previous data source).* Remember to think aloud and say everything that comes to mind.

The participant completes the task while thinking aloud.

Optional Follow-Up Task 4. Connecting Formal and Informal Learning
Researcher: Thinking about moments when you use your personal learning network in formal and informal learning, can you share with me what that looks like? You may want to consider any crossover or connections that occur among your school, work, personal, professional, or community interests in your personal learning network. Remember to think aloud.

The participant completes the task while thinking aloud.

Optional Follow-Up Task 5. Critical Thinking and Digital Literacies
Researcher: I would like to turn your attention to digital literacies and critical thinking. Can you share with me how you draw upon digital literacies (e.g., media, technology, and information literacy) and critical thinking as you navigate, interact, and use your personal learning network? Remember to say what you are thinking. See more information about digital literacies as needed.

The participant completes the task while thinking aloud.

Concluding Thoughts
The researcher begins concluding the think-aloud session with 10 minutes remaining in the hour.

Researcher: We have a few more minutes, is there anything else in particular that you would want to show me or want me to know about your personal learning network or your experiences of connections and interactions? Do you have any questions?

The researcher allows time for the participant to share any concluding thoughts or ask questions.

Researcher: **Thank you for your time and energy today!** I have enjoyed spending time with you. I will stop recording now and then explain the next steps. *End and Save the recording.*

Next Steps
Researcher: For the next steps, I will transcribe and review the session to prepare for our in-depth interview, which is scheduled for next week. The interview should take about 60 minutes. It will involve a series of open-ended questions and may include a review of a few video clips from today.

Reference
Jonassen, D. H., Tessmer, M., & Hannum, W. H. (1999). *Task analysis methods for instructional design*. Mahwah, NJ: Lawrence Erlbaum.

Appendix F: Semi-Structured Interview Protocol

Semi-Structured Interview Protocol

Introduction (5 minutes)	Thank you for meeting with me today to talk about your experiences of connectedness, interactions, and making connections in your personal learning network. This study will help scholars to better understand personalized learning from the learner's perspective. This session will be recorded so that I do not miss anything that you say here today. Your answers will be kept confidential. I will not include your name or any other information that could identify you in any report that I write. Do you have any questions about this interview before we start?
Topic 1 (20 minutes)	Topic 1. Connectedness in Personal Learning Networks To begin, please describe the experience of making connections in your personal learning network. PROBE: 1. What does it mean to build a personal learning network? What is it like to initiate connections? How does it feel to be connected with others in a network? 2. What are the processes you use to build a personal learning network? 3. What does your personal learning network look like? What is it like to experience learning in your personal learning network? 4. What is the reciprocal nature of the experience? How does reciprocity play into your experience?
Topic 2 (15 minutes)	Topic 2. Bridging formal and informal learning Now I would like to discuss the connections between your formal learning and informal learning activities. PROBE: 5. When does this bridging occur? What does it look like? 6. What is it like to experience a connection between formal and informal learning? 7. How does it relate to constructivist learning and the transfer of knowledge?
Topic 3 (15 minutes)	Topic 3. Meaning-making The last thing I would like to discuss are ways that you make meaning from your experiences. PROBE: 8. How do you make sense of and within your personal learning

	networks? 9. What digital and critical literacies do you use in the experience of meaning-making?
Final Thoughts (5 minutes)	Those were all of the questions that I wanted to ask you today. 10. Do you have any final thoughts about your experiences that you would like to share? Thank you for your time. I will be mailing you a gift card as a token of appreciation for your participation in the study. Where would you like it mailed?