EXAMINING SELF-DIRECTED LEARNING IN AN

EDUCATIONAL TECHNOLOGY CLASS FOR PRE-

SERVICE TEACHERS: A QUALITATIVE CASE

STUDY



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I would not be here if it were not for my family. My parents, Ed and Holli, and grandparents, Poppi and Momma Don, always instilled in me the value of treating others well, hard work, and obtaining an education. My grandpa, Poppi, stated, "A leader's primary responsibility is to think of others first. The great duty in life is the promotion of the happiness and the welfare of our fellow man." My grandparents and my parents always made me feel as though I was the best version of myself, and taught me invaluable life lessons about strong character, dedication, and love. Secondly, my younger brothers, Brock, Clayton, and Hamilton, you are my best friends and always challenge me. To my precious babies, Raife, Harris, and Cosette, you are the loves of my life and the reason I do anything and everything. I hope this degree is an example and testament to what you can achieve. Finally, to my husband, my partner, my other (better) half, Stephen, who has seen more than anyone how arduous this journey has been for me. Without you, I would not have been able to do this and for that it has only made me love you more. You are a forever understanding and an unfaltering presence for me and our babies. Words can only express a fraction of the appreciation and love I have for each of you.

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Abstract: The purpose of this case study was to explore a self-organized learning environments (SOLE) experience for adult learners to describe their response in relation to self-directed learning and curiosity in a self-organized learning environment. The participants in this study were students enrolled in two sections of an undergraduate educational technology course for pre-service teachers at a midwestern university. The study included 37 total students who were enrolled in the course.

      This study was a descriptive case study based off of Merriam's (1998) guide for a descriptive case study. The scope of the study was two sections of one course during one semester. The phenomenon studied was providing support for the role of curiosity in a SDL adult learning environment. It is important to consider the context for this study along with multiple variables, exploring data, and altering instruction. The data collection was conducted during the first nine weeks of the course. Data sources included interviews, observations, focus groups, *The Curiosity and Exploration Inventory II* (Kashden et al., 2009) pre- and post-survey, and document analysis. Data analysis entailed open coding of transcripts from interviews and observations. Emphasis was given to identifying categories that "fit" the data. Repeatedly appearing categories and concepts helped to construct themes based on adult self-organized learning and curiosity. In order to help give structure and language to the findings, the final phase of analysis and interpretation applied both Knowles's (1975) and Merriam's (2001) Theory of Adult, Self-directed learning and Kashden et al.'s (2009) *The Curiosity and Exploration Inventory II.*

      The findings revealed the pre-service teachers experience through SOLE demonstrated many elements of SDL and curiosity, adult learning. Further, findings described that using adult learning principles as a guide, learning was enhanced by many of the participants in the study. Findings from the *The Curiosity and Exploration Inventory II (*Kashden et al., 2009) suggested curiosity was slightly enhanced through SOLE in an adult learning environment.

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INTRODUCTION

Self-organized learning environments (SOLE) can facilitate and foster self-directed learning (SDL) skills. In self-organized learning, learners are in control of their learning with little influence from a facilitator. Wiley and Edwards (2002) described self-organized learning as when "a group of students come together without a guiding authority to accomplish any significant purpose" (p. 35). Sharma and Fiedler (2007) discussed self-organized learning as "increasing individual control over instructional functions through a process that involves recording thoughts, returning, and reflecting on thoughts, and then engaging in learning conversations with self and others about one's own learning" (p. 3). Within a self-organized learning community, the learning fosters critical and reflective thinking in relation to "self, knowledge, and the world" through autonomy in both formal and informal settings (Sharma & Fiedler, 2007, p. 4). Through "learning conversations" with their peers (Sharma & Fideler, 2007, p. 5), self-organized learning fosters collaboration and encourages independence as well as accountability for the learners (Harri-Augstein & Thomas, 2013; Mitra, 2012, 2014; Sharma & Fiedler, 2007). The self-organized learning community creates an environment where learners construct their own meanings and enable effective communication with others and achieve better insights to themselves as learners (Harri-Augstein & Thomas, 2013).

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In an education setting, Mitra (2003) described a similar learning environment with little instructor interference as minimarlly invasive education (MIE). This learning environment allows opportunities for learners to explore and choose learning strategies (Dangwal, Jha, & Kapur, 2006; Mitra & Rana, 2001). Dangwal, Jha, and Kapur (2006) described MIE as an adaptable educational learning system within a formal and informal learning setting and may demonstrate the interaction of information technology and learning processes, as well as emphasise self-directed learning (SDL). During MIE, learners self-organized and are in control of their own learning by making decisions on what, where, when, and how they learn (Costa, 2014; Harri-Augstein and Thomas, 2013; Ricci, 2011). Ricci (2011) believed it was important to allow learners the freedom to explore and play. Further, these self-directed and self-organized learning methods can be a "natural and gentle approach to lifelong learning" (Ricci, 2011, p. 135). In his study, Ricci (2011) found that through SDL and self-organized learning, the participants were able to learn more than the researcher's expectation, develop language and mathematics skills outside of the original intent of the learning application, and find ways to apply what they were learning in other areas of their life.

According to Solmaz and Aydin (2016), educational systems need to foster effective learning strategies. Effective learning strategies allow learners to obtain information (Solmaz & Aydin, 2016), and develop quality, intentional processing of learning skills that can benefit the learner throughout a lifetime (Dunlap & Grabinger, 2003; Solmaz & Aydin, 2016). Teachers will and should continue to learn throughout a lifetime (So & Kim, 2013). It is important for individuals to continually strengthen skills and knowledge as a way to develop professionally and vocationally (Solmaz & Aydin, 2016), as well as develop SDL practices

in a variety of learning setting for lifelong learning (LLL) (Dunlap & Grabinger, 2003; Solmaz & Aydin, 2016). Saribas (2015) defined LLL "as having the necessary knowledge, skills and values to plan and assess one's own learning, learn from others in both formal and informal settings by integrating knowledge from different sources and using different learning strategies" (pp. 83-84). Learners who develop LLL skills are described as being able to demonstrate their understanding through a variety of active learning strategies and integrating varying disciplines to prepare them both professionally and personally (Dunlap & Grabinger, 2003; Knapper & Cropley, 2000; Solmaz & Aydin, 2016). Solmaz and Aydin (2016) stated a critical purpose of education is "to prepare people for LLL with educational opportunities, which must develop their capacities for self-direction, metacognitive awareness… to encourage people in conducting their own learning in various circumstances" (p. 55). Therefore, higher education institutions are encouraged to integrate LLL strategies into their curriculum (Solmaz & Aydin, 2016).

In addition to LLL strategies in a higher education curriculum, creating a more contextual learning environment in a higher education classroom may provide a deeper approach to learning when compared to traditional forms of instruction (Herrington & Herrington, 2006; Herrington & Oliver 2000). Herrington and Herrington (2006) suggested strategies for SDL should be fostered through tasks that facilitate collaborative work as well as independent study. Further, understanding the context and engaging in opportunities through experiential learning are pertinent to teachers' understanding of how to handle complex or often unpredictable situations in a classroom (So & Kim, 2013).

When I learned about Mitra's work, it felt natural to me to explore his research and see where it was applicable to my own interests. I had been teaching an undergraduate

educational technology course for pre-service teachers that already had several elements of self-directed learning and inquiry based learning. I noticed that at the beginning of every semester many students would comment that they were not good at technology, and some even questioned why they needed to take the class in the first place. However, as the course progressed I noticed significant, positive changes in attitudes towards technology as well as their overall abilities in teaching with technology. At the beginning of each course, usually after they had expressed some skepticism indicating low self-confidence related to technology use, I often expressed to the students that technology is very broad and that there are pockets that are applicable to everyone, they just need to find their niche. My experiences as a learner, instructor, and researcher have informed this study.

**Background of the Problem**

Kalkaji, New Delhi, is a mix of wealth and poverty, of opportunity and hopelessness. A Kalkaji landmark that illustrates these contrasts is the Indian Institute of Technology (IIT), a setting that separates the world of the rich from the world of poor. On one side of the institution stands high-rise apartments, skyscrapers, and bustling city streets. On the other side sit the infamous slums, bleak shantytowns of desolation where there is no clean water, minimal electrical power, and little hope for change.

It was in this context that computer programming instructor Mitra made a startling discovery. As Mitra (2013) explained in his award-winning TED Talk, he came by this discovery quite by accident. Many affluent parents of his students would comment, "You know, my son, I think he's gifted, because he does wonderful things with computers. And my daughter -- oh, surely she is extra-intelligent" (Mitra, 2013). In these conversations, he said

that he would often think, "How come all the rich people are having these extraordinarily gifted children? What did the poor do wrong" (Mitra, 2013)?

As a result of these quandaries, he conducted his first experiment by making a hole in the boundary wall of the slum next to his office. In his TED Talk, Mitra (2013) explained, "I stuck a computer inside it just to see what would happen if I gave a computer to children who never would have one, didn't know any English, [and] didn't know what the Internet was." He also explained how the laughter and chatter of children filled the air, as they congregated around this strange device in a simple hole in the wall. However, upon closer inspection, what seemed like random noise and activity was actually an organized system of inquiry. Without any prior learning experiences with a computer or knowledge of the English language, the children taught themselves basic computer functions and how to solve problems through a collective, explorative effort.

This initial "Hole in the Wall Experiment" in New Delhi sparked a series of studies conducted by Mitra and his team of researchers. Over a span of five years, the researchers observed how children learned to operate computers and how they learned through modern technology. These "Hole in the Wall" experiments found that children, with virtually no knowledge of what a computer was, were able to learn how to play games, make downloads and conduct searches motivated by curiosity, collaboration, and self-directed learning.

Mitra's research supported and added to a body of existing literature on self-directed learning and peer collaboration. Numerous studies indicate that learning through self-direction helps students develop critical thinking, problem solving, and communication skills (Binbasaran Tuysuzoglu, & Greene, 2015; Cho & Heron, 2015; Choi, Lindquist, & Song, 2006; Prince, 2004; Schraw, Dunkle, & Bendixen, 2006; Stoeger, Fleischmann, &

Obergriesser, 2015; Tanriseven, & Dilmac, 2013). Further, students who engage in self-directed learning have better information retention and demonstrate higher confidence (Herrington & Hmelo-Silver, 2004; Knowles, 1975; Loyens, Magda, & Rikers, 2008; Mitra, 2014).

Inspired by several theories centered on constructivism, child development, and social cognitive growth, a self-organized learning environment (SOLE) supported the concept that students will learn through exploration, collaboration, and curiosity (Mitra et al., 2005; Inamdar, 2004; Mitra, 2003, 2004, 2014; Piaget, 1957; Vygotsky, 1978). Constructivism can be achieved by collaborating and actively constructing knowledge (Piaget, 1973; Vygotsky, 1978). Through constructing and interacting, learning is transformed into something that is meaningful and internal.

Children "invent" ideas in order to "assimilate" and "modify" new knowledge to develop understanding (Piaget, 1973). According to Piaget (1973), both play and experimentation are imperative elements for knowledge development and are strong characteristics of "self-constructed" and "self-motivated" learning. Vygotsky (1978) referenced Piaget, agreeing with his conclusion "that communication produces the need for checking and confirming thoughts, a process that is characteristic of adult thought" (p. 39). Further, collaborative sharing processes assist in the construction of knowledge (Piaget, 1973).

SOLE, as popularized by Mitra, has gained a lot of attention (Arora, 2010; Costa, 2014; Schwartz, 2015). Mitra (2014) merged the notions of self-directed learning, group learning, and peer learning into an ordered whole. Mitra's research with SOLE has been exclusively with children, and at the forefront of his experiments is the idea that through the

Internet, children working in groups are able to learn almost anything without adult interaction (Mitra, 2012, 2014). Communication, collaboration, organization of thoughts, worldly connections, and creativity are all skills that children are able to develop through these self-directed/self-organized methods (Mitra, 2014; "School in the Cloud", 2016).

Mitra's work with children contrasts many practices in higher education institutions that seem to be heavily focused on teacher-centered instruction, textbooks, publications, and educational funding (Herrington & Herrington, 2006; Knowles, 1975; Millard, 2007; So & Kim, 2013). Traditionally, instructor-centered lectures were the primary form of instruction for higher education courses (Herrington & Herrington, 2006; Schreurs & Dumbraveanu, 2014; Stearns, 2017); however, trends in educational practices have encouraged a different approach that focuses on student-centered learning (Schreurs & Dumbraveanu, 2014). In order for learning to become interactive and engaging, curriculum and presentation of material should be student-focused (Herrington & Herrington, 2006; Knowles, 1975; Mitra, 2014; Schreurs & Dumbraveanu, 2014). Further, more authentic learning environments (Herrington & Herrington, 2006) with a more learner-centered approach in higher education are an alternative and favorable form of instruction (Schreurs & Dumbraveanu, 2014). SOLEs are one form of instructional practice that encourages student-focused learning.

In SOLEs, learners form groups organically. Throughout a SOLE session, learners are free to migrate to another group, creating a fluid structure within what may appear to be ordered chaos. However, Mitra described this as neither orderly nor chaotic, but the experience enables emergent behavior and sparks creativity, curiosity, and inspiration (Mitra, 2014; "School in the Cloud", 2016). Mitra (2014) stated, "In a SOLE, children seem to create and maximise meaning out of the information content of what they are researching" (p. 556).

Loewenstein (1994) described curiosity as a critical influence on behavior and a primary catalyst in child development. Learning, exploring, and immersion in activities naturally stem from the immediate function of curiosity (Kashden et al., 2009; Loewenstein, 1994). Some literature suggests teachers should encourage and stimulate curiosity and discovery (Loewenstein, 1994; Mitra, 2014), however, the current educational system does not (Knowles, 1975; Loewenstein, 1994; Merriam & Caffarella, 1999; Mitra, 2014). Kashden et al. (1994) asserted that curiosity has attributes similar to intrinsic motivation and other variables, and people who are curious are more attentive, "process information more deeply, remember information better, and are more likely to persist on tasks until goals are met" (p. 988).

**Statement of the Problem**

While SDL, curiosity, and inventiveness are organic way to learn in early childhood, many modern educational settings may not incorporate SDL practices (Bronson, 2000; Knowles, 1980; Mitra, 2014; Merriam, 2001). In many educational settings, as the learner matures and advances through the educational system, he or she moves from being an active participant to being told what and how to learn, thus gradually becoming increasingly dependent on an instructor to guide their learning (Knowles, 1980; Merriam, 2001; Millard, 2007). The lack of SDL opportunities within the curriculum can cause SDL skills to fade away over time and they become something that must be reintroduced to the learner later in life (Bronson, 2000; Merriam, 2001). SDL skills enable learners to gain many positive, beneficial learning skills such as competence for LLL (Knowles, 1980; Millard, 2007), retain information better (Mitra, 2003), nurture curiosity (Mitra, 2012, 2014), and increase self-

confidence (Knowles, 1975). SOLE as a type of SDL has been successful with children, but has not been tested with adults.

SOLE is designed to foster students' innate sense of curiosity and engage them in positive, student- and socially-directed learning (Mitra, 2012, 2014). There have been multiple studies on learning outcomes of children's experience in SOLE (Dangwal & Kapur, 2008; Dangwal, Sharma, & Hazarika, 2014; Inamdar, 2004; Mitra, 2003; 2014), but the gains children are making in self-directed learning and increased curiosity are also desirable traits for adults (Kashden, et al., 2009; Knowles, 1975; Loewenstein, 1994; Merriam, 2001; Merriam & Bierema, 2014). Knowles (1980) and Merriam and Caffarella (1991) suggested that adult learning environments should be constructed to promote incentive, curiosity, and engagement in self-organized learning. Through SOLE experiences, adult learners may be able to learn through engagement and collaboration in order to foster motivation, elevate curiosity, and have rich learning experiences.

**Purpose Statement**

The purpose of this case study was to explore a SOLE experience for adult learners, in a pre-service teacher education classroom and describe their response in relation to self-directed learning and curiosity. Merriam's (2009) model of a qualitative case study guided the research design and procedures. The SOLE Toolkit designed by Mitra (2015) was used to set-up an adult SOLE lab in a Midwestern university technology course that serves pre-service teachers. Knowles' (1975) principles of adult, self-directed learning was used as a theoretical framework to ensure the SOLE lab is age-appropriate for the adult learners and help explain the findings. *The Curiosity and Exploration Inventory II* (Kashden et al., 2009) was used to explore adult student curiosity throughout the participants' self-organized

learning process. Specifically, curiosity addressed the "Adult Motivation" aspect of Knowles theory and the "Curious" component of Mitra's SOLE Lab.

**Research Questions**

1. What does a SOLE experience look like for adult learners, pre-service teacher education class?

2. How does curiosity manifest in a SOLE experience?

3. How do students and the instructor experience a SOLE activity?

4. How do Knowles (1975) principles of adult, self-directed learning explain the role of curiosity in this environment?

5. What other findings are pertinent to the role of curiosity and adult self-organized learning?

**Significance of the Study**

Current research on SOLE specifically examines children in a collaborative learning environment (Inamdar, 2004; Mitra et al., 2005; Mitra, 2003, 2004, 2014). This study will add to the body of work on SOLE. A gap in the literature exists regarding the study of adult learners in a SOLE lab for the purpose of understanding the learning process and how curiosity is manifested through these experiences. Research suggests that the current education system does not provide enough stimulating activities that encourage curiosity and discovery (Knowles, 1975; Loewenstein, 1994; Merriam & Caffarella, 1999; Mitra, 2014). More specifically, higher education institutions are very teacher-center focused (Herrington & Herrington, 2006; Knowles, 1975; Millard, 2007; So & Kim, 2013), and there is a need for more authentic learning environments in order to create a more dynamic learning experience for students (Herrington & Herrington, 2006). Alternative forms of instruction that provide

students with contextual learning experiences within a higher education classroom may create a more successful learning community to prepare them for their professional field. SOLE experiences naturally facilitate these elements. During SOLE, students participate a rich learning experience through play and discovery while applying SDL learning methods that may help them to make sense of and solve difficult problems. Therefore, through SOLE, it may be possible to understand learning processes in adult learners and how their curiosity may be manifested through these experiences.

**Definitions of Terms**

When conducting research, it is important to ensure that there is a shared understanding of the terms used. This section provides a list of terms that was used in this study along with their definitions:

**Pre-service Teachers.** Pre-service teachers are introduced to many different teaching methods and teaching opportunities throughout their teacher preparation program. These experiences help pre-service teachers gain knowledge they can use in practice and allows them to assume more realistic teaching responsibilities (Kennedy, 1999). Cannon and Sharmann (1996) believed teaching experiences enable pre-service teachers to actively construct knowledge. Through the pre-service teachers' college courses and teaching experience, the students will be able to refine teaching techniques and personal classroom instruction style (Kennedy, 1999) in hopes they have achieved competency of professional teaching skills.

**Self-Organized Learning Environment (SOLE).** Self-Organized Learning Environment is a learning environment that fosters collaboration, innovation, and creativity through the Internet. Learners organize themselves and have the freedom to jointly use

resources, move around, and switch groups all with limited instructor intervention. Each

session begins with a "big question" posed by the instructor, one that is intended to spark

students' sense of curiosity, wonder, or intrigue. Toward the end of a session, the learners

share what they learned and reflect on the process (Mitra, 2014; "School in the Cloud",

2016). Figure 1 lists the mindset of the SOLE Lab.

| Student Driven | • Students are motivated by choice and interests<br>• Students drive process |
|---|---|
| Colaborative | • Students learn socially<br>• Students collaborate in process |
| Curious | • Encourage innate sense of wonder<br>• Curiosity helps contruct understanding |
| Open Minded | • Students are open minded<br>• Instructor is open minded |
| Transformative | • Critical thinking paramount |
| Encouraging | • Effective educators are encouraging |
| Patient | • Effective educators are patient |

*Figure 1*. The SOLE Mindset. This figure illustrates the SOLE philosophy mindset and was
adapted from "School in the Cloud", 2016.

**Curiosity.** Kashden et al. (2009) discussed two central facets to curiosity: a)

exploring and actively seeking opportunities for new information; b) embracing the unknown

and ambiguous nature of daily life. Kashden et al. (2009) believed that curiosity can

contribute to overall emotional, psychological, and social well-being, and that willingness for

learning, exploring, and immersing in an activity are innate traits. Further, curiosity elicits

improved attitude and motivation, in-depth processing of information, improved ability to

retain information, and persistence. Loewenstein (1994) discussed that curious people tend to

also better retain information, devote more attention to the process or activity, and persist with their outlined goals.

       **Knowles Model of Adult Self-Directed Learning (SDL)**. Knowles (1975) explained that SDL is a learning process conducted by individuals collaboratively or individually, in which they are "diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning strategies, and evaluating learning outcomes" (p. 18). During the process, the learner takes initiative to learn, establishes goals, and makes choices on learning strategies. SDL primarily involves the learner with some sort of facilitator (i.e. tutor, teacher, peer, or mentor). Figure 2 depicts Knowles four principles of adult learning engagement.
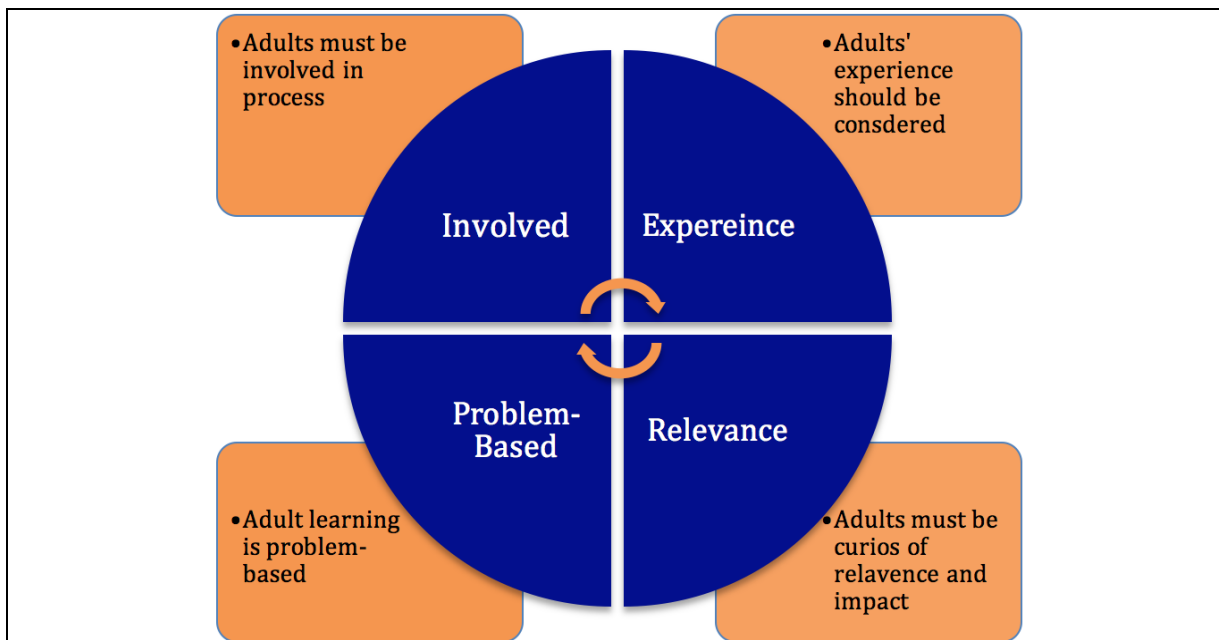


*Figure 2.* Knowles Four Principles of Adult Learning. Principles of adult learning according to Knowles's model adapted from "The modern practice of adult education: from pedagogy to andragogy/Revised and Updated," by M.S. Knowles, 1980.

**Summary**

Mitra's experiments with children has revealed that through minimally invasive, self-directed learning, children's innate curiosity may elicit innovative learning. Learning in children differs from learning in adulthood (Knowles, 1975; Merriam, 2001; Merriam & Caffarella, 1999); however, the inclusion of curiosity and SDL in the learning environment may facilitate lifelong learning, development, meaning, and positive social interaction in both children and adults (Kashden et al, 2009; Knowles, 1975).

Chapter I provided an introduction to the study, statement of the problem, purpose of the study, and the research questions. Descriptive case study methodology is used in this study in order to better understand how adult learners respond to SOLE, self-directed learning, and curiosity in a self-organized learning environment. The theoretical framework informing this study are principles of adult, self-directed learning as identified by Knowles (1975).

Chapter II provides a review of the literature of an in depth understanding of adult learners, SOLE, and curiosity. Specifically, this chapter will provide an in depth look at adult learners and the role of SDL in adult learning environments, the SOLE experiments and a detailed description of the format of sessions, and defining curiosity for the purpose of this study.

Chapter III provides a rich description of the research methods and procedures for this study. Descriptions of participant selection, data collection, data analysis techniques, and design of the study are included. Tables outlining trustworthiness criteria during the study are also included.

Chapter IV provides a description of activities and experiences of pre-service teachers actively learning in a SOLE, who were observed in order to understand how SDL and curiosity might manifest during self-organized learning processes. Presentation of the findings are described, beginning with the context of the study, data collected during SOLE sessions and results from *The Curiosity and Exploration Inventory II* (Kashden et al., 2009).

Chapter V provides a discussion of findings and themes in relation to each research question. A discussion on the implications for theory, teaching, research, and service; and concluded with a summary and its findings.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this case study was to explore a SOLE experience for adult

learners, in a pre-service teacher education classroom and describe their response in

relation to self-directed learning and curiosity. Chapter II provides a literature review that

addresses key conceptual components of Knowles' (1975) principles of adult learning as

a theoretical framework, curiosity, Mitra's SOLE, pre-service teachers, and a synthesis of

self-directed learning (SDL), SOLE, curiosity, and adult learning.

**Theoretical Framework**

During most of the last century, the dominant teaching and learning theory that

guided educational practice was pedagogy, or "the art and science of teaching children"

(Knowles, 1980, p. 40).  Learners of all ages were thrust into this prevailing system, and

adult learners and their instructors experienced difficulties in the usefulness and

applications of pedagogical methods (Knowles, 1980). The pedagogical model was not

sufficient in helping adults develop sustainable, relevant knowledge. Instructors of adult

learners reported that they and their students wanted something more, but they were at a

loss because they had no theory to support alternative instructional practices for adults

(Knowles, 1980).

Knowles (1975) was the first to research and construct a theory designed

specifically for adult learners. Building on his important work, referred to as andragogy,

Other theoriests came to the fore, and consequently, understanding processes and intricacies of how adults learn a central question within adult learning research, theory, and practice (Merriam, 2011; Merriam & Cafferella, 1991; Shannon, 2003). While a single adult learning theory has not been agreed upon, a myriad of interrelated theories, models, and principles have guided curriculum development in adult learning environments since the mid-1900s (Knowles, 1950, 1975, 1980; Merriam, 2001; Shannon, 2003).

**Adult Learners**

Merriam and Cafferella (1991) stated, "Adult education is a large and amorphous field of practice, with no neat boundaries such as age…" (p. 45). While the exact age of when one becomes an adult is not established, an adult can be defined socially as one that performs adult, mature roles, or psychologically as one who's "self-concept is that of an adult" (Knowles, 1980, p. 24). According to Knowles (1980), examples of adult social roles include workers, spouses, or parents, and psychological factors include a mature exploration or perception of self and taking responsibility for one's existence.

A common theme in adult learning environments is that the adult is entering into the learning process with a degree of life experiences that can contribute to the overall learning of the individual and the group (Knowles, 1980, 1984; Merriam & Cafferella, 1999). The process of adult learning encompasses experiences in which "new knowledge, understanding, skills, attitudes, interests, or values" is acquired and built upon existing knowledge and skills (Knowles, 1980, p. 25). Experiences of the adult learner can be significant influences and necessary components of an adult learning environment (Knowles, 1984), as well as reflection and critical discourse (Mezirow, 1994). For

instance, group discussions and problem-solving activities should be integral techniques

for instruction in order to provide a rich resource for all of the learners involved

(Knowles, 1984).

A major characteristic of adult education is the process of adult learning used to

acquire growth, development, and new knowledge in both formal and informal settings.

Merriam and Cafferella (1999) described formal settings in adult learning can be in a

classroom, but can also include a computer lab, participating in interactive

telecommunication, and non-classroom settings. Merriam and Cafferella (1999)

prescribed a four-part typology based on Knowles (1964) work which included: 1)

independent organizations, 2) educational institutions, 3) quasi-educational organizations,

and 4) non-educational organizations. Opportunities outside the field of education can be

described as non-formal educational settings. These settings can be described as having

less structure, more directed to specific needs, and providing more flexibility (Merriam &

Brockett, 1997; Merriam & Cafferella, 1999).

**Andragogy versus Pedagogy**

As mentioned above, Knowles (1980) recognized that pedagogical instruction is

not favorable to adult learners, and adults desire and need more than the strategies

"pedagogy prescribed, including fact-laden lectures, assigned readings, drill, quizzes, rote

memorization, and examinations" (p. 40). Consequently, in contrast to pedagogy, he

developed the term "andragogy", from the Greek word "andr," or adult (Knowles, 1980,

p. 42), which puts the adult as the central figure in the learning process. Within the

andragogical design, Knowles (1984) described the role of the instructor as a "facilitator

of learning" who encourages learners to use a range of multiple resources, including their

peers, to learn.

Knowles (1980) believed that children and adult learners had differences in learning assumptions and learning characteristics. For instance, he found that as individuals mature, (1) their self-concept becomes more dependent and self-directing, (2) they accumulate experiences that provide a "rich resource," (3) they become more focused on tasks and social roles, and (4) immediacy of application elicits a performance-centered mentality. Moreover, characteristics of adult learners are based on four critical assumptions of andragogy that are different from pedagogy: 1) self-concept, 2) adult learner experience, 3) readiness to learn, and 4) orientation toward learning. Table 1 compares the central differences in pedagogy and andragogy.

Table 1

*Comparison of Pedagogy and Andragogy*

| Regarding | Pedagogy | Andragogy |
|---|---|---|
| Concept of the Learner | The role of the learner is, by definition, a dependent one. The teacher is expected by society to take full responsibility for determining what is to be learned, and if it has been learned. | It is a normal aspect of the process of maturation for a person to move from dependency toward increasing self-directedness, but at different rates for different people and in different dimensions of life. Teachers have a responsibility to encourage and nurture this movement. Adults have a deep psychological need to be generally self-directing, although they may be dependent in particular temporary situations. |
| Role of learners' experience | The experience of learners bring to a learning situation is of little worth. It may be used as a starting point, but the experience from which learners will gain the most is that of the teacher, the textbook writer, the audiovisual (AV) aid producer, and other experts. Accordingly, the primary techniques in education are transmittal techniques - lecture, assigned reading, AV presentations. | As people grow and develop they accumulate an increasing reservoir of experience that becomes an increasingly rich resource for learning for themselves and for others. Furthermore, people attach more meaning to learners they gain from experience than those they acquire passively. Accordingly, the primary techniques in education are experiential techniques - laboratory experiments, discussion, problem-solving cases, simulation exercises, field experience, and the like. |
| Readiness to learn | People are ready to learn whatever society (especially the school) says they ought to learn, provided the pressures on them (like fear of failure) are great enough. Most people of the same age are ready to learn the same things. Therefore, learning should be organized into a fairly standardized curriculum, with a uniform step-by-step progression for all learners. | People become ready to learn something when they experience a need to learn it in order to cope more satisfyingly with real-life tasks or problems. The educator has a responsibility to create conditions and provide tools and procedures for helping learners discover their "needs to know." And learning programs should be categories and sequenced according to the learner's readiness to learn. |
| Orientation to learning | Learners see education as a process of acquiring subject matter content, most of which they understand will be useful only at a later time in like. Accordingly, the curriculum should be organized into subject-matter units (e.g. courses), which follow the logic of the subject (e.g., from ancient to modern history, from simple to complex mathematics or science). People are subject-centered in their orientation to learning. | Learners see education as a process of developing increases competence to achieve their full potential in life. They want to be able to apply whatever knowledge and skill they gain today to living more effectively tomorrow. Accordingly, learning experiences should be organized around competency-development categories. People are performance-centered in their orientation to learning. |

*Note.* Adapted from "The modern practice of adult education: from pedagogy to andragogy/revised and updated" by M.S. Knowles, 1980, pp. 43-44.

**Self-Directed Learning (SDL)**

Knowles (1975) stated, "It is a tragic fact that most of us only know how to be taught; we haven't learned how to learn" (p. 14). However, some researchers posit that knowing how to learn is an inherent part of being human. For example, Bronson (2000) emphasized, "The capacity for conscious and voluntary self-regulation is central to our understanding of what it is to be human" (p. 1). While self-directed learning (SDL) is natural and the way we all learn as newborns and toddlers, many modern educational practices are often teacher-directed rather than learner-directed. Consequently, SDL becomes something that fades away over time and must be reintroduced (Bronson, 2000; Merriam, 2001). In many educational settings, as the learner matures and advances through the educational system, he or she moves from being an active participant to being told what and how to learn, thus gradually becoming increasingly dependent on an instructor to guide their learning (Knowles, 1980; Merriam, 2001; Millard, 2007).

Knowles (1990) emphasized the importance of this reintroduction to self-direction and explained that providing a "brief experiential encounter with the concepts and skills of SDL helps adults to feel more secure in entering into an adult educational program" (p. 136). Knowles (1975) model of adult SDL is a learning process conducted by individuals collaboratively or individually, in which they are "diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning strategies, and evaluating learning outcomes" (p. 18). During the process, the learner takes initiative to learn and makes choices on "appropriate learning strategies."

Understanding the natural process of learning focuses on intrinsic characteristics within the learner and takes away the emphasis of the teacher (Knowles, 1980). By

examining SDL instructional practices, the instructor takes on the role of a facilitator, and

> Adults acquire a new status, in their own eyes and in the eyes of others… Their
>
> self-concept becomes that of a self-directing personality…which can elicit a sense
>
> of release and allow them to own other areas of learning in their lives. (p. 46)

Knowles et al. (2011) discussed the process of learning as involving change and

developing habits, knowledge, and attitudes. With these skills, SDL can enable learners

to develop competence for lifelong learning (Knowles, 1980; Millard, 2007), when the

learning takes place in a logical context for application.  Knowles et al. (2011) stated,

"The more proficient we become as self-directed learners, the better we can make use of

all kinds of learning resources" (p. 117).

## Curiosity

Self-directed learners tend to be driven by curiosity (Mitra, 2012, 2014). Kashdan

et al. (2009) discussed two central facets to curiosity: a) exploring and actively seeking

opportunities for new information and b) embracing the unknown and ambiguous nature

of daily life. They suggested that curiosity may contribute to overall emotional,

psychological, and social well-being, and that learning, exploring, and immersing in an

activity are innate traits of curiosity (Kashdan et al., 2009; Loewenstein 1994). Further,

curiosity could also elicit improved attitude and motivation, in-depth processing of

information, improved ability to retain information, and persistence (Kashdan et al.,

2009).

### Definition of Curiosity

According to researchers, there is no consensus on a concrete definition of

curiosity (Byman, 2005; Kashdan et al., 2009; Loewenstein, 1994). Beginning

discussions of curiosity were primarily focused on morality rather than psychological impacts and were reported as being discussed by philosophers and religious thinkers as prior to the development of field of psychology (Loewenstein, 1994). Loewenstein (1994) proposed that curiosity was originally viewed as an intrinsically motivated factor for learning or seeking out information, and philosophical thinkers such as Aristotle and Cicero proposed that men sought to learn for intrinsic reasons rather than external gain. Curiosity discussions also included passion and identified two succinct forms of curiosity: good and bad. Loewenstein (1994) referred to St. Augustine's depiction of curiosity stating good curiosity was represented through scientific inquiry, and bad curiosity was represented through insatiable desires for vices.

Defining curiosity in the modern era began to add behavioristic and environmental elements. Psychologists began examining a wide range of conditioned responses to "exploratory behavior" (Byman, 2005; Loewenstein, 1994). Although early researchers classified these responses or behaviors as forms of curiosity, Loewenstein (1994) described them as "more in common with the modern term *attention*… they are not necessarily intrinsically motivated, are unemotional in character, and lack the drive properties associated with a cognitive appetite" (p. 77).

**Curiosity and SDL**

Loewenstein (1994) stated, "Educators know much more about educating motivated students than they do about motivating them in the first place" (p. 93). Literature related to teaching suggests integrating stimulating material to encourage and foster curiosity in students, and curiosity requires pre-existing knowledge by students' acknowledging there are gaps in their knowledge (Loewenstein, 1994). By encouraging

students to discover and motivate their learning, curiosity can be a catalyst for a desire to learn and fill information gaps. Stansberry, Thompson, Dalpias, and Hathcock (2015) discussed that natural curiosity appears in some learners, and educators should use methods that elicit that curiosity. Much of the learning that takes place in an adult learner setting requires self-directed methods (Knowles, 1975; Stansberry et al., 2015), and some researchers acknowledge that one strong component of SDL is curiosity. Knowles (1975) recommended that teachers integrate opportunities for learners to become more self-directing. There are many similar facets of curiosity and SDL that promote positive outcomes for learners. Mitra (2003) found that students who participate in SDL were able to retain information better and become better communicators. Similarly, Knowles (1975) proposed that SDL in adult learning can foster confidence and take control of their learning. Loewenstein (1994) discussed that curious people tend to also better retain information, devote more attention to the process or activity, and tend to be more persistent with their outlined goals.

Curiosity and SDL both seem to instill a willingness to want to continue to learn, a desire for accumulation of new "abilities and experiences" (Kashdan et al., 2009). Curiosity was an essential aspect of Mitra's (2013) experiments, and he found through the child's natural sense of curiosity, they were motivated to learn and engaged in self-organized collaboration. Kashdan et al. (2009) identified facets of curiosity including support for the development of intelligence, finding meaning in life, and positive social engagement.

**Sugata Mitra and Self-Organized Learning Environments (SOLE)**

Motivation and engagement in a SOLE can foster cognitive development and

positive learning experiences (Mitra, 2014). A SOLE is student driven, collaborative, and transformative, which can make learning more sustainable and transferable to application (Mitra, 2014; *School in the Cloud,* 2016). This type of learning environment encourages curiosity, facilitates social interactions and choice, and provides opportunities for learners to construct knowledge from what already know (*School in the Cloud,* 2016).

Social interactions are extremely important for cognitive development (*Hole-in-the-Wall Beginnings*, 2016; Mitra, 2014; Piaget, 1957; Vygotsky, 1978). Learning through SOLE has shown positive growth (*School in the Cloud*, 2016) and in some instances suggested student performance of learners in SOLE matched or exceeded the learning of students outside of SOLEs (Costa, 2014, Mitra, 2012; 2014). Dangwal and Kapur (2008) discussed how sharing information between children in these environments allows for *scaffolding*. By engaging in meaningful dialogue, children are able to work within a *temporary framework* that enables important cognition. Dangwal and Kapur (2008) identified scaffolding as an important catalyst for the child's development as a learner and a member of society.

**Mitra's SOLE**

Mitra's first SOLE experiment, the "hole in the wall", developed from the idea of learners using computers for learning in an unsupervised environment. Mitra (2003) presumed that regardless of what background the learner comes from (i.e. social, cultural, or economic) children's innate curiosity would facilitate the learning process. Through a literal "hole-in-the-wall," Mitra conducted his first experiment by making a space in the boundary wall of the slum next to his office at a technology institution in Kalkaji, New Delhi. He placed a computer in the hole, and set it up for free use and accessibility. There

was a quick response to this curious new addition; in particular, children were intrigued.

Mitra soon developed a hypothesis that "The acquisition of basic computing skills by any

set of children can be achieved through incidental learning provided the learners are

given access to a suitable computing facility, with entertaining and motivating content

and some minimal (human) guidance" (*Hole-in-the-Wall Beginnings*, 2016). Soon, three

more hole-in-the-wall experiments were setup to test this hypothesis, concluding that

children in all three locations developed computer skills on their own through SDL.

Mitra (2014) stated, "SOLEs are a first faltering step towards preparing our

children for a future we can barely imagine" (p. 238). Inspired by the notion that all

children should have the same educational opportunities, regardless of location, SOLEs

became a particularly innovative topic with Mitra's "hole in the wall" computer

experiment (Mitra, 2003, 2012, 2013). Inspired by several theories centered on

constructivism, child development, and social cognitive growth, SOLE explores the

concept that children learn through exploration, collaboration, and curiosity (Inamdar,

2004; Mitra, 2003, 2005; Piaget, 1957; Vygotsky, 1978). Mitra (2014) wanted to observe

not only how children construct their knowledge, but also how they did this with minimal

or no adult influence. Further, Mitra (2003, 2014) acknowledged the value and

importance of creativity and curiosity within learning and was inspired by the prospect of

children using these skills to tackle challenges.

Mitra (2014) asserted that knowing everything is not as important as being able to

discover "what and how". Further, he posited, "Creativity is more important than 'order

and method'" (Mitra, 2014, p. 556). Since the initial stages, Mitra has evolved the hole-

in-the-wall experiments into SOLE environments that are conducted in indoor learning

environments simulating a "hole in the wall". These SOLE indoor learning environments are known as SOLE sessions and follow a set of guidelines developed by Mitra.

**SOLE Session**

Mitra's (2003) purpose for developing SOLE was to foster learning environments for students to work together, as a community, to find answers to questions through the Internet. SOLE experiences elicit many traits that are inherent to constructivist theory and student-directed instruction: real-world application, transferability, collaboration, critical thinking skills, seeking out knowledge, discovering not the right answer, but more importantly *how* to find the right answer. SOLE use computers and are centered around learners in self-organized groups of children. According to observations of SOLE, without instruction children organically form their own groups around the computers (Dangwal et.al, 2014; Mitra 2003). The instructor's role is to be a facilitator during sessions.

A SOLE session encompasses many different facets of learning through several contexts. A session is divided into three sequential time frames (Table 2).

Table 2

*SOLE Session Timeline*

| Time | Activity |
| --- | --- |
| First 5 Minutes: Questions | Pose a "big question" <br> The question will be framed as a genuine process of discovery in order to promote curiosity <br> Explain the SOLE Process |
| 30-45 Minutes: Investigation | Students work in student formed groups to find answers to the big question online. <br> Encourage students to resolve any group issues themselves. <br> Observe and document the SOLE: take notes, photos, ask questions, etc. |
| 10-20 Minutes: Review | Invite the students to share their stories of collective discovery. Talk about similarities/differences between their answers, help to see links to other areas. <br> Encourage debate. Facilitate discussion about the question and investigative process <br> Engage the students in their own review: What would they do differently next time? What do they think others did well? |

*Note.* Adapted from "The School in the Cloud", 2016.

**"Big Question".** A SOLE session begins with a "big question" posed by the

instructor. During this time, the instructor introduces the topic and creatively prompts

students through varying materials that complement the "big question". The "big

question" is described as, "ones that don't have an easy answer. They are often open and

difficult; they may even be unanswerable. The aim of them is to encourage deep and long

conversations, rather than finding easy answers" ("School in the Cloud", 2016). These

big questions are engineered with the purpose of eliciting critical thinking, collaborative

work, and discovering theories throughout the children's learning process (Mitra, 2014).

Further, a good big question should provide connections across content areas (Mitra,

2014; "School in the Cloud", 2016). Some students may need some time to get used to these types of questions, so starting with simple questions and then progressing towards harder ones may be appropriate. Some examples of effective "big questions" are: "What would happen to the Earth if all insects disappeared?" or "What are fractals?" for simple questions, or "Who built the pyramids and why?" or "Can trees think" for more difficult questions (Dangwal & Kapur, 2008; Mitra, 2014; "School in the Cloud", 2016). The questioning provides opportunities for students to explore a variety of sources, extrapolate different answers, and challenge one another. A key aspect of the big questions is that the purpose is not to discover the "right" answer, but rather to develop methods and skills that are transferable and applicable. The questions can be ambiguous, precise, poignant, or causal (Mitra, 2003, 2014; "The School in the Cloud", 2016).

**Investigation.** The investigation period takes about 40 minutes. During this time, students explore the big question collaboratively, while the instructor provides encouragement. Students are encouraged to collaborate within their group or move around to other groups. Few rules are given to the students, and this lack of rules enables children to change groups, talk to each other and other groups, and walk around to observe their peers' work.

**Presentation and Review.** The final phase is the review, lasting 10-20 minutes. During this time, students listen to their peers' present findings, while the instructor facilitates discussion. The process, and the students' reflection on what worked or did not work, is an important component of the overall learning experience.

**Emerging Technologies**

The development of digital and Internet technologies has aided in the

implementation of SOLE labs. The philosophy behind SOLE is that sessions should be open for every child to use outside of regular school hours (Mitra, 2014). Students are encouraged to play games, chat, and use the resources available to collaborate and learn outside of the classroom. Distance collaboration is also a key aspect of SOLE that may not have been readily available at the time of Mitra's first experiment in the late 90s. Instruction in remote areas is made possible through eMediators, or "Grannies", who are provided through the SOLE network they call School in the Cloud. Grannies communicate through Skype and consist of volunteer mediators, whose role is to foster curiosity, help develop language fluency, and further skills that assist and inspire the children's search for big questions more confidently. The Grannies are accessible anywhere, regardless of where SOLE is located, allowing students access to their supportive mediator throughout the learning process. Males, females, the young, the old, and those from a wide range of backgrounds can fulfill the role of the Granny. The School in the Cloud was developed to assist an instructor with running a SOLE session. The whole process of using emerging technologies as resources has not only contributed to the cognitive development of the participants, but also presents opportunities for cross-cultural development. Further, students who live in remote areas have the same opportunities as those who live in easily accessible communities with the same level of instruction and content.

Studies explored through SOLE are ones that investigate the co-construction of knowledge between the learner and the instructor. SOLE sessions have opportunities woven throughout, and naturally elicit collaboration and communication, curiosity, creativity and innovation, critical thinking, self-directed learning, worldly connections,

and technology fluency (Mitra, 2012, 2014; "School in the Cloud", 2016). According to

Bandura (1977), when learners feel they have been successful (mastery), their sense of

self-efficacy is strong and the chances of proficiency in the future is likely. A strong

component of SOLE is how students present their research findings and reflection.

Bandura (1977) asserted that through vicarious experiences and modeling, the learners'

sense of self and capabilities are enhanced. Mitra's (2000, 2012, 2014) findings of self-

organized learning indicated that the children demonstrated lasting knowledge and

sustained skills through their exploration.

**Studies Supporting Mitra's Work**

Self-organized learning can increase student engagement (Mitra, 2014), stimulate

exploration and self-directed learning (Ricci, 2011), and encourage students to work

together to make decisions and take control of their learning (Costa, 2013; Harri-

Augstein & Thomas, 2013; Ricci, 2011; Wiley & Edwards, 2002). Inspired by Mitra's

"hole in the wall" and his concept of SOLE, some researchers and educators have begun

investigating the applicability of these ideas. Al-Nofaie (2016) explored two Saudi

children's motivations for learning a foreign language as well as ways the participants

created autonomy through available digital media. Through interviews, observations, and

learning logs the data collected revealed the students developed "positive language

attitudes" and the role of digital media in developing "learners' motivation for learning

extramural languages" (p. 1). Al-Nofaie also found that learners "utilise and vary their

use of digital language resources" as tools for developing their sense of self" (p. 1). Al-

Nofaie (2016) discovered that when the participants in the study took control of their

learning through self-directed methods as well as reflected on their learning, their

learning experiences were enhanced.

Arora (2010) conducted a qualitative ethnographic study that observed computer usage among children engaging in meaningful exploration and developing communication skills. Similar to Mitra's studies, Arora (2010) found children developed innovative vocabulary that described symbols on the computer. Through peer-collaborative learning, it is possible for learners to construct and invent new ideas (Arora, 2010). Arora (2010) suggested that through the "hole in the wall" research experiments there was evidence illustrating children's self-directed learning capabilities through play and exploration. Further, Aurora (2010) suggested that "learning with computers in this way *is* free learning, learning *is* play, and play *is* possible by all children, and accessible to all in such public environments" (p. 9).

## Pre-Service Teachers

Pre-service teachers, or teacher candidates (Solmaz & Aydin, 2016), are integral and invaluable to the educational system. Pre-service teachers can be described as students who are teacher candidates and embarking on a teacher education program at an educational institution. Throughout a teacher preparation program, pre-service teachers should be introduced to many different teaching methods and teaching opportunities. These various teaching experiences should help the pre-service teachers gain skills that transition into practice and obtain more realistic teaching responsibilities. Cannon and Sharmann (1996) believed teaching experiences enable pre-service teachers to actively construct confidence. Through the pre-service teachers' college courses and teaching experiences, the students are able to refine teaching techniques and personal classroom

instruction style (Kennedy, 1999; Stansberry, 2017) in order to achieve competency of professional teaching skills (Stansberry, 2017).

During their educational training, the guidance and instructional experiences should be embedded within the context of the profession (Kennedy, 1999; Stansberry, 2017). Kennedy (1999) discussed the notion that teachers often teach how they were taught and derive methodologies and perceptions based on their own educational experiences stating,

> Their experiences in primary and secondary schools give them ideas about what school subject matter is like, how students are supposed to act in school, and how teachers are supposed to act in school. Thus, when they begin to teach, they adopt the practices of their former teachers. (p. 55)

Prior experiences as a student coupled with experiences in the classroom create a frame of reference for pre-service teachers and aide in the development of how they "interpret situations they face, make sense of what happens in their classrooms, and make decisions about what to do next" (Kennedy, 1999, p. 57). Understanding how to make informed decisions and how to teach goes beyond learning from "initial frames of reference" (Kennedy, 1999, p. 57), and instead requires intentional, effective, continuous learning that provides knowledge for handling complex problems in the classroom (So & Kim, 2013; Solmaz & Aydin, 2016).

Pre-service teachers learning characteristics are an integral part of society and educational practice (Solmaz & Aydin, 2016); therefore, curriculum that supports adult learning elements such as LLL, collaboration, and SDL strategies are important (Herrington & Herrington, 2006; Solmaz & Aydin, 2016). Solmaz and Aydin (2016)

stated, "If university students want to be a part of the new learning society, they should become lifelong learners and this should be the outcome of a learning experience" (p. 56). When pre-service teachers engage in LLL strategies, it provides opportunities for them to grow, take control of their careers, and make contributions to society and the field of education (Solmaz & Aydin, 2016). Collaborative inquiry among teachers is a method with the potential to redefine the teacher's role in teaching practice and develop teachers' professionalism (Cobb et al., 2003; Darling-Hammond & McLaughlin, 1996). Through authentic learning environments and contextual experiences, pre-service teachers are able to develop LLL attributes and collaborations skills that will aid them professionally. Therefore, providing opportunities for pre-service teachers to engage in andragogy type practices is favorable for their learning.

## Conceptualizing SDL, SOLE, Curiosity, and Adult Learning

There are many common elements and principles between SDL, SOLE, curiosity, and adult learning. Understanding how these elements connect and interact with each other are important to understanding how adult learners experience SOLE. Key constructs were adapted from SDL, SOLE, curiosity and principles of adult learning characteristics as outlined by Mitra (2014), Kashden, et al. (2009), and Knowles (1975). Below is a bulleted list that addresses the key constructs across the theories and are critical to this study and elements within each theory.

Construct 1: Self-Directed Learning

- SDL - Self-Directed
- SOLE - Student driven; Organically form groups themselves
- Adult Learning - Engagement in self-organized learning

Construct 2: Collaboration

- SDL - Collaboration; Independence

- SOLE - Collaborative; Work as a community

- Curiosity - Satisfying and engaging in social relationships

- Adult Learning - Adults experiences should be considered; Enhanced collaboration skills; Interest in social interactions and social roles

Construct 3: Engagement, Communication, and Presentation

- SDL - Increase student engagement and communication skills

- SOLE - Positive and increase in student engagement; Get better at integrating what they already know into discussions both inside and out of the classroom

- Curiosity - Persistence on tasks until goals are met

Construct 4: Interpersonal Skills

- SDL - Organization of thoughts

- SOLE - Strengthen interpersonal and presentation skills; Share findings through presentations

- Curiosity - In depth processing of information

- Adult Learning - Adults must be involved in their learning by taking evaluate learning outcomes, make goals and choices based on decisions

Construct 5: Creativity

- SDL - Creativity

- SOLE - Creativity

- Curiosity - Creativity

Construct 6: Lifelong Learning and Worldly Connections

- SDL - Lifelong learning; Willingness and desire to continue to learn; Worldly connections in natural, authentic learning environment

- SOLE - Lifelong learner; Real-world connections; Seeking out knowledge; Learning is emergent and transformative

- Curiosity - Catalyst for learning in child development; Finding meaning in life; Actively seeking and willingness to want to continue to learn; Learn through exploration; Enjoy challenging situations as an opportunity to grow and learn

- Adult Learner - Lifelong learner derived from contextual learning experiences; Acquired and built upon existing knowledge and skills; Brief introduction to SDL concepts in a learning environment

Construct 7: Curiosity

- SDL - Engage in activities that promote curiosity

- SOLE - Innate sense of curiosity

- Curiosity - Curious

- Adult Learner- Engage in activities that promote curiosity

Construct 8: Open-minded

- SOLE - Open-minded

- Curiosity - Embracing the unknown and ambiguous nature of daily life

- Adult Learner- Accepting

Construct 9: Processing Information

- SDL - Critical thinking

- SOLE - Discovering not the right answer, but more importantly *how* to find the right answer.

- Curiosity - Process information more deeply

- Adult Learner- Experiences they bring depth to the learning process; Learning for a purpose

Construct 10: Self-Concept

- SDL - Reflective thinking; Confidence and appreciated their abilities; Take control of own learning

- SOLE - Self-discovery; Empowered to take control of own learning; Spontaneity; Encouraging

- Curiosity - Develop a sense of well-being, wisdom, happiness, meaning in life; Intrinsic motivation; Attentive; Seeks new things or experiences

- Adult Learner - Self-concept becomes more dependent and self-directing; Motivated internally; Promote incentive

Construct 11: Information Retention

- SDL - Retain information better

- SOLE - Improve reading comprehension, behaviour, language, Stronger memory recall

- Curiosity - Retain information better; Accumulation of new abilities and experiences

Construct 12: Problem-Based

- SDL - Problem solving

- SOLE - Problem-solving; Question based

- Curiosity - Enjoy doing something that is complex or challenging

- Adult Learner- Performance-centered mentality; Problem based

**Summary**

This chapter provided an in-depth review of the literature including the theoretical framework informing this study, a definition of curiosity in relation to this study, detailed descriptions of SOLE experiments, and an outline for SOLE sessions. Specifically, a description of how Knowles' (1975) model of adult learning theory and definition of andragogy relates to this study. For the purpose of this study, curiosity is explained and defined, as well as a rationale for using *The Curiosity and Exploration Inventory II* (Kashden et al., 2009). Finally, rich details of SOLE and how the experience may encourage curiosity, choice, social interactions, access prior knowledge, and develop transferable skills in the learner.

CHAPTER III

METHODOLOGY

French philosopher Voltaire said, "Judge a man by his questions rather than his answers" (as cited in Patton, 2002, p. 251). In relation to my study, the central question is how SOLE develops and curiosity manifests in specific undergraduate classrooms. Qualitative methods were used to answer this question. Patton (2015) stated, "Qualitative research inquires into, documents, and interprets the meaning-making process" (p. 3). Qualitative case study methodology provided insight into the intricacies of the adult learning processes in specific Self Organized Learning Environments.

**Purpose of the Study**

The purpose of this case study was to explore a SOLE experience for adult learners, in a pre-service teacher education classroom and describe their response in relation to self-directed learning and curiosity.

**Research Questions**

1. What does a SOLE experience look like for adult learners, pre-service teacher class?

2. How does curiosity manifest in a SOLE experience?

3. How do students and the instructor experience a SOLE activity?

4. How do Knowles (1975) principles of adult, self-directed learning explain the role of curiosity in this environment?

5. What other findings are pertinent to the role of curiosity and adult self-organized learning?

## Epistemological and Theoretical Perspective

### Epistemology

Constructionism is the epistemological perspective guiding this study. Crotty (1998) defined constructionism as "the view that all knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of interaction between human beings and their world, developed and transmitted within an essentially social context" (p. 42). In this study, students and the researcher collectively constructed knowledge throughout learning and research processes. Merriam (1998) emphasized, "Qualitative researchers are interested in understanding the meaning people have constructed, that is, how they make sense of their world and the experiences they have in a world" (p. 6).

### Theory

Principles of adult, self-directed learning (SDL) offered theoretical structure and language to the research process and findings. Understanding the learning processes of communicating, collaborating, and exploring can also reveal how curiosity may be elevated during SDL. According to Knowles (1980), as a person naturally matures, their self-concept moves from being dependent to being more self-directed in everyday life. Regarding the adult learner experience, adults accumulate experiences as they mature and move through life, and from these experiences they bring depth to the learning process. However, Knowles (1980) stated,

If in an educational situation an adult's experience is ignored, not valued, not

made use of, it is not just the experience that is being rejected; it is the person.

Hence the greater importance of using the experience of adult learners as a rich

resource for learning. (pp. 10-11)

Also from these natural evolving experiences a person becomes "ready to learn when

they experience a need to know or do something in order to perform more effectively in

some aspect of their life" (Knowles, 1980, p. 11). From experiencing a "need," he or she

is motivated internally. As adults embark on learning tasks, they are learning for a

purpose not "for the sake of learning; they learn in order to able to perform a task, solve a

problem, or live in a more satisfying way" (Knowles, 1980, p. 12). As illustrated in

Figure 2, this internal motivation is spurred by four principles: personal involvement, past

experience, relevance of subject matter, and a problem based approach to learning. All of

these features were integrated into the SOLE experience.

*Figure 2.* Knowles' Four Principles of Adult Learning. Principles of adult learning according to Knowles's model adapted from "The modern practice of adult education: From pedagogy to andragogy/Revised and Updated," by M.S. Knowles, 1980.
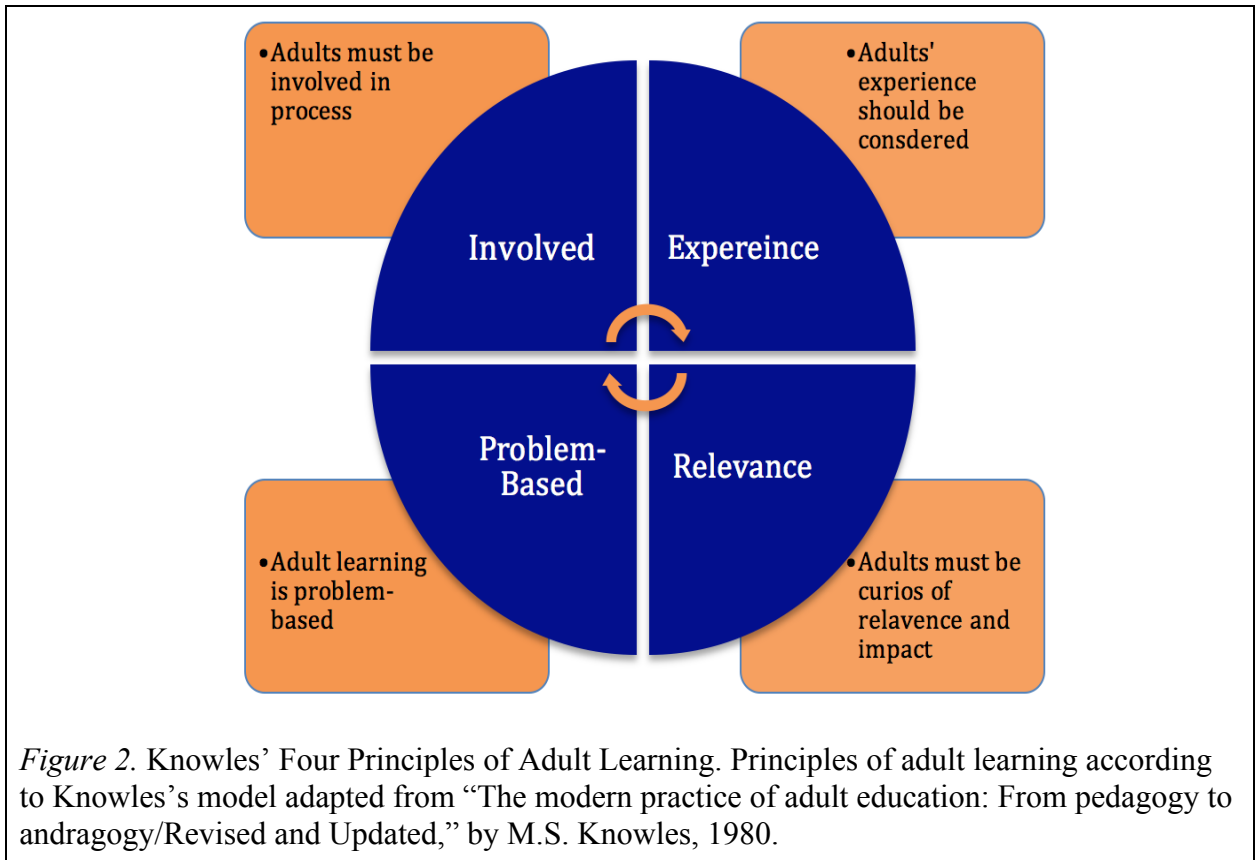
## Methodological Procedures

This study was a descriptive case study of two sections of an undergraduate, pre-service teaching course at a Midwestern university. I applied Merriam's (1998) guide for a descriptive case study. Merriam (1998) described personal experiences being the core of descriptive case studies stating they provide a "more vivid, concrete and sensory than abstract" and that they should be "rooted in context" (p. 31, 38). According to Merriam (1998), "a detailed account" of a phenomenon is definitive of a descriptive case study. This type of case study includes an innovative program within education, as well as contributes theories and findings for comparison to the field of research. The scope of the study was two sections of one course during one semester.

Merriam (1998) described descriptive case studies as resonating "with our own experience because it is more vivid, concrete and sensory than abstract" and further explained "our experiences are rooted in context, as is knowledge in case studies" (p. 31). The phenomenon studied in this case study is providing support for the role of curiosity in a SDL adult learning environment. It is important to consider the context for this study along with multiple variables, exploring data, and altering instruction.

**Data Collection**

Data was collected in two sections of the same undergraduate course at a Midwestern university during the spring 2017 semester, which ran from January to May. The data collection was conducted during the first nine weeks of the course. Data sources included observations, focus groups, personal reflections, curiosity pre- and post-inventory, and document analysis (Merriam, 1998; Patton, 2015). Site selection was designated prior to the beginning of the study based on convenience. All of the participants in the study were students enrolled in two sections of an undergraduate educational technology course for pre-service teachers. The study included 37 students total enrolled in the course.

The scope of the study was in the "natural setting" for two sections of one course during one semester. The data collection was conducted during the first nine weeks of the course. Data collection sources were video recordings during SOLE sessions, as well as detailed field notes to observe student interactions and processes. Section one of the course met twice a week for one hour and fifteen minutes. Section two of the course met once a week for three hours.

For this qualitative study, the students took *The Curiosity and Exploration Inventory II* (Kashden et al., 2009) before the first SOLE session, and again after the last SOLE session. As one of multiple sources of data collection and triangulation in qualitative research, surveys may be used in an exploratory, rather than predictive, manner (Harris, 2015).

**Observations.** Observational data was collected in every course meeting during SOLE sessions and focus groups. The data collected was recorded via detailed field notes and recordings. The reason for recording sessions was to revisit the sessions and observe more deeply into the data in order to formulate a stronger analysis. Also, this helped with further discovery of what happened during sessions as well as validated the focus groups by making connections between participants' conversations during SOLE and focus groups.

**Focus groups.** Focus groups were conducted after each SOLE session. Specific, open-ended questions (Appendix D) were asked during each group, while also allowing for opportunities for organic conversation to emerge (Patton, 2015). In order to understand how curiosity might be manifested and escalated as the SOLE sessions progress, it was important to reflect after each session through verbal discussions between peers and the instructor. The focus groups were transcribed immediately following the sessions.

**Documents.** Participants took notes and documented their findings throughout SOLE sessions. They created a variety of end products after each session that illustrated what they learned about the topic. The participants used many technology tools to take notes and create innovative presentations. I used these documents for analysis.

**Visual materials.** Photographs were taken throughout the SOLE sessions that illustrated how students experienced SOLE. The physical environment of the class and the technology equipment, audio and video recordings, and projects developed throughout the SOLE sessions were also photographed.

**Curiosity inventory.** *The Curiosity and Exploration Inventory-II* (Kashden et al., 2009) was given at the beginning of the study and then again at the end of the study after the completion of the final SOLE session. The purpose of the curiosity inventory was to add another data source that illuminated how students' curiosity may be elevated throughout SOLE sessions. Mean scores from the pre- and post-inventory were calculated for each question as well as the overall average score.

**Data Analysis**

Data analysis entailed open coding of transcripts from focus groups, participants' reflections, and observations (Miles & Huberman, 1994). Patton (2015) described data analysis for qualitative inquiry as "collecting quotes from people, verifying them, and contemplating what they mean" (p. 14). Merriam (1998) stated, "Meaning is embedded in people's experiences and that this meaning is mediated through the investigator's' own perceptions" (p. 6).

The first phase of data analysis was to transcribe all of the recorded focus groups. Each focus group was transcribed verbatim. The students wrote their personal reflections on the virtual discussion board for the course, and I later organized their reflections by week on an excel sheet. The next phase of analysis was to identify categories that "fit" the data. Repeatedly appearing categories and concepts helped to construct themes based on adult self-organized learning and curiosity. I went through observational data,

transcribed focus groups, and quotes from participants' reflections to find elements of these theories throughout the data. From the bulleted list outlined in Chapter II, I was able to use these key constructs to code and look for common themes throughout the data. From this process, themes emerged and I was able to use the participants' words as those themes which helped me organize my findings.

The final phase of analysis and interpretation applied Knowles' (1975) and Merriam's (2201 Theory of Adult, Self-Directed Learning and Kashden et al. (2009) *The Curiosity and Exploration Inventory II* which helped give structure and language to my findings. The themes that emerged from the coding process were fitted into the research questions and analyzed using adult learning theory, SDL, and curiosity constructs.

<div align="center">**Trustworthiness**</div>

Establishing credibility, transferability, dependability, and confirmability in qualitative research are criteria for creating trustworthiness. Informed by Lincoln and Guba's (1985) work, trustworthiness criteria were used in this study to assure the validity and legitimacy throughout process of the study. To ensure trustworthiness, I employed peer debriefing, member checking, and triangulation of different data sources. Regarding member checks, I reviewed some of my data findings with the participants individually and collectively. Below, Tables 3, 4, and 5 outlines trustworthiness criteria with results and examples as outlined by Lincoln and Guba (1985).

Table 3

*Credibility Criteria and Examples in Qualitative Research*

| **Credibility** | | |
|---|---|---|
| *Criteria/Technique* | *Result* | *Examples* |
| Prolonged engagement | Builds relationships<br>Rises above own preconceptions<br>Context is appreciated and understood | Teacher as researcher<br>Focus groups<br>Built a positive classroom community |
| Persistent observation | Provides depth<br>Most relevant elements and characteristics | Observations<br>Focus groups<br>Participant's personal reflections |
| Triangulation | Provide consistency<br>Well developed | Multiple sources of data:<br>Observations, focus groups, document collection of student performance and work, curiosity inventory, student reflections |
| Peer debriefing | Check for bias | Focus group<br>Participant's personal reflections |
| Member checking | Check for accuracy and volunteer additional information | Focus groups<br>Personal reflections at the end of SOLE sessions |
| Purposive sampling | Site selection will provide opportunity to observe student support systems and technology center culture | The scope of the study will occur in the "natural setting" for two sections of one course during one semester. |

*Note.* Principles of trustworthiness in qualitative research adapted from "Naturalistic Inquiry," by Y.S. Lincoln and E.G. Guba, 1985.

Table 4

*Transferability Criteria and Examples in Qualitative Research*

**Transferability**

| Criteria/Technique | Result | Examples |
|---|---|---|
| Referential adequacy | Check for validity | Information on school demographics, explored SOLE website |
| Thick description | In-depth detail to check for possibility of transferability to other populations | Background on adult learners, observations of collaborative and SDL environments |

*Note.* Principles of trustworthiness in qualitative research adapted from "Naturalistic Inquiry," by Y.S. Lincoln and E.G. Guba, 1985.

Table 5

*Dependability/Conformability Criteria and Examples in Qualitative Research*

**Dependability/Conformability**

| Criteria/Technique | Result | Examples |
|---|---|---|
| Access to an audit trail | Allow auditor to determine trustworthiness of study | Focus groups, notes, documents, peer debriefing, email exchanges between SOLE researchers |

*Note.* Principles of trustworthiness in qualitative research adapted from "Naturalistic Inquiry," by Y.S. Lincoln and E.G. Guba, 1985.

## Triangulation of Data

### Participants

The setting of this study was in an educational technology course for adult, pre-service teachers at a Midwestern university. The population of the university consisted of

21,046 undergraduate and 4,175 graduate students enrolled, of which 49% are females and 51% are males. The diversity of the population included 69% white, 9% two or more races, 6% Hispanic, 5% African American, 5% American Indian, and 2% Asian. There were 27% out-of-state students, and 3% international students represent 61 countries. Students between the ages of 18 to 22 made up 62% of the student population. The student-to-instructor ratio university-wide was 20 to 1. There were 85 undergraduate degrees that included 73 majors with 26 fields of study. There were approximately 2588 students enrolled in a college of education.

This study focused on pre-service teachers enrolled in two sections of one educational technology course. All of the students enrolled have been accepted into EHA, and this course is the only required educational technology course for students in the program. There were eight sections of the educational technology course, with seven graduate teaching assistants and one lead faculty member. One section of the course took place on Tuesday evenings from 6:45 to 9:30, with eighteen students enrolled. The other section took place on Tuesday and Thursday mornings from 9:00 to 10:15 with nineteen students enrolled.

The study consisted of six consecutive sessions around the same topic (educational technology), but with different "big questions." Mitra (2014) described that one of the main objectives of SOLE was to facilitate collaboration in a group learning environment. Therefore, the students were all in the same classroom and self-selected groups. One instructor facilitated the session. Each session lasted 90 minutes and was broken down into three phases: (1) five-minute introduction with big question, (2)

investigation, and (3) presentation of findings, discussion, and reflection. Table 2

illustrates the breakdown of each SOLE session.

Table 2

*SOLE Session Timeline*

| Time | Activity |
| --- | --- |
| First 5 Minutes: Questions | Pose a "big question"<br>The question will be framed as a genuine process of discovery in order to promote curiosity<br>Explain the SOLE Process |
| 30-45 Minutes: Investigation | Students work in student formed groups to find answers to the big question online.<br>Encourage students to resolve any group issues themselves.<br>Observe and document the SOLE: take notes, photos, ask questions, etc. |
| 10-20 Minutes: Review | Invite the students to share their stories of collective discovery. Talk about similarities/differences between their answers, help to see links to other areas.<br>Encourage debate. Facilitate discussion about the question and investigative process<br>Engage the students in their own review: What would they do differently next time? What do they think others did well? |

*Note.* Adapted from "The School in the Cloud", 2016.

During the first class period, the students were read a script (Appendix A), and

informed of the study then asked to sign a consent form. After consent was given, the

researcher gave a pre-assessment curiosity survey to each participant. The researcher

gave the participants a consent form to sign prior to the start of the study (Appendix B).

They had the opportunity to ask questions concerning the consent and signed a consent

form prior to the start of the study. The participants' names were changed to pseudonyms

when reporting results to maintain anonymity. Research procedures were approved by the

university's Institutional Review Board' January 24, 2017, and designated the study's

IRB number as ED16194. Table 6 is a timeline of the study.

Table 6

*Timeline of Study*

| Week | Class Period | Big Question |
|------|-------------|--------------|
| Week 1 | Talk about class<br>Introduce study<br>Sign IRB consent forms | |
| Week 2 | Session 1 | What is the purpose of having technology in the classroom? |
| Week 3 | Session 2 | Consider you are given only three technologies to have in your classroom. Your administrator would like you to provide a critical examination of (a) what they would be, (b) why you chose them, and (c) how would you use them. |
| Week 4 | Session 3 | What is a learning ecosystem?<br>What role does instructional design play in this? |
| Week 5 | Session 4 | What is assessment and what are the essential elements?<br>How do you know what to assess?<br>How would assessments change if the Internet/technology resources were allowed in the examination room/during test taking? |
| Week 6 | Session 5 | What is "meaningful differentiation" and what does that look like in a classroom?<br>How do we prepare students for jobs that do not yet exist?<br>Hypothesize what would the academic and social outcome be of a student taught in a technology free classroom versus a student taught in a technology equipped classroom. |
| Week 7 | Session 6 | How do I teach my students to research Internet resources effectively and |

| | | efficiently?<br>What is "information fluency", and how does that apply to research?<br>If KNOWING is obsolete, what would you teach and how would you teach it?<br>TED Talk: Talk Sugata Mitra: Build a School in the Cloud |
| Week 8 | Final "big question" and Wrapping Everything Up | Based on findings and experiences:<br>How would you design a setting for learning that does not resemble a classroom?<br>How would you transform a lesson that integrates technology? How would you use innovation, differentiation, and engagement in this lesson?<br>Final reflections<br>Post-assessment |

*Note*. Timelines of study adapted from *EDTC 3123 Applications of Educational Technology* course objectives.

The groups created a presentation a variety of formats to present their findings at the end of each session. The questions were created to disrupt the order in which students are used to working and learning. The rules were presented to students before each session.

## Summary

This chapter explained the theoretical perspective and qualitative methodology used to guide explore how pre-service teachers engaging in SOLE experience an adult learning environment. An explanation of data collection procedures and Kashden et al.'s (2009) *The Curiosity and Exploration Inventory-II* is provided. An in-depth description of the participants and design of study has also been provided in this chapter.

CHAPTER IV

PRESENTATION OF DATA

The purpose of this case study was to explore a self-organized learning environment (SOLE) experience for adult learners, in a pre-service teacher education classroom and describe their response in relation to self-directed learning (SDL) and curiosity. The activities and experiences of pre-service teachers actively learning in a SOLE were observed in order to describe how SDL and curiosity might manifest during self-organized learning processes. Data collected through focus groups, observations, and students' work during an educational technology course for pre-service teachers at a midwestern university are presented in this chapter as a descriptive case study. All data were gathered during the 2016-2017 academic year. Seven focus groups with 39 pre-service teachers in two sections of an educational technology course were recorded, transcribed, and coded to look for themes; observational notes and student reflections also provided means of data collection. *The Curiosity and Exploration Inventory II (*Kashden et al., 2009) was given as a pre- and post-assessment to determine if participants' perception of their own curiosity increased from the beginning to the end of the course. This chapter will report the findings beginning with the context of the study, data collected during SOLE sessions and a results table from the Kashden et al. (2009) *The Curiosity and Exploration Inventory II* (Appendix C).

**Midwestern University**

The university is located in the Midwestern region of the United States and maintains a strong reputation in academic research. The university also takes pride in offering enrollment and various bachelor's, master's, and doctoral degree programs for students across five campuses in a large number of fields. The educational technology course at the university is a required course for all undergraduate students majoring in education.

**Educational Technology Program and Course**

**Educational Technology Program**

The students enrolled in the educational technology program are all pre-service teachers from a variety of discipline areas. These areas include agriculture, art, early childhood, elementary, family and consumer sciences, language arts, mathematics, music, science, social studies, and special education. According to the University's 2017 educational technology program website,

> The mission of the Education Technology program is to facilitate the growth of scholars and education technology professionals through rigorous programs of study that provide exceptional hands-on, collaborative, and innovative learning, research and service experiences and are highly regarded at the international, national, state, and university levels. ("Technology," 2017)

The program was designed for pre-service teachers to have opportunities that to have hands-on learning experiences through collaboration in an authentic learning environment. According to Stansberry (2017), "Pre-service teachers personally need confidence, knowledge and skills in teaching with technology" (p. 2). Therefore, an

authentic learning environment that has activities situated in specific contexts can help students gain a deeper understanding (Herrington & Herrington, 2006; Herrington & Oliver 2000; Stansberry, 2017). Further, learning with technology in meaningful ways can foster creativity and innovation (Stansberry, 2017).

**Educational technology program learning spaces.** The classroom for the course has 24 desktop computers on individual desks. A majority of the computers are in a horseshoe shape around the outskirts of the room with the students facing the wall when seated and the computer screens facing out toward the room. The remaining four computers are positioned in a cube formation towards the back-center area of the classroom. The front of the room has three circular tables, each comfortably seats up to six students. The floors are carpeted with the walls painted a neutral color and typically decorated with projects and posters created by students. These projects and posters illustrate teaching ideology, technology integration, educational technology, and the International Society for Technology in Education (ISTE) standards. There are three windows on one wall with adjustable blinds to allow natural sunlight to penetrate the room. The design of this classroom was intended to provide a model teaching space for pre-service teachers.

In addition to each student having access to a desktop computer, at the front of the room there is an interactive SMARTBoard connected to a desktop computer that is used by the instructor and peer teaching teams. There is also one printer available for all of the students in the room. On the front desk, there is a document projector as well as ports to connect external resources, such as a laptop and other educational aids.

Another computer lab is located down the hall from the classroom that allows

students to check out laptops, tablets, and cameras. On the third floor of the building is

the T.E.C.H. Playground, a lab that facilitates the transformation of education through

creative habits. The lab is open Monday through Friday, 8:00 a.m. to 5:00 p.m.. The

T.E.C.H. Playground houses a variety of integrative and innovative technology resources.

This area currently includes a lifespan treadmill desk, telepresence robot, swivel (a

wireless base that holds an iPad to allow the user to record a video), 3D printer, flight

simulator, EEG machine, SMARTBoard, GoPro cameras and accessories, Little Bits, 3D

monitor, Xbox, Osmo apps, BB8 Sphero Robot, Elements 4D app, and a virtual reality

headset. Mursion's virtual-reality simulation has custom content and avatars that

resemble students that a pre-service teacher is likely to encounter once they begin

teaching. The Mursion technology enables pre-service teachers to practice a variety of

instructional strategies such as classroom management or specific content areas. The unit

of analysis for this case study is the course; therefore, the next section shows context

where this course resides.

**Educational Technology Course**

A key course in the educational technology program is *EDTC 3123 Applications

of Educational Technology*, which was developed for pre-service teachers to gain

knowledge and develop pedagogies for teaching with technology. The course is required

for all pre-service teachers, and is offered every semester. There are eight sections of the

course, taught by seven graduate teaching assistants and a lead faculty member. Each

section has a maximum of twenty students enrolled. The course uses a free ebook

(http://mytechplayground.com) organized around big ideas of teaching with technology and naturally facilitated the development of efficient instructional design.

The course is designed as an introduction to viewing educational technology as a tool through planning, development, and implementation of educational media and technology instruction. The course emphasizes the importance of exploring possibilities, finding patterns, learning from others, playing with technology tools, and taking pride in the learning process and accomplishments (Stansberry, 2017). The *EDTC 3123 Applications of Educational Technology* course provides a positive, safe learning environment that facilitates engagement through peer learning, modeling, creativity, and innovation. In order to give pre-service teachers opportunities to learn how to best learn with technology and successfully integrate technology into their teaching practices, a variety of self-directed learning course activities were designed. The following is a detailed description of these course activities.

**Course Activities**

The first three weeks of the course are dedicated to the pre-service teachers becoming acclimated to the concept of technology integration and developing a sense for instructional design with the instructor serving as a model of effective teaching with technology. The students are expected to behave as professionals in this course which is nurtured through a variety of activities and group discussions. The students also take an active role in their learning, and begin to navigate the course resources. The goal of their exploration is for the students to be engaged in an adult learning environment, and to begin conceptualizing how technology can effectively be integrated into their curriculum to engage student learning.

Course assignments the pre-service teachers engage in are designed to "reflect this clear expectation that the students engage in the course as professionals" (Stansberry, 2017, p. 6). Assignments include an introductory SMART Notebook presentation to introduce themselves to the class, build the best teacher activity, peer team teaching, reflection on peer team teaching, lesson makeover assignment, and a reflective essay at the end of the course.

**Build-the-best-teacher activity.** The build the best teacher activity was designed based on the concept of the Build-a-Bear Workshops stores, where customers go through an interactive process in which the teddy bear or stuffed animal of their choice is assembled and customized during their visit to the store. The build-the-best-teacher activity is done at the beginning of the course and involves the students working in groups to create their vision of the best teacher. The students work together to create a visual representation and are given the following list:

1. Choose a physical representation

2. Choose sound: What does the best teacher sound like?

3. Choose Values: What does the best teacher value?

4. Stuff your teacher: What else is the best teacher filled with?

5. Fluff your teacher: How does the best teacher stay "fluffed"?

6. Chose actions: What does this teacher do that makes him/her the best teacher?

**Peer-teaching teams.** During the fourth through eighth weeks of the course, the students form peer-teaching teams, each comprised of four students. The peer-teaching teams' assignment is designed to "immerse students in the role of a teacher" and

"increase engagement" (Stansberry, 2017, p. 6). In each team, students choose one of the

following individual roles: lead teacher, technology expert, resource manager, or

assessment specialist. The role of the lead teacher ensures their planning guide document

is complete, collaborates with the resource manager to create an interactive presentation

using SMART Notebook software of ebook chapter content, arranges a time for the

teaching team to meet face-to-face for planning in the T.E.C.H. Playground. The

technology expert is in charge of assisting the teaching team in creating their technology

artifacts prior to teaching the lesson. The technology expert is also responsible for

creating an assessment for the technology tool and asses the students' learning with the

assessment as well as keep a record of which students successfully completed the

technology tool assignment. The resource manager's role is to conduct a thorough web

search for the best resources related to the week's content and/or technology tool, post

five of the best on the course's Diigo group with a description of why the resource for

this chapter was chosen, tag the resources appropriately (ex: lesson plan, tutorial,

multimedia, iPad), and share to the Diigo group. This person also serves as chapter

content expert, working with the lead teacher on SMART Notebook interactive

presentation over chapter content. The assessment specialist designs the pre- and post-

assessment over the chapter content, assist the technology expert in developing a rubric to

assess student technology projects, and report results of all assessments to instructional

coach. The instructional coach, the course instructor, give suggestions and guidance in

the OneNote class notebook and meet with the peer team teaching team prior to their

teaching date. The instructional coach also evaluates the peer team teaching group. All

members of the team are responsible for writing reflections on the team's performance in the reflection section of the planning guide.

The students use a planning guide that follows Gagne's Nine Events of Instruction in order to assist the students in developing their own lesson plans for teaching in the coming weeks. Each week, the peer teaching team teaches on a different technology topic and technology tool. Their lesson includes a pre- and post-assessment on chapter content, interactive SMART Notebook presentation, additional resources, and an activity with a rubric assessing the technology tool. The team teaching practices teaching with technology by engaging their peers, providing differentiated learning experiences, and teaching a technology tool. The students use the knowledge they learned from the lesson to create their own product with the technology tool for that week.

**Reflections.** At the end of their peer team teaching, the students reflect on their experience answering the following questions:

1. What were the class averages for the pre-assessment and post-assessment? Was there a gain? Which questions did students do poorly on? What does the data tell you?

2. How effective was your pacing and structuring of the lesson? Did you successfully follow Gagne's 9 Events of Instruction? In what ways did using Gagne's 9 Events of Instruction impact student learning?

3. During the lesson, at which points were students most engaged? Least engaged? What does this tell you?

4. Review TIM (Technology Integration Matrix). Where would you plot the Characteristics of the Learning Environment and the Levels of Technology Integration into the Curriculum for the lesson you have taught? Explain.

5. What did you learn by teaching this lesson that will carry over to the next time you teach?

Both the teaching reflections and the reflective essay at the end of the course are designed to elicit a deeper level of thinking and help the students to become accustomed with the process of reflection.

**Lesson makeover.** The lesson makeover assignment is an opportunity for the students to demonstrate their understanding of how to successfully integrate technology into curriculum by transforming an outdated lesson plan that does not originally include technology. The students choose a lesson from a list that matches their content area/grade level and transform the lesson so it is more innovative, effectively integrates technology, engages students, and differentiates for all types of learners. The lesson also must include a formative and summative assessment, list of resources, detailed instructional design, and a reflection on how the new lesson meets the requirements.

## Planning and integrating SOLE in a technology course for
## pre-service teachers

I had been teaching the previously outlined educational technology course for pre-service teachers for three semesters, and I was consistently observing the students' hesitancy towards learning new technologies, integrating technology into the classroom, and overall peer collaboration in the learning process. Although the course was designed to be student-centered, engaging, and differentiated, I was not getting the sense that the

students were demonstrating elements that are typically characteristic of student-centered learning, which include developing confidence, creativity, innovation, self-motivation, curiosity, and increased communication skills.  While I did notice significant, positive changes in attitudes towards technology as well as their overall abilities in teaching with technology as the course progressed, there still seemed to be some key components missing. During the time of instructing my first semester of this course, I attended a symposium and nomination dinner for the Brock International Prize in Education. There were fascinating, brilliant educators being nominated, but there was one nominee that caught my attention, Mitra, the creator of hole in the wall experiments and SOLE labs. While his philosophy behind self-organized learning, collaboration, and exploration through the Internet were not necessarily new in the field of education, his structure and implementation of the SOLE labs seemed to naturally fit into the course I was instructing. By using Mitra's SOLE design, I was able to use the objectives already embedded in the course to develop big questions and create my own SOLE lab. The following is a description of the course transformation into a SOLE lab.

**Conversations with Mitra's research team.** Natalia Arredondo was a SOLE coordinator in New York City, and was the juror who nominated Mitra for the Brock International Prize in Education. I had the pleasure of meeting Natalia in person and briefly described my research interest. Several months later, we reconnected via Skype, and Natalia expressed to me that her research team along with Mitra had been discussing the need for researching SOLE experiences with adult learners. She was eager to discuss what this would look like in a university setting, and we discussed the feasibility of turning my course into a SOLE lab. We later established an open conversation through

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email in which I was able to consistently check-in with Natalia. She assisted with the development of the SOLE sessions and helped me understand the embodiment of SOLE. She provided suggestions for revisions to my Big Questions, presentations, and how to facilitate the sessions.

**Design and Development**

Transforming the course into a SOLE lab did not require a change in the learning space, but more of a change in my instruction and the design of the course. This integrated, rather than total renovated approach, to the environment is consistent with the most recent work with SOLE in the United States and abroad (Weisblat & McClellan, 2017). The students needed to be exposed to the same learning goals as outlined in the course description and experienced by students in other sections of the course; therefore, I needed to come up with questions that addressed these learning goals and were still open ended enough to follow SOLE guidelines. I began by going through each week in the free eBook and figuring out what the ultimate purpose of that lesson was. From this I was able to take the lesson objectives and transform them into questions that were appropriate for SOLE. The first class period began with introducing myself and informing the students that this section was going to be doing a research study and would follow a different format; however, the learning objectives were still the same as the other courses. The students were offered the choice of transferring to a different section or signing forms of consent to participate in the study. The following is a rich description of some of the participants who participated in the study.

**Participant Profile**

Zara appeared to be a student very dedicated to her learning and education. She described herself as someone who enjoys challenging herself, but wants to follow the rules and "please" her instructors. Zara expressed that she enjoys being at the top of her class, and although she is naturally smart and gifted, she said she works hard to advance her knowledge. She does this through a variety of extracurricular activities that include volunteering at a local elementary school and philanthropy events through her sorority. Zara's physical demeanor appeared as both inviting and assertive despite her petite stature. Her tone of voice was pleasant and her peers respectfully listened when she shared her opinion. She was also very receptive to feedback, and often asked probing questions after her peers had given her comments.

George demonstrated similar academic goals to Zara's. He also seemed to seek out quality, assistive feedback and consistently encouraged his peers. His opinions and views always seemed to be well received and would often elicit deeper conversations from other classmates outside of his group during focus groups. In addition, he was passionate about young students with learning disabilities, particularly those who are deaf. This was observed through his consistent interest in applying knowledge he learned in class to his work with deaf students as well as practicing and becoming fluent in American Sign Language.

Raven was a very open and expressive person. She expressed she learned better when instructions are given to her and more "straight forward" because it made her feel more confident. She always worked well with her group members and, according to them, their conversations with her would challenge them to think more deeply or in a

different way. She seemed to thrive when the questions were more direct and expressed she was uncomfortable when the questions were more broad. Raven would often keep her group on task by repeatedly verbalizing they needed to move back to the question they were addressing.

Brock was a non-traditional student. He was middle-aged and worked as a technology teacher at a vocational technology school in a nearby city. He was always eager to learn and expressed that he enjoyed class discussions. Brock would often share his experiences teaching a technology class for adults. Brock seemed to enjoy being a leader in the classroom, which was observed through leading discussions, asking probing questions, and being an active listener to his peers.

Ryan was a secondary education major and enjoyed talking about history. He shared with the class that he had spent time in the military and chose to go back to school. Ryan enjoyed learning but described himself as more of a "traditional learner." He expressed he felt learning should be teacher-directed and students need to be told specifically what to do.

Cara was from a small, rural community about two hours from the university. She expressed she was inexperienced with technology as well as teaching in front of groups. Cara said she was challenged by using technology and expressed she was nervous about taking *EDTC 3123 Applications of Education Technology*. Cara appeared to be passionate about learning through her inquisitive questions and eagerness to investigate questions. She also expressed interest in hearing and learning from her peers.

Molly was from a midsize town in a different state. Molly was an active participant in her sorority and would occasionally share some of her positive experiences

working and volunteering through the organization. She was knowledgeable in child development and seemed to understand instructional strategies, but she expressed little experience with integrating technology into instruction.

Mabel appeared to be comfortable talking in front of the class and would often take on a leadership role in the class discussions. She was eager to learn while in class, but did not invest a lot of her time on coursework. Mabel often talked about extracurricular activities, and it seemed she did not always make her education a priority. Mabel had a strong personality and was not hesitant to try new things in the classroom, which made it seem as though she was comfortable being challenged.

Sarah was from a small, rural community and graduated from a small high school. Sarah was a secondary education major, passionate about English and literature. She seemed to connect well with other people through her ease of communicating with her peers. Sarah's body language indicated she was open to working in a group setting. She enjoyed generating ideas about how to integrate technology into her future classroom. Sarah would explore different ways to engage learners in her future classroom and demonstrated that she understood there are different types of learners.

Rylee was a shy, soft-spoken student from a mid-sized town about an hour away from the university. She did not participate in whole group discussions, but seemed to prefer to listen during that time. Rylee appeared more comfortable working in a small group rather than participating in a class discussion. Rylee was an attentive student and who seemed to enjoy learning, but she appeared to not enjoy being too far out of her comfort zone.

Anna was an early childhood major. She was taking *EDTC 3123 Applications of Education Technology* with a group of friends she was close to outside of class. Anna was passionate about third world countries, and wanted to teach somewhere in South America when she graduates. She expressed she did not understand how technology integration pertains to her teaching interests. She did not spend a lot of time on her coursework while in class and rarely participated in group discussions.

Doris was one of Anna's friends outside of class. She was a member of the same sorority as Anna, and they would often have conversations about their extracurricular activities. Doris shared with the class that her mom is a teacher and she often uses her as a reference and mentor to influence her learning about teaching. Once class started, Doris was always a leader within her group, which was demonstrated by her constantly telling them to stay on track and initiating their plan for the session. Doris would contribute to group conversations by providing opinions and asking probing questions. She expressed that her education was important to her, and she enjoyed learning.

Kay was from a small, rural community. She was passionate about exercising and would talk about how she enjoyed helping others learn to live a healthy lifestyle. She would often integrate health related elements into her presentations. She stated that she used technology daily and was interested in learning how she can use it in her classroom. Kay was always eager to come to class, and would often arrive early. She also seemed to feel comfortable talking in group discussions and dedicated to doing well in school.

Justin was from a rural community an hour from the university town. He was a secondary education major specializing in history. He came to class about half of the time and expressed he was not interested in using technology in his classroom. He stated that

he preferred a teacher directed model of teaching, and did not really want to learn other forms of instruction. Justin expressed he did not want to use technology in his instruction and did not want to change or add to his teaching philosophy. He seemed to work well with his group members when he was in class, but did not spend a lot of time or put effort on coursework.

Tara was a nontraditional student returning to college after staying at home with her children. She had a little experience within the school system, but was primarily a stay at home mom. She was dedicated to her studies and brought valuable insight to the course, but would occasionally be absent to take care of her children. She was soft-spoken and typically quiet during focus groups, but provided opinions and shared knowledge after deep thought and consideration.

Zed was a student who was taking his time through college and was one of the older students in the class. He was often late to class, but was very present during the class time. He was creative and had a playful sense of humor. Zed was a leader in class discussion and often broke the ice or encouraged others students to talk. He was comfortable teaching and talking in front of his peers, and was very respectful to everyone else in the class.

Mary was from the same town as the university and was a Family and Consumer Sciences major. She was in the last semester of her degree program and was already student teaching at a secondary school. Mary consistently texted on her phone during SOLE sessions, but would still make an effort to work in her group. She appeared confident during class discussions and presenting to her peers. She was actively involved in her sorority and often discussed her important role in within the organization. Mary

seemed to be preoccupied with activities outside of class. She was respectful when her peers were talking, but did not seem engaged during class time.

Lacy was majoring in Family and Consumer Sciences. She would often arrive to class early and expressed her passion for creating and sewing. She seemed to understand her role as a learner and educator. Lacy was actively involved in class discussions and worked well with her group members.

Casey was from a midsized town about 45 minutes from the university. She describes herself as a learner whose job is to "actively participate" and apply her learning to her future classroom. She appeared eager to gain knowledge in technology in order to integrate it into her future classroom. Casey would typically arrive to class early and begin working on her coursework in this class or other classes, often asking her peers for feedback or opinions. She was a leader within her group as well as during focus groups. She would often discuss her extracurricular activities, which included being a member of the Education Student Council, an active member of her sorority, and working with children at local elementary schools.

Ella was from the same town as the university and a secondary education major. She was very soft spoken and missed several class periods. Ella worked well with her group, but did not contribute to class discussions. She expressed that she had experience in graphic design, but it did not appear that she used these skills to investigate the question or create her presentations.

### SOLE Session Experiences

Observational data were collected during every SOLE session as well as student created artifacts. The first assignment that was adapted for the study was the build-a-

teacher activity. This was not an actual SOLE session, but it was designed as an introductory activity for the students to get used to SOLE as well as begin thinking about what a teacher really embodies and perhaps begin developing as professional educators through this class for their future. According to Knowles (1990), scaffolding or a "brief experiential" designed to be self-directed learning (SDL) is often important in an adult learning environment. The sessions following the build-a-teacher activity took place during weeks two through eight of the course (see Table 5 for details). Below is a rich description of the activities the students engaged in starting with the build-a-teacher activity and followed by the SOLE sessions.

**Build-a-Teacher Activity**

The build-a-teacher activity occurred the first day of class as an introductory activity for the students to get used to a SOLE setting. Since all of the students enrolled in the class were future educators, I made the assumption that most had been exposed to SDL at some point in their education and it was possible some already felt it was part of their teaching philosophy. However, I have observed that an adult learning environment at a higher education institution, lecture is often the main form of instruction and students may not be as accustomed to SDL methods. Therefore, I decided to transform the build-a-teacher activity into a mini SOLE session with the main elements of SOLE and SDL.

Instead of listing objectives for the build-a-teacher activity, I presented the students with the task of "building" the best teacher. We briefly discussed some traits or characteristics they felt an ideal teacher may embody. I asked them to think back to their own experiences as well as look at traits within themselves they felt might be positive teacher attributes. The students were instructed to form their own groups, and many

chose the person or persons they were sitting next to. The students were provided

resources such as technology tools, molding clay, paper clips, large sheets of parchment

paper, markers, and other art supplies to create their teacher. How they created and

presented their teacher was entirely their choice. I encouraged them to be creative and

express how they envisioned their teacher anyway they wanted. They were given roughly

15-20 minutes to work on the assignment after which time they stood up in front of the

class as a group and presented their project. Expectedly, there was some hesitation;

however, I noticed some enthusiasm as they began working and all of the students

seemed to work well collaborating with one another.

Students chose to use a variety of technology tools to create their teacher. Doris,

Anna, and Ella's groups chose to use a Bitmoji application and uploaded the image into

SMART Notebook.  Figure 3 is Doris's Groups build-a-teacher activity.



*Figure 3*. Bitmojo Build-a-Teacher Activity. Interpretation of a teacher from the build-a-teacher activity using Bitmoji application software.
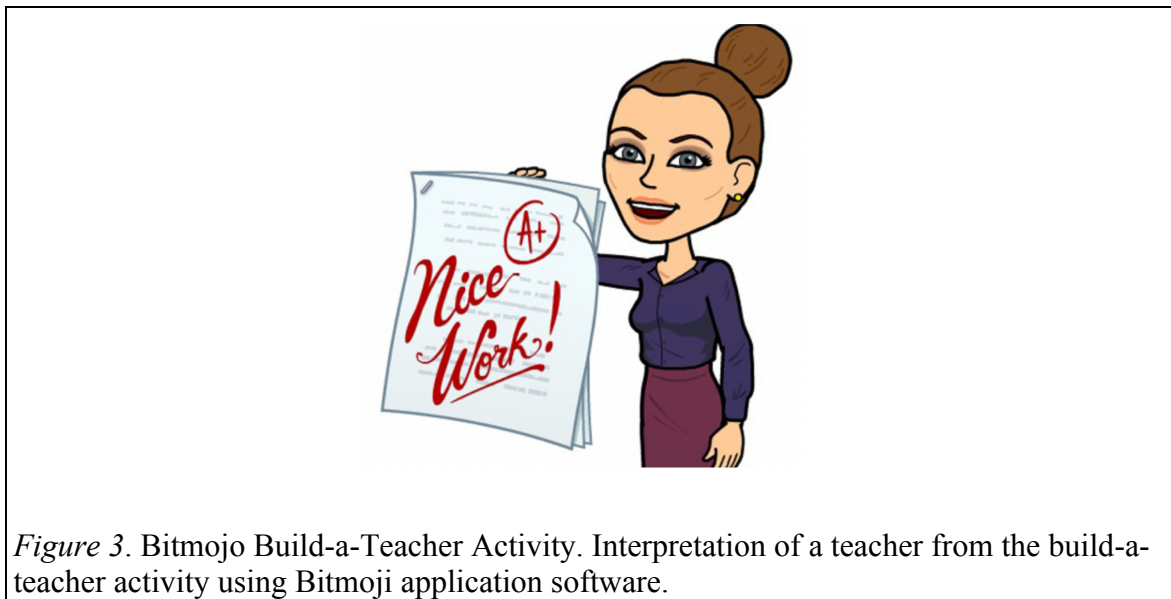
Brock's group used Microsoft Word to create images of teachers found in some

popular movies. Some of the movie characters included Mr. Miyagi, Mrs. Doubtfire, and

Coach Carter. Brock explained that they chose these characters because they were often thought of as ideal teachers. Figure 4 is an illustration of their presentation.



*Figure 4*. Illustrating Teacher Characteristics through Images. Images of iconic teachers are used to represent an interpretation of an ideal teacher. All images are of characters from movies and were adapted from a Google search by the group.
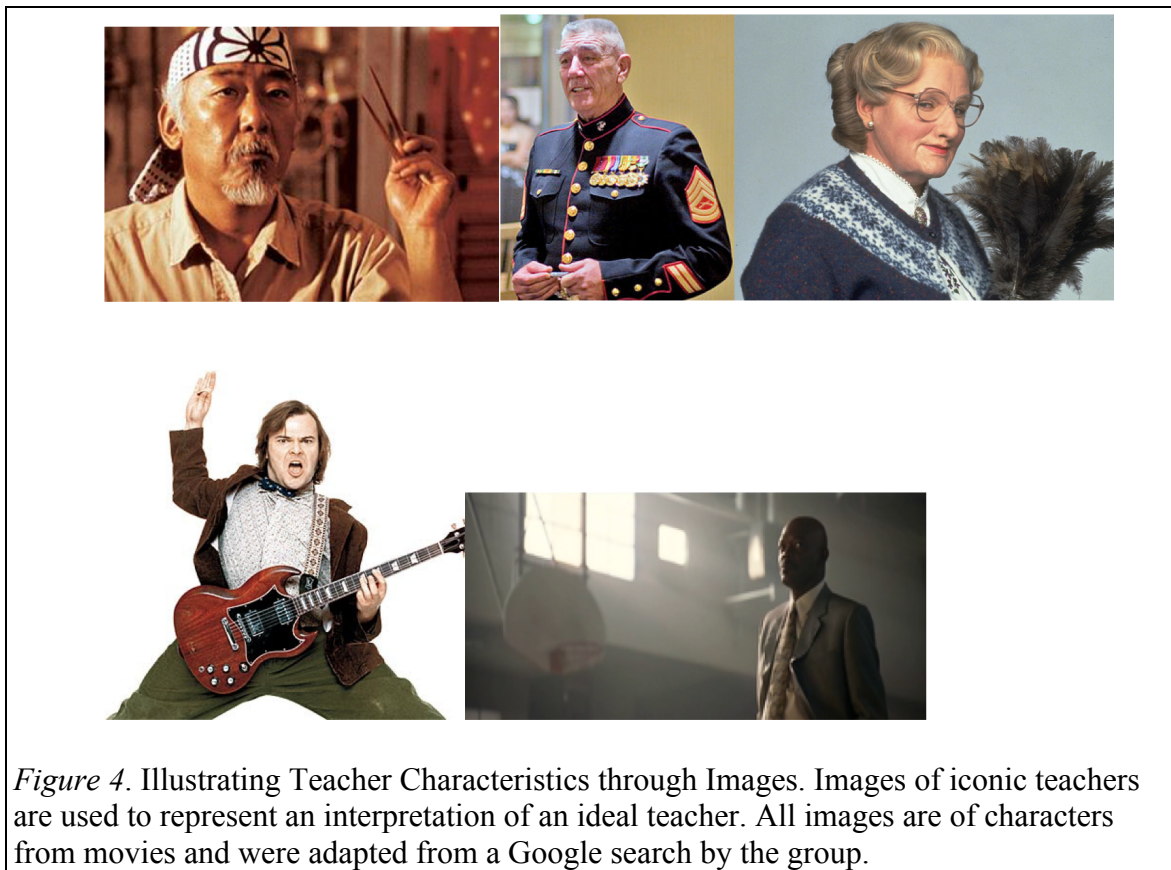
Two groups chose to create personal learning networks (PLN) through creating social media accounts. Molly's group chose to create a Twitter account, while Raven and Mabel's group created an Instagram account. Raven and Mabel described how they created their teacher by searching for images of students working together, inspirational quotes, and other visual representations of how they want to be when they enter the professional world. They included morning workout routines because they felt it was important to maintain a healthy lifestyle. Raven expressed she enjoys looking at Pinterest for organizational ideas, so they included a photo of how to organize a classroom set of art supplies. Mabel expressed she loved coffee, so they included an image of a coffee

cup. Figure 5 is an image of Raven and Mabel's Instagram account created to illustrate their ideal teacher.
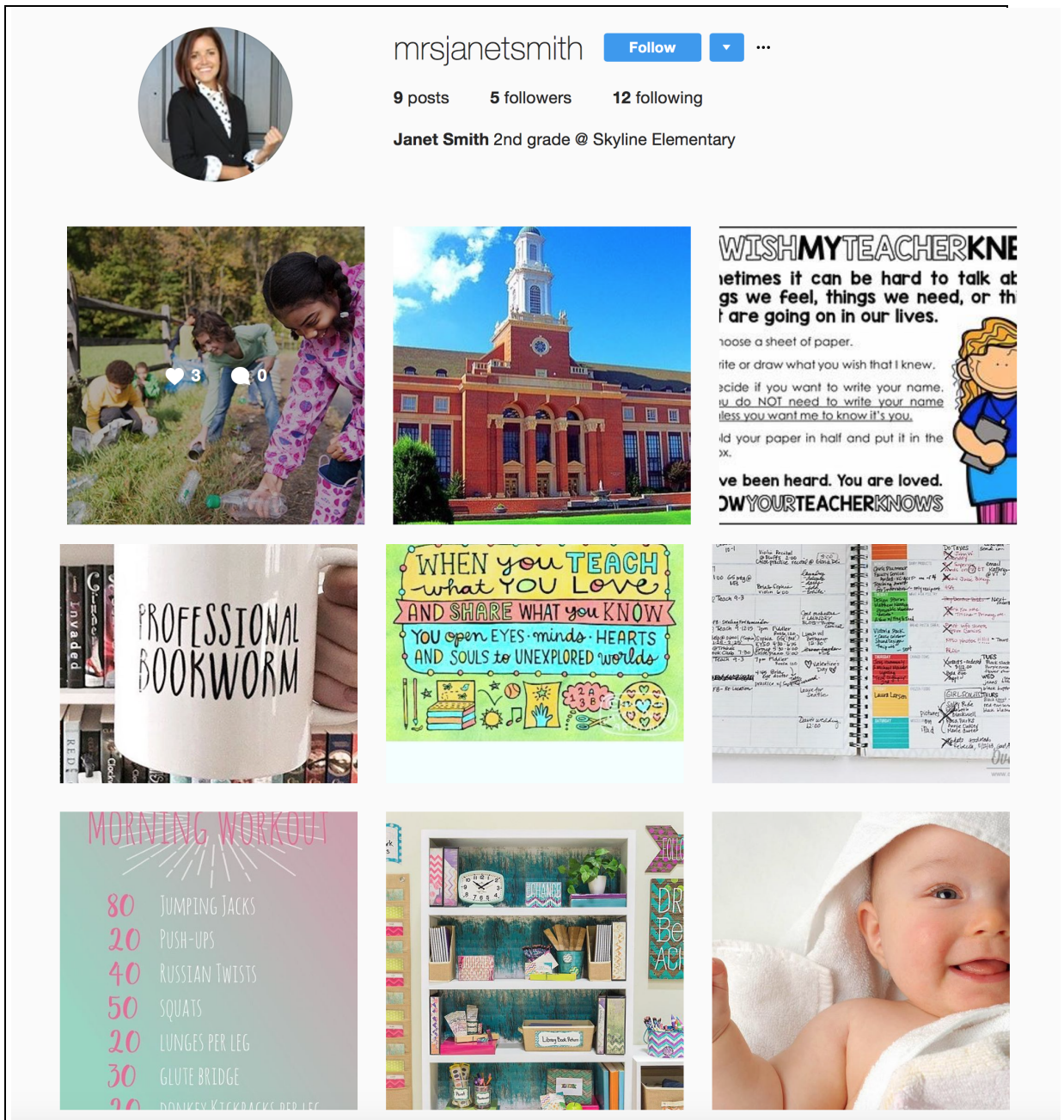


*Figure 5.* Teacher Illustrated through Instagram. Student created Instagram account to illustrate characteristics of an ideal teacher using images from a Google search.

Zed and Lacy's group created a teacher made from modeling clay. The students in this group brainstormed key terms they would use to describe an ideal teacher and wrote

them on the paper made dress. They decided to make the teacher resemble a female because most of their favorite teachers were female. Figure 6 is an image of their model.
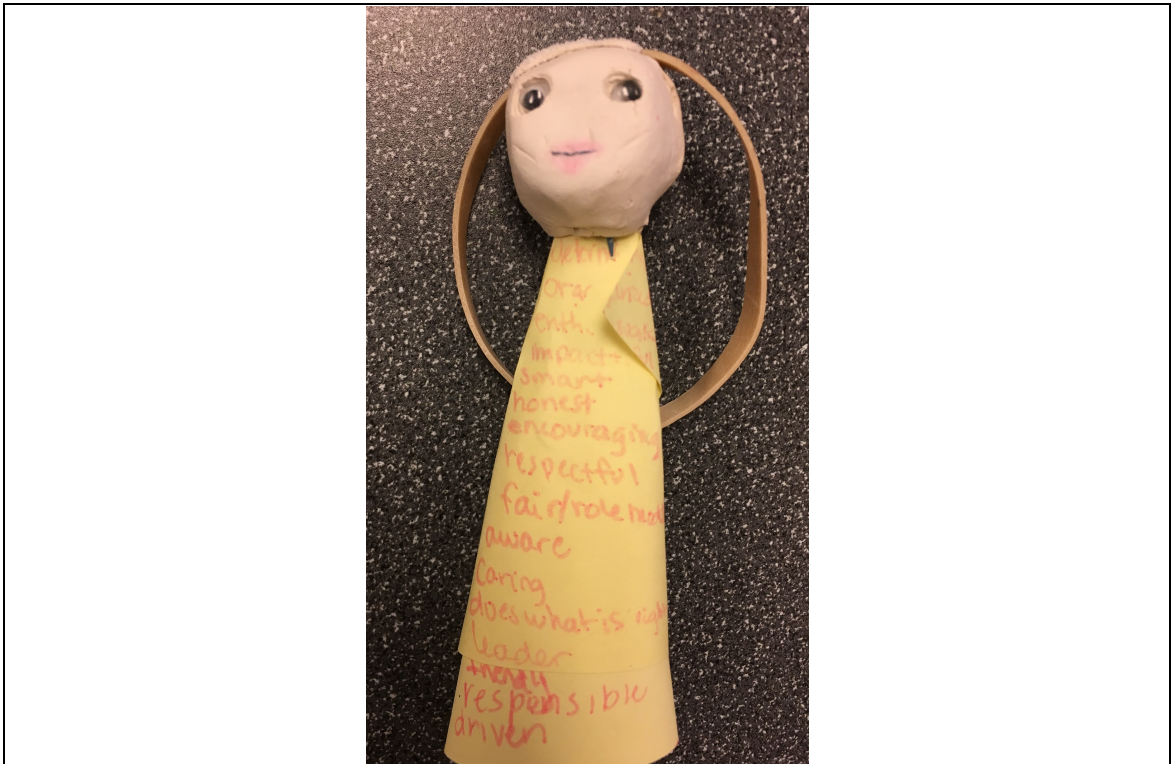


*Figure 6.* Teacher Made from Modeling Clay. A teacher created with modeling clay and a dress made out of paper that has descriptive characteristics of an ideal teacher.

All of the groups seemed to enjoy creating their teacher. Once their teacher was created, they presented them to the class. This whole process was an introduction to SOLE and how they would be collaborating in groups to create and present their findings. The following is an outline of each SOLE session.

**SOLE Sessions**

The SOLE sessions began the second class period. As soon as the class started, we jumped right into the first SOLE activity. Each class period was conducted in accordance with SOLE guidelines. For example, the first five minutes were spent discussing the question(s) or statement(s). During this time, the students would ask for clarification on the question to make sure they understood what I was asking and begin to

think of their approach. As the sessions went on, this was also a time during the process

when students would share how they might approach the question with their classmates.

After the initial five minutes, the students formed their groups and chose a learning space.

This included circling around one desktop computer, each member using a personal

computer, moving to the hallway for quiet, or moving to the middle of the room to use

the circular tables.

The next 30-45 minutes involved investigating the question. During this time,

students used the Internet to investigate and used discussions within their group and a

variety of tools to take notes and create presentations. Note taking, investigation

processes, and presentation included an array of tools. For instance, some groups chose to

share a GoogleDoc, create a presentation through PowerPoint or SMART Notebook,

handwritten notes, or research on the computer then a verbal discussion over what they

were learning about.  Figure 7 illustrates student work throughout SOLE sessions.
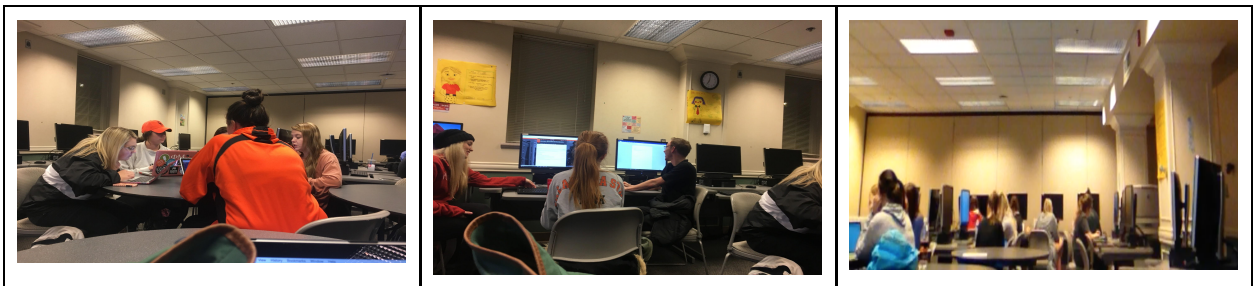


*Figure 7*. *Images of Students Working in Groups During SOLE*.  Image 1 is an example
of students working around a circular table. Image 2 is an example of students working
around one computer. Image 3 is an example of students working in a group with their
backs to each other at the center of the room.

During the final 10-20 minutes, students presented their projects to the class and

engaged in rich discussions. The first few sessions I was the main facilitator of

discussion, but as the students began to feel more comfortable within the learning

environment, the presenters would often naturally facilitate the discussion and their peers

would pose questions or offer insightful comments.  Figure 8 is an interpretive drawing

of how the SOLE sessions looked in this classroom setting for this study.
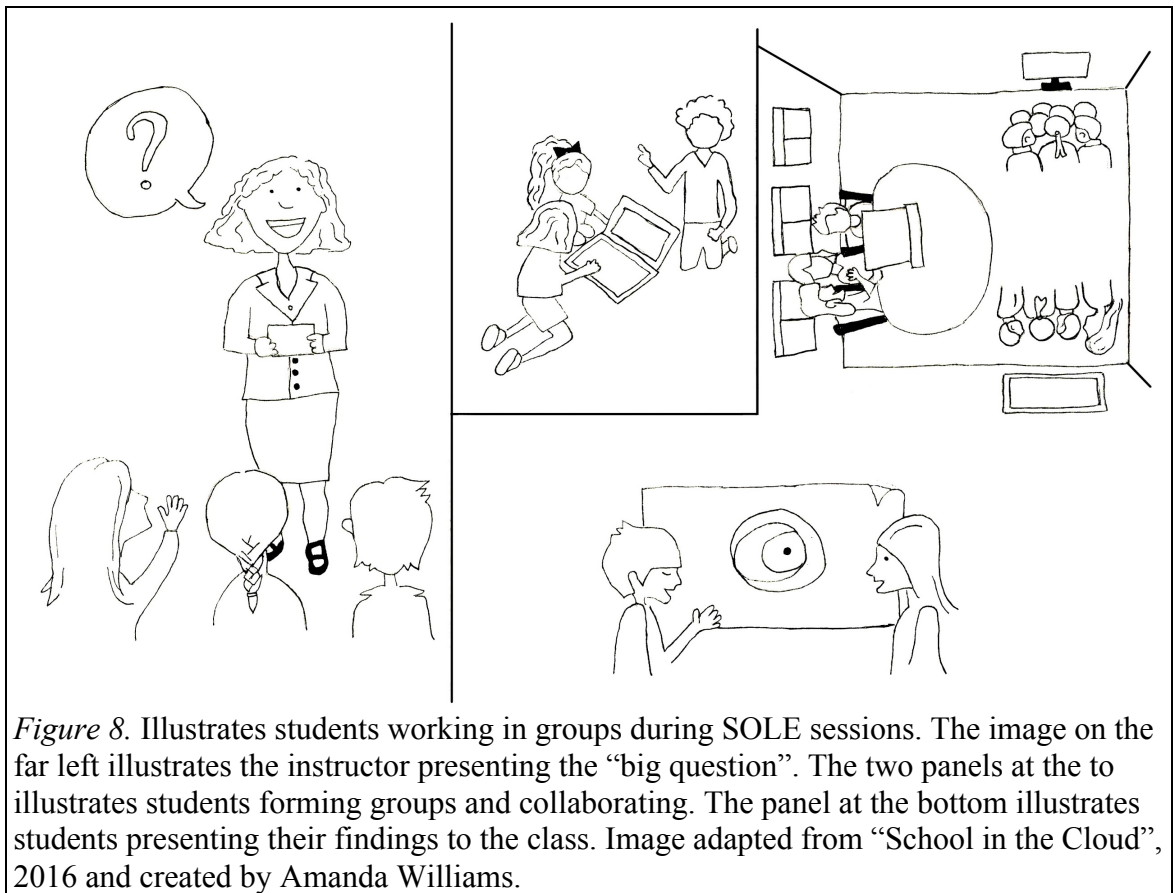


*Figure 8*. Illustrates students working in groups during SOLE sessions. The image on the far left illustrates the instructor presenting the "big question". The two panels at the to illustrates students forming groups and collaborating. The panel at the bottom illustrates students presenting their findings to the class. Image adapted from "School in the Cloud", 2016 and created by Amanda Williams.

At the end of each class period, the students wrote a reflection about something

they took away from the lesson. This could include, but was not limited to, a couple of

terms or words, one or two descriptive sentences, a particularly useful resource, new

technology tool(s), an epiphany, a question they still may have about the topic, or what

they would change/keep the same for the next session. The students posted their

comments on the class's virtual discussion board but always had the option of sending it

to me privately.

**Session one.** Week two began the first SOLE session. I presented the students with the SOLE session timeline and gave them the guidelines (Table 2). The first five minutes were spent understanding the big question for this session: What does technology have to do with learning? The students formed groups averaging three to five students. Beginning with the first session, their groups were chosen based on the proximity to where they were sitting. This first session was a learning curve for the students, but they were successful with investigating the questions and creating presentations based off of those findings. During the investigation time, students were a little quiet and appeared as though they weren't quite sure how they felt about this process. Some stated it was different but "interesting". Others expressed they didn't get the whole picture until groups started presenting. Many expressed their takeaway from this session was getting a better picture of educational technology. Rylee described her takeaway from this session stating "Technology can be used in so many different ways, but the most important thing is that it allows for students to be interactive with their learning rather than just watching the teacher lecture. Technology allows a hands on approach that keeps the students focused and interested in learning".

Presentations during this session were not interactive or very engaging. The students did use appropriate images and descriptions to illustrate their findings, but their presentations were a little static. The students chose to create their presentations using a similar presentation tools including SMART Notebook, GoogleSlides, PowerPoint, and GoogleDocs. Rylee's group, displayed in Figure 9, chose to use a SMART Notebook presentation. Below is an image taken from their presentation.
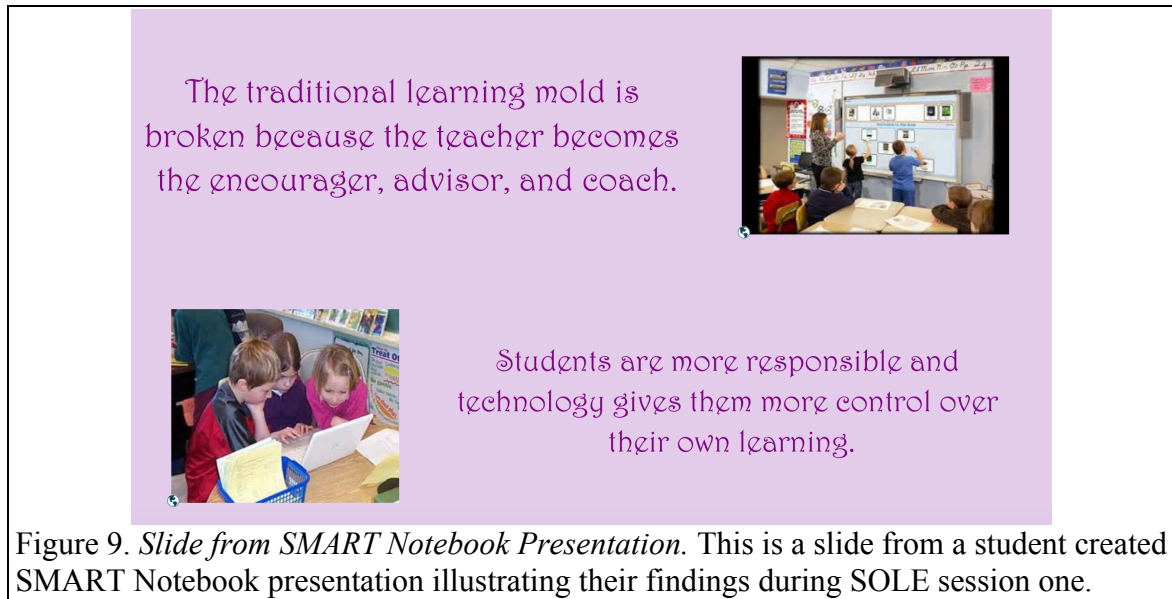
Figure 9. *Slide from SMART Notebook Presentation.* This is a slide from a student created SMART Notebook presentation illustrating their findings during SOLE session one.

During the focus group most students were hesitant to speak. Some students expressed they were initially confused by the broadness of the question, but felt better about it when they began investigating. We did address that while they learned from the presentations, they were all similar in format. Some students stated they were intrigued and eager to learn in this format.

**Session two.** Session two and following sessions begin the same format as session one. I presented the guidelines for SOLE and outlined the time breakdown the session. The big question for session two was: Consider you are given only three technologies to have in your classroom. Your administrator would like you to provide a critical examination of (a) what they would be, (b) why you chose them, and (c) how would you use them. After reading the question, the students were quiet for a bit and began to ask me questions in order to clarify what I was asking. Most students wanted a little further explanation about what I was asking, but this discussion did not last long and the students articulated they were ready to get into groups and begin investigating. The students chose

the same groups they had been in during session one. I observed slightly more dialogue

here and a sense of eagerness while investigating the question.

Brock and Ryan's group created a presentation that illustrated functional

technologies with the classroom. They chose lights, climate control, and a SMART

Board. Their reasoning behind their choices were that students need a comfortable

learning environment in a classroom setting. They reflected on experiences where the

lights were too bright in their classrooms, or the heater was not turned up high enough

during the winter season. Brock felt that these were not only necessary technologies, but

foundational for a classroom. Ryan added that they chose an interactive SMART Board

because they felt engaging students in their learning was important. He felt that a

whiteboard could enhance interaction in the classroom. Below, Figure 10 are slides from

their PowerPoint presentation.



*Figure 10. Three Technology PowerPoint Presentation.* This figure illustrates slides taken from a student created PowerPoint presentation that illustrated their interpretation of three important technologies to have in the classroom. The slides represent the three technologies through descriptions and images. Slides 1 and 2 illustrate the importance of lights. Slides 3 and 4 illustrate the need for climate control. Slides 5 and 6 illustrate the need for an interactive SMART Board.

Sarah and Casey's group chose to use GoogleSlides for their presenation. Their group chose technology tools the students could use in their classroom. They explained their reasoning behind choosing these tools were because they were seeing them a lot in the classrooms they were observing in currently. Casey discussed how her school had a class set of ChromeBooks and really enjoyed having this at her school. The last slide was an outline of why they chose their three tools, and provided two explanations for why they chose those tools. Figure 11 shows the last slide taken from Sarah and Casey's group's presentation.



*Figure 11*. This is a slide from GoogleSlides. This slide describes why this group chose their technology tools for their classroom.
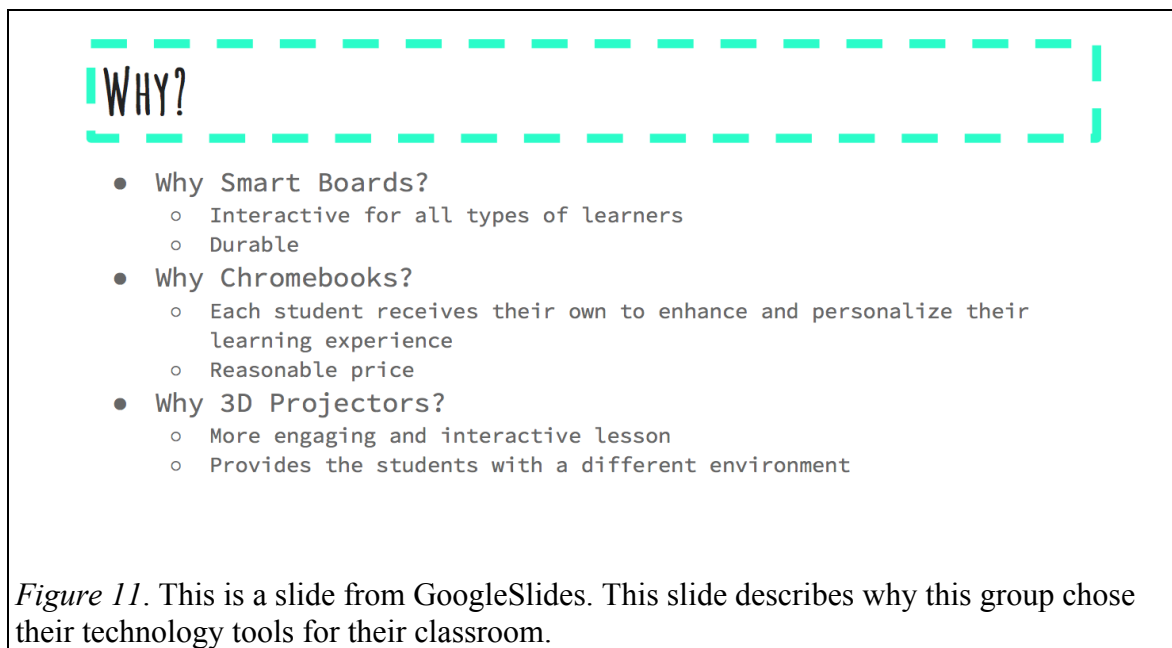
The presentations during this session seemed slightly more detailed and personal. However, presentations were still not very interactive or engaging. All of the groups chose to use the same presentation formats as the previous session that included SMART Notebook, PowerPoint, GoogleSlides, and GoogleDocs.

**Session three.** Session three asked the questions: What is a learning ecosystem? What role does instructional design play in this? This session seemed to create a little

more excitement between the students. Students were confused by the term "learning ecosystem" and most were not familiar with "instructional design." During the presentation of the question, students asked for a definition of these terms, and I responded by telling them that was part of what they needed to investigate. Brock started processing out loud how he was going to approach this question, and this seemed to make other students feel more comfortable.

Presentations during this session used the same tools as previous sessions; however, some groups play around with other presentation tools. Justin and Mabel's group made up a song and paired it was an image they found on the Internet to illustrate their interpretation of the questions. Zara, Raven, and George's group chose to do a skit to illustrate how technology should be used in the classroom. They presented their classroom and each took a different role (teacher, student, narrator). George used dialogue to narrate what was going on in the classroom, and stated,

> I am sensing a negative classroom ecosystem, negative frame of mind. I don't think how you are teaching is helping your students grow, or you grow as a teacher. I noticed you had a lot of rules, and they all seem very negative. Let's change this to a positive list. Embrace mistakes and learn from them with these goals.

Sarah and Casey's group created a Prezi presentation. Figure 12 is an image of their presentation.
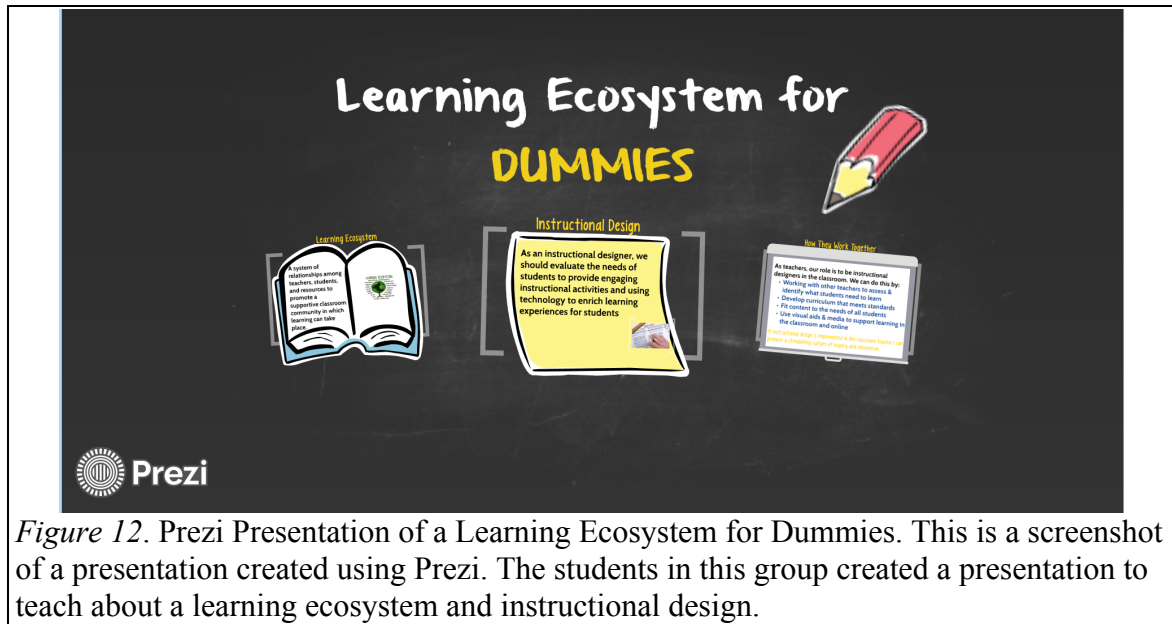
*Figure 12*. Prezi Presentation of a Learning Ecosystem for Dummies. This is a screenshot of a presentation created using Prezi. The students in this group created a presentation to teach about a learning ecosystem and instructional design.

This session seemed to elicit more excitement than past sessions. The focus group lasted longer than the previous sessions and there were more self-reflective responses from the students. One student reflected they developed "a whole new perspective about the classroom/learning environment and how it all works together for or against the students' learning." Mabel stated,

> This question was pinpointed enough so that we were able to take it in many different angles. As a group, we enjoyed doing a song because it provided our classmates a different way to look at the material instead of more conventional ways. This was by far my favorite question so far because it seemed more fun than the prior ones.

Many students expressed they were experiencing a new way of learning through SOLE and were excited to see what the other sessions were going to be like.

**Session four.** Session four was designed to learn about assessments. The questions for this week were: What is assessment and what are the essential elements?

How do you know what to assess? How would assessments change if the
Internet/technology resources were allowed in the examination room/during test taking?
This was the first session that asked more than just two questions. It was much more
multitiered than the others. This appeared to through the students off at first, but as they
reread the questions they began to talk through their thought process and realized they
could approach the question similarly to the last session. For example, many students
expressed they broke down the question in session three to better understand what it was
asking and they felt this was also a good strategy for this session. During the
investigation, the students seemed hyper focused and diligently working on their
investigation.

Presentations during this session were the most creative out of all of the sessions
and included a wider variety of presentation formats. Many groups started integrating
YouTube videos into their presentations. One group actually created an assessment
through an online assessment tool called PollEverywhere. Justin's group chose to do
something similar and created an assessment using a jeopardy game application. Sarah's
group created a syllabus that outlined their understanding of assessment. They used
Microsoft Word to create their presentation. The syllabus demonstrates their
understanding of assessment, as well as an example of how they might apply this
understanding for their own instruction. Figure 13 is an image of their syllabus.
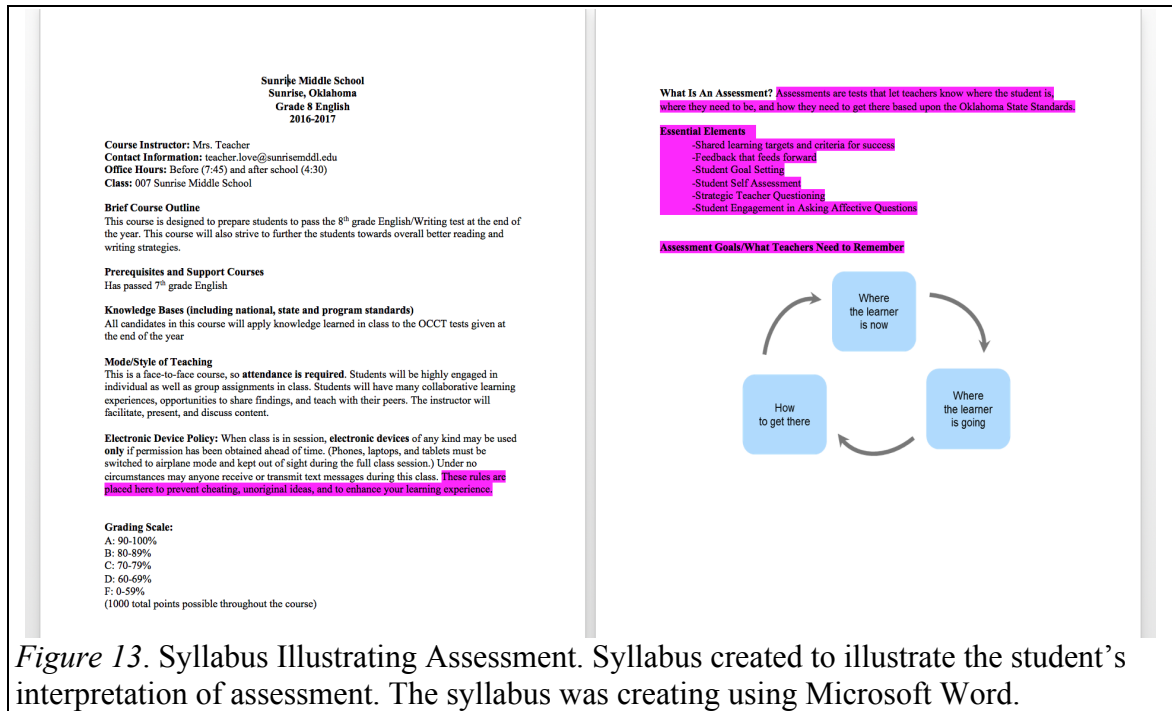
*Figure 13*. Syllabus Illustrating Assessment. Syllabus created to illustrate the student's interpretation of assessment. The syllabus was creating using Microsoft Word.

After this session, students seemed a little more fatigued than usual. They expressed this session seemed to have more content. Also, assessments were something they were already familiar with as a learner, but they expressed they felt they learned more about assessments and learned how assessments might look in their future classrooms. Rylee reflected, "This SOLE assignment was even a form of an assessment, and we will always be assessing things throughout our life." Another student stated, "I learned how different methods of teaching can benefit students for future learning. I hadn't really thought of the way I took tests in elementary school until this SOLE assignment."

**Session five.** Session five asked the students to: Hypothesize what would the academic and social outcome be of a student taught in a technology free classroom versus a student taught in a technology equipped classroom. The session for this week looked similar to the other sessions. Students seemed to know how they wanted to approach the

question and what looked best for their group. Many of the presentation formats were the same, however, some groups were still exploring different methods of presenting their findings.

Molly's and Mary's group chose to use an online tool called Smore. They created a presentation that was visually interesting and included links to resources. Figure 14 is a screenshot from their presentation that details their interpretation of meaningful differentiation.



*Figure 14*. Image from Tech and Future Classrooms Presentation. This group used resources found online to create a presentation using Smore.

This question seemed to require a more in depth thought process when compared to the previous sessions. One student stated, "I thought this week's questions were a little denser than a few of the others." I also observed that students seemed to become more becoming fluid with their SOLE investigations. I also observed that this week more than

the past sessions students appeared more comfortable presenting in front of their peers and exploring different technology tools. George reflected, "This week was exciting. The question was open ended and much more interesting to answer."

**Session six: This week's question investigated.** How do I teach my students to research Internet resources effectively and efficiently? What is "information fluency", and how does that apply to research? If KNOWING is obsolete, what would you teach and how would you teach it? I showed the students a segment from Mitra's TED Talk where he discusses these concepts briefly. This was to give the students a better perception of the concepts being asked in this session. The students appeared a little confused by these questions and asked for a lot of clarity. Their questions elicited whole class discussions and together they were able to gain understanding enough to begin investigating.

This week there were many students absent which seemed to change the dynamic of the sessions slightly, but the students still chose to be in the same groups they had been in. The presentation tools that students chose to use were similar to other sessions, but seemed to include more elements of engagements and interaction. This was evident through short YouTube video clips and interactive games created on SMART Notebook.

Figure 15 is an example of how George and Zara's group created an interactive activity using SMART Notebook. They created a match, drag and drop activity for the students come to come up to the board and participate in. They would read the questions, then have a student come up to the board.
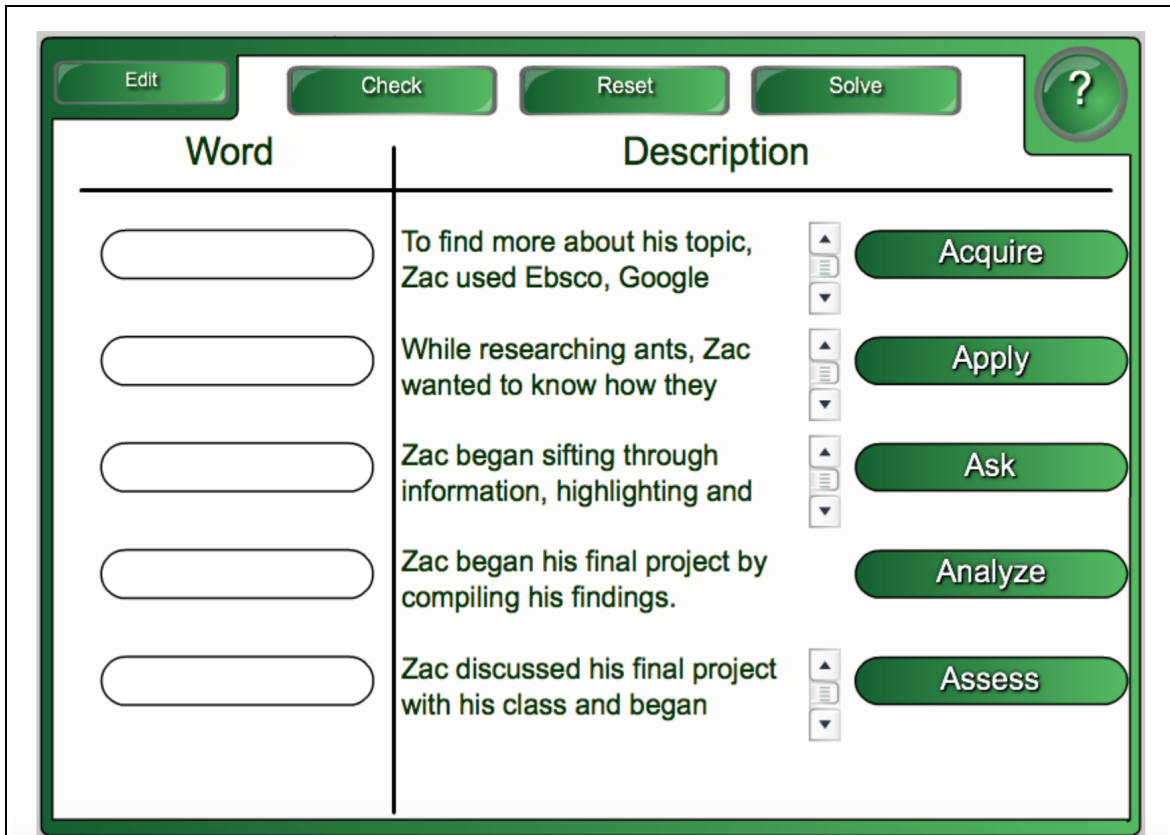
*Figure 15. SMART Notebook Interactive Activity.* Screenshot taken from a SMART Notebook activity from a student created presentation.

This session appeared more engaging than past sessions, and most students seemed to really enjoy this session. One student reflected this by stating, "I feel like this was a really engaging SOLE and is very applicable in classrooms that are heavily using technology as resources." Many students also expressed that this SOLE session helped them to think about concepts outside of the classroom as well, creating a more dynamic learning experience. Doris felt, "This was a really good lesson and I think it developed good conversations that were not only applicable to the classroom, but life as well." Some students expressed they were frustrated. Zara stated,

This week's question frustrated me more than any of the previous questions. I'm

not sure if this is because of my energy level or because I had trouble connecting

the questions to each other. After the presentations and discussion, I feel that I

understand the content more clearly.

This was also a sentiment shared by Raven.

**Session seven.** This was the last SOLE session of the study; therefore, I wanted to

assess a variety of learning objectives. This session was designed to wrap up the SOLE

sessions. Session seven asked: Based off of findings and experiences, how would you

design a setting for learning that does not resemble a classroom? How would you

transform a lesson that integrates technology? How would you use innovation,

differentiation, and engagement in this lesson? Students seemed to jump right into this

session. They appeared confident with their investigation, and I heard many

conversations about them making connections between other SOLE sessions.

Some students chose to create a presentation individually for this session because

they wanted to apply their knowledge unique to them. For instance, Doris chose to

collaborate with her normal group while investigating the questions, but she wanted to

create her presentation on their own. Sarah chose to do the same thing with her group,

because her content area was secondary education while the rest of her group was

elementary education.

David, Raven, and Zara chose to create their presentation using a GoogleDoc.

They illustrated their findings through drawings then later described what the drawings

meant. The students drew their findings using a stylus pen then uploaded the images to a

GoogleDoc. Figure 16 is an image of their drawings that depict their setting for a learning environment.



*Figure 16*. Interpretive Drawing of Learning Environment. Illustrates student's interpretation of a positive learning environment for students.
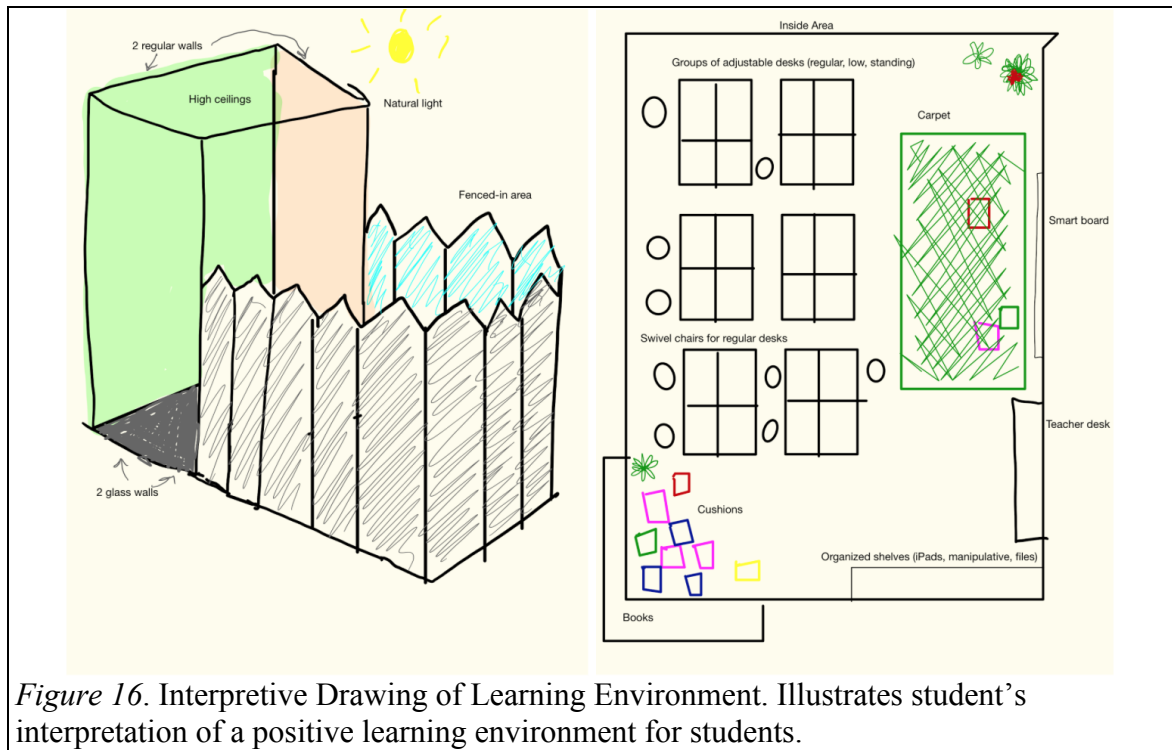
The focus group for this session illuminated that many of the students enjoyed the freedom and creativity of the SOLE sessions overall, and this session in particular. Students enjoyed learning from their peers, and I observed they seemed more comfortable during discussions as well as presenting material by the end of the sessions. Ryan expressed overall he was "confused on the broadness of the questions, and the lack of a true focus on most of the questions."

Another group that included Mabel, Cara, and Justin, decided to make a song. They assigned each other parts and created a one-minute song. After that, they explained what the song was about and how they interpreted the big question for the session.

**Themes from the University Classroom SOLE Experience**

Observational data were collected during every course meeting from both SOLE sessions and focus groups. After each session, the participants were asked the same focus group questions which addressed how they felt about the experience and when they investigated the questions, what they learned about themselves as a learner, their thought process, potential changes or what they might keep the same, how their curiosity was elevated or not elevated, and when they felt confused or confident throughout the sessions. Through detailed field notes and audio-video recordings, an analysis of what happened during sessions and focus groups illuminated elements for forming groups, approaches to the question(s), processing information, and presentations. This section provides descriptions on how these students and their classmates experienced SOLE sessions. Themes that emerged during sessions from observations, participants' dialogue throughout the process, and presentations are illustrated.

**Forming Groups and Work Spaces**

Mitra (2014) encouraged learners in SOLE sessions to collaborate with one another both within their groups and outside of their groups (*School in the Cloud*, 2016). In order to facilitate Mitra's philosophy, I reminded the students at the beginning of each SOLE session what the guidelines were and that it was acceptable, and encouraged, to collaborate/discuss with members outside of their group as well as move to a different group during the session. Every week the students chose the same groups. Even when there were students missing, they still chose to work in a small group rather than merge or branch out to other groups. During a focus group after session six, Katie expressed they discussed moving groups because they were short two members: "We thought

maybe we should just combine with this group but then we were, like, they have their way of doing it and we have our way, so it's just easier to not that's how we felt". Similarly, Jordan stated, "I'm pretty sure at the beginning of our discussion we thought, oh let's join them, and then we were, like, no I don't want to do that (laughter); we just have our own group."

During each session, I observed the students worked together and formed a consistent pattern regarding how they conducted their research and put together a presentation. Beginning with the first session, the students formed groups averaging three to five students. Their groups were chosen based on the proximity to where they were sitting. Raven expressed, "It's interesting, I wonder how we went into groups that match our personalities so well. Because I don't feel like I picked people who I am just going to match with. It was random". Many of the students came into class and sat next to their friends or people they recognized from other classes, like Doris and Anna. There were a handful of students, such as Brock and Kay, who enjoyed sitting close to the front of the class, which is why they chose their seats. For the rest of the class periods and sessions the students came into class and sat at the same computer or table in the middle of the room and stayed in their same groups.

Some groups would circle around one computer, some would bring their own personal computers or tablets, some would use two computers – one for research and one for creating the presentation – and some groups had a one to one computer student ratio. While all of the group's strategies and activities were innately different in every class session, the students were consistent in choosing to organize in the exact same groups and in selecting the same computers. The member's of Sarah's group were all elementary

education majors and would immediately sit at the round table in the middle of the room. All of the students in this group brought their own computers and worked together but on separate devices. Mabel's group would either choose to sit at the back of the room on the desktop computers in a straight line, or would go in the hallway and share two laptop computers. Molly and Tara's group sat in a square formation with two groups of two students side by side, but their backs were to each other. The remaining groups would get in small semi circles around one to two computers. Although all of the groups had their own way of configuring and navigating their workspaces, within each group they consistently chose the same methods every session.

**Approaching the Question**

All of the groups had different strategies for approaching the crafted big question that initiated each SOLE session. Some students started making their presentation straight away and worked while they researched, others chose to brainstorm, and several groups chose to define key terms or breakdown the question before they began conducting research. Casey explained her group typically picked out key terms or "items that could be defined" when they began their investigation. During the first focus group after session one, Zed stated, "We, broke up the question and figured out what the question actually meant, then took our own take with it". Another student described a similar approach in his group by stating they usually "Address the entire question… we break the question down into smaller chunks…" Tara expressed their group was a little overwhelmed with the ambiguity of the question and investigative process and felt as though for the next session her group should take a different approach such as "Narrow

the topic down a little. Make it a little less broad. [Or] come up with a central idea to focus on."

I noticed towards the middle of the SOLE sessions all of the groups were putting their presentations together in the same order the questions were presented to them. In the sixth focus group I asked the students how they were processing the question and if their presentations were an indication of their learning process. Many of the groups stated they put their presentations together in this format because that's how the questions were presented to them. George stated they did not always approach the questions in a linear way, but "start with what we know the most." Raven added to this by stating, "I think when I look at the questions and I see how one applies to another question" that is how she processes at times. However, when they put their presentation together it is more "linear" and based on how the questions are presented.

The students had similar conversations within their respective groups, often asking one another questions for ideas and clarification. Raven detailed her group's thought process by illustrating the steps they went through to approach the question and investigate stating,

> We talked about every option we had. We can split up, we can look things up, we can try and find resources, we can just discuss, we can bring in personal stories, etc. It was so open ended, it was as though we could just talk about it and decide which would be the best way to get this information together.

Some students were very quiet, but always on task and contributing to the group. During one focus group session, Zed expressed, "I think our group at first, kind of, not disagree, but we had different opinions on it, so we had to, like, figure out a way we

could have one presentation but we could each have their own section." Doris said her group would keep "an open discussion going" during their investigation.

I noticed most of the students naturally assumed roles, such as note taker, researcher, image finder, and presentation maker. These roles were formed informally and independently during the first SOLE session and typically stayed the same throughout all the sessions. Zara, George, and Raven's group seemed to share roles and did not have an obvious leader. They always started with a brainstorming session that discussed interpreting the question or what presentation format they were going to use. Molly, Mary, and Tara's group used a Google document for collaboratively taking notes beginning in the first SOLE session and added to it each session. Sarah stated their group used a "scribe" to take notes while they were brainstorming and many other students in the class nodded in agreement indicating they chose this same method for approaching the question initially. One group expressed they started using a scribe to avoid missing or forgetting information discussed during their brainstorming session. Another student used the term "delegate" to describe how their group broke down the question and approached the whole investigative process.

One method some groups chose to use was to reflect on their own experiences as learners. Raven described her group's methods as going "back to when we were in elementary school and middle school" to figure out how they were going to make their presentation and what information they felt would be valuable. Similarly, another student discussed how she collaborated with the members in her group to develop their presentation saying they "talked about our own personal examples and how that worked out and that kind of like sparked what we wanted to talk about in our presentation."

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Some of the group's *modus operandi* was to assign the questions to individual group members. During the focus groups, the students expressed this was an efficient method because it helped them "understand fully what the whole presentation was going to be about" as well as assist in how they were going to present the information and make sure they answered all aspects of the question. Zed said his group always defines key terms first and then tries to find the answers, and that's what has worked best for his group.

Most of the groups chose to use the same method for every session, but there were some groups who seemed to adapt their approach to the question based off of prior knowledge or experiences with the question. For example, during session four, Molly's group changed their approach from going to straight to the internet without brainstorming, to rewording the question so they could understand it better and then find an answer. Molly explained this process by stating:

We have done every question the same - are we going to make this in SMART Notebook a PowerPoint or whatever - and then did our research and grabbed what we thought was valid then pasted it into our presentation using a keyword search… For this one we had to reword your question so we could better find the answer.

In session six, Molly explained that every week her group approached the question in a different way depending on how they put the presentation together.

**Time.** The first session seemed to be a trial session for time management. The students were not used to a SDL format so figuring out how to organize their work within the timeframe took some practice. During the first focus group, Zed expressed their group

felt a little rushed stating they were "Limited by time. It was so much information out there and just having 30 minutes or so, I put it together really quick". Brock also had similar feelings stating he felt like he was in "survival" mode because

> We had 40 minutes, or I don't really remember what the time frame was, but we didn't really discuss the value of our ideas, oh here is three let's put them out and put it on paper and let's get it into the format and go. It's just we weren't like having a philosophical discussion about lights and climate control and SmartBoard, it was like let's throw this in there and keep going. So I call that survival. I mean we weren't philosophical about it or anything we weren't thinking about how we were feeling about our choices; we were just throwing choices out on the screen.

One student expressed they began to feel behind because they weren't sure what the terms in the questions were. This seemed to happen sporadically throughout sessions as students learned how to investigate new terms as well as become accustomed to educational terms. However, as the focus group session went on, students seemed to be more confident with their time management and the "learning curve" from the previous session helped identify "strengths" within the group.

George's group was consistently looking for creative, interactive ways to present their information. The first time they created their presentation they planned to add questions and discussions to the end of their presentation, but "cut it out just for time." Zara stated they liked the idea of "engaging the whole class", but wanted to be mindful of everyone else's presentation times. After discussing instructional strategies and ways to include questions and discussions in their presentations, this group along with others in

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this section consistently strived to make their presentations more interactive and adjusted their time.

During the second session, there were some groups who got stuck on part of the question. During the focus group they expressed that they were "frustrated" and one group "spent most of our time trying to think of a third technology that we could use." Molly reflected on her group's strategies and felt their time could have been spent better if they would have started putting their presentation together earlier "because we spent the majority of our time trying to come up with our technologies, and I think it would have been better to start putting together what our presentation was going to be and then hopefully our third idea would just come along the way". Many of the students nodded and agreed with Molly's statement, and reflected on their own experiences researching this particular question. Molly also said she felt her group was "scrambling" and would have rather spent "that time working on our presentation and presenting our ideas well". However, by the third session, it seemed as though everyone had become acclimated with their time management and took up the whole time frame with very little time to spare if any at times.

In session four, I observed George, Zara, and Raven's group in particular began to demonstrate strong patterns of challenging themselves as a group. They expressed in the focus groups one of their goals was to improve their teaching as well as enhance their presentations by making them more creative and interactive each time. Most of the time this was a successful strategy, however during the fourth session they were still trying to navigate the time constraints and realized they spent too much time discussing their presentation format rather than the content. Zara said she was "stressed" because they

talked about doing all of these different instructional strategies and presentation formats then realized they only had eight minutes left and threw together a presentation "last minute." Many of the class during this session asked for more time; however, I observed it was not due to poor planning rather they were wanting a more in depth understanding of the question. The students seemed more intrigued and had more meaningful conversations while they were investigating when compared to the past sessions. Other groups, including Doris's and Zed's, experimented with different presentation formats, but would quickly become frustrated when it did not work out as it was supposed to.

There were some groups that would consistently finish early. These groups delegated work between the students, and I heard fewer conversations between them. For example, they would each be responsible for different portions of the question and creating a certain amount of slides. All of these groups used the same presentation format every time, which was either SMART Notebook or PowerPoint. Their presentations were typically less interactive and more a report of facts, rather than conceptual and creative when compared with the other groups' presentations.

**Processing Information and Learning from Others**

During the sessions and focus groups, I observed many of the students figuring out different ways they process information. I often heard discussions about connections with their other courses that they used as part of their resources for investigating the question. George reflected on how he processed information during SOLE session four stating, "I thought it was cool to learn about assessment and the background information because I can like apply it to my life right now." During the investigation, I observed George and Zara discussing how they were just reviewing this material in another one of

their classes and how this assignment was helpful to give them another perspective and apply the information.

I also observed some students preferred to write the question down in their notebook rather than continuing to read it off of the board. Both Brock and Ryan, two members of the same group, agreed this was a preferable way of reading and processing the question because they are more "old fashioned" and would rather take "notes and highlight" on paper. I noticed another student writing down information on paper rather than taking notes on the computer and she expressed this was because "That way I physically know what we are addressing versus just reading it and trying to go after I write it down and try to figure out what the question is asking."

All of the groups primarily collaborated and asked each other questions while processing information. I observed conversations within all of the groups that often included clarification of the question or an opinion on information they were gathering. However, there were little or no conversations happening between groups during the sessions. One student expressed they were "confused" so I asked if they sought ought an explanation from anyone else, but no one did. Brock explained why he didn't seek out answers from other groups stating "I don't want to admit I don't know something… I think if I was around people who didn't care what their opinion was I may have asked, what does that mean?" The students were comfortable discussing between groups during focus groups, but not during sessions.

By session six, there was a clear pattern of conversation for most of the groups. Many would begin brainstorming then working with conversations picking up about the same time points while they were investigating the question. It appeared as though the

students were beginning to articulate their ideas, research more efficiently, and understand how to ask probing questions. The focus group after session six validated my observation when Molly stated, "I think that there are different ways of collaborating then just discussing and coming up with answers for everything… sometimes, at least in my group the conversation gets shifted by the consensus, and it would be interested to see everyone's train of thought and then come together and synthesize them at the end I would like to take that approach." Raven also illuminated that her group would typically decide which part each person would present, "but we also understand that anyone can jump in at any time."

When the students began their SOLE sessions, many were hesitant for a variety of reasons. Some students expressed their concerns while others wore their uncomfortableness on their faces. My encouragement and facilitation seemed to ease their questions, but there was a learning curve for many. I observed during the first session that many of the students kept looking around the room, their body language suggesting they were uncomfortable and not confident. The presentations at the end of the first session were very fact based and straightforward. I acknowledged this observation during the first focus group, and one student in particular seemed to be very responsive and open with their reflection on both their experience during the session and their concerns. Three students in particular, Zara, George, and Raven, ended up informing a group, and their open conversations during the beginning focus groups seemed to encourage the other students to open up.

Zara, George, and Raven showed consistency in their drive to improve their research skills, understanding of content and processing information, and creating

stimulating, interactive presentations. Zara stated her initial thoughts when creating her presentation: "Is the teacher going to approve of this?" George also expressed this sentiment by building off of Zara's response stating

> Yeah… what she was talking about, having to take all of the ideas that I think I know and in a way that can be iterated that was difficult, but I also felt that is the way we were going to put that together going to be acceptable by the teacher, and so I began to feel the same way that Zara felt 'is the teacher going to approve of this?

> After Zara and George expressed their uneasiness about whether I would approve or accept of what they were doing, the rest of the class nodded in agreement and visibly relaxed as I explained this process was not about the right or correct answer, but rather the discovery of multiple answers through a variety of ways.

> Raven expressed she was also unsure whether I would approve of what they were doing or if they were even on the right track, but she both relished in it and found it a challenge. She also seemed to grasp the purpose of a SOLE instructional strategy:

> It was this weird sense of independence of we can look at it, we can not look it up, we can go with our thoughts, we can go with our personal stories; there were so many options, and none of them were wrong. We could have pursued any one of them and it would have fit the assignment; it would have been great, it would have gotten our point across. And it's like she said, it's not a feeling I'm familiar with in my other classrooms.

Another student from a different group also felt they were trying to figure out what the instructor wanted and reflected during the first focus group:

I think, I don't know if it's still because I'm stuck in traditional form of learning, but in the beginning I got stressed out about whether we were going to find the information that we were supposed to learn through the day. I was nervous, 'are we ever going to get a real answer?' Because in my mind how we grew up in teaching and learning, there is a real answer that the professor wants you to understand and so I like was nervous are we going to find this on our own, when are we going to find the real answer? But this might just take some getting used to, I think, on my part.

After the first session, many students relaxed significantly and overall there was more conversation within groups and during the focus sessions. This was even more evident when one student expressed, "I was happy that we got to collaborate with each other. I think that makes me a little more comfortable whenever I'm doing something that's sort of more open ended, like that question was." During the second session, more students began to express how although they were outside their "comfort zone," they were still enjoying the SOLE learning experience. Some students felt they were able to think "more deeply" and could foresee how they "would actually use tech in my classroom, which is honestly something that I have not thought about before today" (Focus group, session two). Sarah experienced an "epiphany" when she realized that her "teaching style might not necessarily do well with a lot of technology" and she felt technology could be used to "enhance" her teaching.

Sometimes the focus groups would last longer than the actual SOLE sessions. Most of the students were encouraged, stimulated, and readily curious to see what their peers were learning and how they would present their information. During all of the focus

groups, this was expressed by many of the students. Molly said she liked doing the research and found it "interesting to see what other students came up with and how their presentations differed or were the same as ours". Many students expressed their appreciation for collaborating within their group and open discussions during the focus groups. They felt they were able to expand their own ideas based on the "ideas and experiences" of their peers. Raven called this "grouped independence."

At times many of them agreed they only were grasping a portion of the question, but after the presentations and focus group it "opened their eyes" and they were able to see a "bigger picture" and "different perspectives", as well as understanding "why". Zed stated he preferred presentations with a lot of images because to him, "learning visually is a lot easier than going in and reading a paragraph…" Towards the middle of the SOLE sessions, one student reflected they were unsure about the topic, but "After we spoke about it as a class, it made more sense to me. Nonetheless, I learned a lot this week about the concepts we discussed… it was nice to see everyone working together to come to form our own opinions…" After a different SOLE session, a student wrote in their reflections, "I learned a lot by observing everyone's presentations this week."

## Themes from Curiosity Inventory

There are many connections within the principles of SDL, SOLE, curiosity, and adult learning. SDL and SOLE are learning environments that encourage intrinsic motivation, foster creativity, and provide activities that elicit curiosity. An adult learner is typically engaged in their learning and takes in interest in social interactions (Knowles, 1980), and through collaboration and building community, curiosity can be elevated and illuminated (Inamdar, 2004; Kashden et al., 2009; Mitra, 2003, 2004, 2014; Mitra et al.,

2005; Piaget, 1957; Vygotsky, 1978). Observing curiosity in adult learners is one way to establish how curiosity may be elevated through SOLE. A further assessment of curiosity can be discovered through a pre- and post-assessment inventory.

*The Curiosity and Exploration Inventory II (*Kashden et al., 2009) was given as a pre- and post-assessment to determine if participants' perception of their own curiosity increased from the beginning to the end of the course. All of these assumptions for a t-test were not met. The data did not have a normal distribution, the sample size was small, and there was not homogeneity of variance. Therefore, mean scores from the pre- and post-assessment were calculated for each question as well as the overall average score. The mean score for all ten questions in both the pre- and post-assessment, as well as the overall average score showed an increase in curiosity. The assessment given is in Appendix C, results from the assessment are displayed in Table 7.

*Table 7*

*Mean Assessment Scores of the Curiosity and Exploration Inventory II*

| Assessment Question | Pre-Assessment | Post-Assessment |
|---|---|---|
| 1. I actively seek as much information as I can in new situations. | 3.6216 | 3.8182 |
| 2. I am the type of person who really enjoys the uncertainty of everyday life. | 2.5676 | 2.7879 |
| 3. I am at my best when doing something that is complex or challenging. | 3.0811 | 3.3636 |
| 4. Everywhere I go, I am out looking for new things or experiences. | 3.2973 | 3.7576 |
| 5. I view challenging situations as an opportunity to grow and learn. | 3.6216 | 3.8182 |
| 6. I like to do things that are a little frightening. | 2.8649 | 3.0606 |
| 7. I am always looking for experiences that challenge how I think about myself and the world. | 3.3514 | 3.5152 |
| 8. I prefer jobs that are excitingly unpredictable. | 2.7838 | 3.0909 |
| 9. I frequently seek out opportunities to challenge myself and grow as a person. | 3.3514 | 3.8182 |
| 10. I am the kind of person who embraces unfamiliar people, events, and places. | 3.4595 | 3.5758 |
| Overall Average Score | 3.2000 | 3.4606 |

*Note.* Adapted from "The Curiosity and Exploration Inventory-II: Development, Factor, Structure, and Psychometrics," by T.B. Kashdan, M.W. Gallagher, P.J. Silvia, B.P. Winterstein, W.E. Breen, D. Terhar, and M.F. Steger, 2009, *Journal of Research in Personality, 43*(6), 987-998.

**Summary**

The purpose of this case study was to explore a SOLE experience for pre-service teachers and describe their response in relation to self-directed learning and curiosity. This chapter described the context where the study took place and presented data from SOLE sessions through detailed observations, focus groups, and participant reflections. Chapter V discussed the results of the study in relation to each research question and Knowles's adult learning theory.

CHAPTER V

DISCUSSION OF FINDINGS

The purpose of this case study was to explore a self-organized learning environment (SOLE) experience for adult learners, in a pre-service teacher educational classroom and to describe their response in relation to self-directed learning (SDL) and curiosity. The study used qualitative research methods and followed a case study design to observe pre-service teachers' learning in an undergraduate educational technology class. All data were gathered during the same semester-long time period. Seven focus groups with the pre-service teachers in the two sections of the educational technology course were recorded, transcribed, and coded to look for themes. *The Curiosity and Exploration Inventory II* (Kashden, et al., 2009) as a pre- and post-assessment to compare scores in order to describe any change in curiosity level. I was both the researcher and instructor for this course and served as a facilitator during the SOLE sessions, conducted all observations and focus groups, and led all discussions.

The participants in this study included 39 pre-service teachers enrolled in two sections of an educational technology course for pre-service teachers at a midwestern university. These students were asked to participate in the study because they were enrolled in the two sections of the educational technology course I was assigned to teach. All of the participants were pre-service teachers with a variety of teaching and learning backgrounds. Each participant was given the opportunity to enroll in a different section if

they did not wish to participate in the study. All of the students signed the consent form, giving permission to be observed, interviewed, and record their work as artifacts for the study.

The study was based on the following five research questions:

1. What does a SOLE experience look like for adult learners, pre-service teacher education classroom?

2. How does curiosity manifest in a SOLE experience?

3. How do students and the teacher experience a SOLE activity?

4. How do Knowles (1975) principles of adult, self-directed learning explain the role of curiosity in this environment?

5. What other findings are pertinent to the role of curiosity and adult self-organized learning?

The data collected during this study and presented in Chapter IV are used to respond to the research questions. The data shows how the pre-service teachers responded to a self-directed learning instructional strategy in an adult learning environment and the role of curiosity within this learning environment. This chapter analyzes and interprets the findings as well as offer suggestions for further research. This chapter is first guided by the research questions and then followed by a discussion on the implications for theory, teaching, research, and service. It concludes with a summary and its findings.

**Research Question 1: What does a SOLE experience look like for adult learners, pre-service teacher education classroom?**

The first research question regarded what a SOLE experience looked like with pre-service teachers as participants. The course was already designed to elicit collaboration and student-centered learning; therefore, the SOLE redesign was easily adapted into the existing curriculum. Thus, rather than designing a new course, I used actual SOLE principles to adapt to the existing curriculum. This process aligned with some of the current thinking on SOLE developed by Weisblat and McClellan (2017), where instead of creating a traditional SOLE Lab, with the "granny cloud" and specific class layout, existing classes in a school adapt existing curricula to include SOLE principles. Learning objectives for the course remained the same, and there was evidence the students in this study still received all of the information everyone else did in the other sections. Observations throughout the sessions illuminated many principles of adult learning theory, elements of SDL, SOLE, and curiosity. The following sections are the themes that emerged from the study and illustrate what the SOLE experience looked like.

**Collaboration and "Grouped Independence"**

The course's initial build-a-teacher activity was designed to introduce students to SDL, SOLE, and an adult learning experience. In many educational settings, as the learner matures and advances through the educational system, there is a shift from being an active participant to being told what and how to learn (Knowles, 1980; Merriam, 2001; Millard, 2007). This shift can cause the learner to be dependent on an instructor to guide their learning (Knowles, 1980; Merriam, 2001; Millard, 2007), and cause constructs of SDL to fade over time (Bronson, 2000; Merriam, 2001). Knowles (1990) emphasized the

importance of this reintroduction to self-direction and explained that providing a "brief experiential encounter with the concepts and skills of SDL helps adults to feel more secure" (p. 136). Many of the students' expressed that their experiences in higher education courses were primarily teacher-centered and the students were unaccustomed to being in charge of their own learning; therefore, having an introduction to the full SOLE experience was important.

During the build-a-teacher activity, the students organized themselves into groups, collaborated to make choices to create and present their projects, and used prior experiences to inform their project. There was slightly more guidance with this project when compared to SOLE sessions because the students were being introduced to important elements of learning in an adult environment and how SOLE sessions would operate. Many of these elements were observed through this activity. For example, the students organically used prior knowledge to influence their decisions (Knowles, 1980; Mitra, 2014) on their interpretation of an ideal teacher. The students engaged with one another through collaboration in order to create an end product. This initial collaboration and engagement in positive social interactions pervaded throughout the rest of the sessions. All of the groups asked each other questions while processing information. I observed conversations within all of the groups that often included clarification of the question or an opinion on information they were gathering. The students were not only creating satisfying relationships and building community, but their experiences through these activities enhanced their collaboration skills. A self-organized learning community, should enable learners to think critically (Sharma & Fiedler, 2007) as well as create an environment where learners can construct their own meanings and enable effective

communication with others and achieve better insights to themselves as learners (Harri-Augstein & Thomas, 2013).

The SOLE sessions served as catalysts for the students to create a positive learning community. Raven described the class environment as "grouped independence." A self-organized learning community should foster collaboration and encourage independence as well as accountability for the learners (Harri-Augstein & Thomas, 2013; Mitra, 2012, 2014; Sharma & Fiedler, 2007). Throughout the sessions, it looked as though the students were working collaboratively within their groups and building community through their presentations. Mitra (2014) explained that the SOLE experience could promote community within the learners. The positive learning community built by the students was observed through their appreciation of learning from their peers as well as through class discussions in the focus groups. On many occasions students expressed that their learning was enhanced by listening to their peers' presentations. Sharma and Fideler (2007) described these as "learning conversations" with peers and explained that these conversations are an integral part of self-organized learning constructs (p. 5). Students stated they felt they were able to expand their own ideas by viewing their classmate's different perspectives. The focus groups were often a time when students expressed what they valued learning from their peers. Molly illuminated an important aspect of collaboration that also served as a good description of how the students were building a learning community:

I think that there are different ways of collaborating than just discussing and

coming up with answers for everything… sometimes, at least in my group, the

conversation gets shifted by the consensus, and it would be interesting to see

everyone's train of thought and then come together and synthesize them at the

end.

Another example of building a learning community through engaging positive

social relationships was observed by the respect the students had for each other's ideas.

Raven discussed how her group valued each other's opinions and "understand that

anyone can jump in at any time." Zara, a member of Raven's group, also discussed that

this was a valued element in their group. Zed stated their group would often come up

with ways to incorporate everyone's interpretation of the investigation. Through SOLE

activities, students were able to collaborate, which fostered their development of working

as a community (Knowles, 1980; Mitra, 2014).

**Investigation and Computer Fluency**

An important aspect of the SOLE sessions was how the students used technology

tools to research, create presentations, and present their findings. Self-organized learning

should encourage learners to take control of their own learning by making decisions on

what, where, when, and how they learn (Costa, 2014; Harri-Augstein & Thomas, 2013;

Ricci, 2011), and reiterate the importance of allowing learners the freedom to explore and

play (Ricci, 2011). In the early sessions, Doris's groups attempted to use a new

technology tool for their presentation and she described it as "chaotic" because it took up

more time to figure out how to use the tool rather than investigate and present their

findings. Her group chose to use this tool again in the next session, and they later

expressed the process was much smoother after having become slightly more familiar with it. Zed and Lacy's group decided to switch up their tool and expressed some frustration, but they did not dwell on it because that was not the new tool was not their focus, they felt that how they presenting their findings was more important. Mitra (2014) described an important element that learners gain from SOLE is computer fluency. Further, SDL methods create opportunities for learners to organize their thoughts and apply their learning (Knowles, 1975).

There were few groups, and their presentations were always very similar in format. Their presentations were organized logically and covered all of the elements in the questions (Mitra, 2014); however, there seemed to be a lack of in depth processing of the information, which is one element illuminated when curiosity is enhanced (Kashden et al., 2009). Knowles (1975) proposed that adult learners engaging in SDL should inspire them to take control of their own learning. Further, constructivist learning theories suggest that learners learn through exploration, collaboration, and curiosity (Inamdar, 2004; Mitra, 2003, 2005; Piaget, 1957; Vygotsky, 1978); however, these very few students did not demonstrate these learning experiences. Evidence from Justin suggests this may have been the case for him, while observations of these students have informed these assumptions. The students in these groups would often come to class late and would rarely engage in focus group discussions. While these students had lengthy conversations, most of their dialogue was not directed to anything related to the course. Further, during one session, a group member state "let's just do whatever is fastest". While they covered all of the information, they were using the "big question" as a checklist and provided a simple answer to each element rather than demonstrating they were processing the

information and digging deeper. These groups delegated work between the students and I heard less conversations between them. For example, they would each be responsible for different portions of the question and creating a certain amount of slides. These groups did not express that they wanted to explore any other tools, and they demonstrated a lack of interest in creating stimulating presentations. Loewenstein (1994) discussed that curious people tend devote more attention to the process or activity. Their presentations were typically less interactive and more a report of facts, rather than conceptual and creative when compared with the other groups' presentations. This finding could be an indication that these students were not accepting this type of learning environment, their curiosity was not stimulated and they were uninterested, or there was a lack of willingness and desire to learn and intrinsic motivation.

**Groups and Roles**

The students initially sat next to people they were familiar with when they came into the classroom, then organically form groups based on where they were sitting. Taylor reflected how everyone appeared to connect well even though initially choosing their group was random. Knowles (1990) discussed how adults should be allowed opportunities to self-organize in an adult learning environment, and according to SOLE philosophy, students may change groups for each session or during sessions. Mitra (2014) discussed how children may do this naturally and described this collaborative learning environment as "organized chaos" due to them moving around the room. However, Knowles (1980) believed that children and adult learners had differences in learning assumptions and characteristics. The students in this study, appeared organized and expressed this was a preferable learning environment. The students reflected they felt

"uncomfortable" interchanging groups and were worried about offending their current group members. As previously mentioned in Chapter IV, one student stated in an early focus group they felt adding a new person to contribute new ideas to their group could provide a different perspective and enhance their knowledge; however, that never happened and was never discussed again. In fact, I observed that the ordered nature of the SOLE sessions appeared to elicit confidence within the participants and increase collaboration as well as a deeper understanding of the objectives for the course. It seemed as though there was a combination of a sense of loyalty to their group, feeling comfortable and creating a sense of camaraderie, as well as understanding each other's thought processes, strengths, and weaknesses. Knowles (1980) found that as individuals mature, they become more focused on tasks and social roles. As mentioned in chapter IV, Katie discussed that she preferred keeping the same group members because they already knew how to interact and communicate with each other. Jordan and others expressed similar feelings about changing groups. These elements of working together as a community and building relationships are important characteristics of adult learning, SOLE philosophies, and SDL.

The students expressed that they enjoyed their groups and felt a sense of community within those groups. Knowles (1975) explained SDL is a learning process conducted by individuals collaboratively or individually, in which they are "diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning strategies, and evaluating learning outcomes" (p. 18). The students' sense of comfort aided in fluid conversations between the students within their groups. It looked as though there were no discernable leaders within the groups. These roles were

formed informally and independently. The students self-directed to establish roles they describe such as "scribe," "researcher," "image finder," and "presentation maker" during the sessions. Zara, George, and Raven's group was a good example of how the roles within the group were fluid and often blurred throughout sessions. Another example of self-directed roles is Zed and Lacy's group. The roles in their groups typically stayed the same throughout the sessions, but they were chosen by themselves as opposed to delegated by one person. This was another example of how the students were self-organizing within their groups and taking control of their learning (Knowles, 1975; Mitra, 2003, 2012, 2014). Their ability to communicate within their groups and create stimulating presentations significantly enhanced for most groups. Some students recognized this learning environment as favorable to their other courses. Community is an important element of SOLE, and many students agreed this was one reason why they felt so comfortable with each other (Mitra, 2014).

**Communicating**

Vygotsky (1978) and Piaget (1973) both described communication as an important process for adult thought. Further, collaborative sharing processes assist in the construction of knowledge (Piaget, 1973). Communicating during SOLE sessions enhanced a variety of learning facets. For example, through the students' collaboration in their groups, they learned better how to articulate ideas and findings. This was observed through all of the sessions in group investigations, presentations, and focus groups. Mitra (2014) described that SOLE can allow opportunities for learners to integrate what they already know into discussions. Examples of students enhancing their communication skills were apparent in how they were discussing experiences outside of the classroom

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and bringing them into their investigations. I would often hear George and Zara discussing what they were doing in other classes and making inferences and connections. Casey, Lacy, and Brock would often talk about their experiences with tutoring or being in other educational settings and how they were able to take those experiences and integrate them into their understanding in SOLE sessions. This was one example of how the students were developing lifeline learner skills. Learners who develop LLL skills are described as being able to demonstrate their understanding through a variety of active learning strategies and integrating varying disciplines to prepare them both professionally and personally (Dunlap & Grabinger, 2003; Knapper & Cropley, 2000; Solmaz & Aydin, 2016). Other examples that were observed during sessions included students making connections between key terms in the questions. Session three asked the students what a learning ecosystem was. During the focus group, many students expressed they understood what an ecosystem was and used that knowledge to investigate how learning connected with ecosystem. Later focus sessions revealed that this was a common trend for the students.

Mitra suggested that SOLE should create an emergent learning environment. A common theme throughout the sessions was the students' increasing release of finding the "right" answer. As described earlier in Chapter IV, many students, such as George and Zara, expressed they "felt" the need to please the teacher or were "unsure" they were not finding the correct answer. By the end of the sessions, most of the students reported they were no longer consumed with the right answer, but how to find answers. Knowles (1975) stated, "It is a tragic fact that most of us only know how to be taught; we haven't

learned how to learn" (p. 14). By the end of the study, many students reflected they no longer felt unsure, and they felt they developed a different mentality on how to learn.

Justin was one of the only students who articulated he still felt like he wanted to be told what to find and how to find it. He consistently reflected that this learning environment was difficult for him because he would rather "just be told what to do." This could be due to adult learners being dependent on the instructor to guide their learning (Knowles 1980; Merriam, 2001; Millard, 2007). Knowles (1980) stated that a normal aspect of maturating is to move to a more self-directed learning process, but this process occurs "at different rates for different people and in different dimensions of life" (p. 43). Ryan also expressed he preferred a "teacher-directed" model and that he was a "traditional learner." He expressed his view of learning was that "students need to be told specifically what to do." Similar to Justin, Ryan's mentality reflects he still felt more comfortable with an instructor to guide his learning (Knowles, 1980; Merriam, 2001; Millard, 2007).

**Presentations**

The students' presentations illuminated a lot of connections between SDL, SOLE, curiosity, and adult learning. Knowles (1980) and Merriam and Caffarella (1991) suggested that adult learning environments should be constructed to promote incentive, curiosity, and engagement in self-organized learning. Through their presentations, students were enhancing their communication skills, organizing their thoughts into a concise format in order to share their findings to the group (Kashden, et al., 2009; Knowles, 1980; Loewenstein 1994; Mitra, 2012, 2014). All of their presentations demonstrated they grasped the objective for the week. According to Knowles (1980), the

process of adult learning encompasses experiences in which "new knowledge, understanding, skills, attitudes, interests, or values" is acquired and built upon existing knowledge and skills" (p. 25). As the sessions went on, evidence of a deeper understanding of content was apparent through their confidence presenting material as well as making connections between past sessions. This would occur both deliberately and organically. For example, Zara would often be presenting something and be reminded of a past session as she was presenting. Some students expressed they wanted to be more creative with their presentations. This was apparent through Zara, George, and Raven doing a class simulation as well as Justin's group making up a song.

**Positive Social Interactions**

Knowles (1984) described the role of the instructor in an adult learning environment as a "facilitator of learning" who encourages learners to use a range of multiple resources, including their peers, to learn. All the students demonstrated positive social interactions throughout the entirety of the SOLE sessions. During the sessions, the students respected their peers' opinions and found ways to incorporate everyone's interpretation. The students made observations about themselves and expressed they not only enjoyed hearing from their peers, but they were learning to learn from one another. One student stated, "I think our group at first had different opinions on it [the question] so we had to figure out a way we could have one presentation, but we could each have their own section." As mentioned in Chapter IV, Zed also shared that his group had a similar experience and that his group chose to "figure out a way we could have one presentation but we could each have their own section." Other groups had "open conversations" or brainstorming sessions," as described by Doris and George. This was

an important revelation for how the students were processing their information. Knowles (1980) described adult learners as having an interest in social interactions. Mitra also prescribed SOLE as a catalyst for positive social interactions and collaboration. Further, SDL, SOLE, and curiosity should all elicit satisfying social relationships. The sense of comradery and building positive social interactions was also observed through some students arriving early to class to hang out with group members prior to class starting. Zara and George did this frequently and would have meaningful conversations about their lives as well as touch base on activities and assignments in other course.

**Research Question 2: How does curiosity manifest in a SOLE experience?**

In order to observe how curiosity may manifest in a SOLE experience, *The Curiosity and Exploration Inventory II* and observations were conducted to explain this research question. Below are findings from the inventory and a discussion of curiosity observations during SOLE sessions.

**Curiosity Inventory**

The Kashden et al. (2009) *The Curiosity and Exploration Inventory II* was used to explain any possible changes in curiosity level. The mean score for all ten questions in both the pre- and post-assessment, as well as the overall average score showed an increase in curiosity.

**Observational Data**

Observations and focus groups throughout the sessions revealed many ways students experience curiosity during a SOLE session. Many of the ways curiosity manifested in students were described through during focus groups and person reflections at the end of sessions.

**"It Got Me Curious".** One central facet to curiosity is when learners explore and actively seek opportunities for new information (Kashdan et al., 2009). During the focus groups and personal reflections, students expressed curiosity by stating they were "interested" to see how their peers would interpret and present the question. Many students expressed the diversity of the presentations paired with how everyone was interpreting the information was valuable and increased their interest on the topic. Sometimes the students would reflect they were curious about why their peers were choosing different aspects of the content and were curious to understand what their peers thought processes were. Further, some students wanted to see how they could use concepts in other presentations and make them their own. Rylee stated, "It got me curious about why they chose each thing that they did and how I could use their ideas in my own way".

Students' expressed their curiosity was elevated and in some cases not, in correlation with the questions for each session. Another central facet of curiosity is embracing the unknown and ambiguous nature of daily life (Kashden et al., 2009). Many students expressed why their curiosity was elevated in some cases stating they were unfamiliar with the concepts the questions were asking or it got them thinking about how they would use these concepts in their own classroom. Kay expressed multiple times that her "curiosity was elevated" because she was beginning "to see the different ways to use things" through this SOLE process. This was also expressed by many of her peers throughout the sessions. Many others students often commented on how the concepts they were learning in class could translate their own instruction.

**Trying New Tools.** An important element of curiosity is the learner's ability to process information in depth (Kashden et al., 2009). Molly's group is one example of how curiosity may have manifested in this way. As described in Chapter IV, Molly and her group were approaching the question the same way each session, but they began using different strategies to "better find the answer." Strategies they used were rewording the question and approaching the question in a different way depending on how they were presenting material. This happened in several groups throughout the sessions. Raven, George, and Zara often used this strategy, as did Sarah and Casey's group. One of the goals for Sarah and Casey was to challenge themselves to explore different tools and discover how they could use it to process the information more deeply and present it in a creative way.

**Actively Seeking and Digging Deeper.** Curiosity plays a fundamental role for fostering learning and motivation (Kashden et al., 2009). After the last SOLE session, Kay stated in her reflection, "My curiosity was elevated through the process to see the different ways to use things." Students would also express curiosity during the focus groups about what they were researching, how it made them think deeper, and "caught" their "attention." Learning, exploring, and immersing in an activity are innate traits of curiosity (Kashdan et al., 2009; Loewenstein 1994). Also, the ability to think deeply is a central facet of curiosity as well as part of the SOLE mentality (Kashdan et al., 2009; Mitra, 2014).

Students expressed curiosity in response to the question for that session. I observed some students would be more intently researching specific questions they were more interested in or found to be challenging. After one session, students expressed their

curiosity on different seating arrangements in classrooms and if this would make a difference in the class climate. One element of curiosity is that it requires pre-existing knowledge by students' acknowledging there are gaps in their knowledge (Loewenstein, 1994). A SOLE encourages curiosity, facilitates social interactions and choice, and provides opportunities for learners to construct knowledge from what already know (*School in the Cloud,* 2016). This instance demonstrated that not only were the students discussing the arrangement, they were also discussing how they wanted to conduct more research on the topic. Many were sharing information they had already done research on and asking each other questions about their own experiences. Kay asked, "Has anyone ever been in a class where maybe the teacher or the class seating arrangement was random? I would never come in this class in what I perceived was somebody else's seat." Many students agreed with this, and one student responded, "It would be very interesting, I've never seen it. I mean would we come out of here with 20 new friends, or would we come out of here no different, I mean I'm curious."

By encouraging students to discover and motivate their learning, curiosity can be a catalyst for a desire to learn and fill information gaps (Lowenstein, 1994). The SOLE sessions allowed for students to discover new concepts that helped fill gaps. Brock was a student who consistently used the term "curious" throughout every session. His curiosity seemed to manifest in many ways. Brock described he was interested to dig more deeply into certain topics, primarily ones he was not very familiar with. Through the sessions, he was able to fill in these gaps. He seemed to recognize this in himself as a learner, and his curiosity appeared to continually be a catalyst for his learning (Kashden, et al, 2009; Knowles, 1980; Mitra, 2014). Brock expressed that some questions made him curious

about different teaching methods and how he could incorporate strategies into his own classroom. He enjoyed learning with his peers and developing presentations that were creative. Brock and his group would often use the same technology tool to put their presentations together, however, they often used images in a creative way to convey their findings. Brock and his group also consistently interpreted the question in a different way than most groups, and expressed they wanted to dig deeper, be more creative, as well as explore different perspectives and instructional strategies. Brock articulated that he was very eager to learn and was often intrinsically motivated. This is an example of how natural curiosity appears in some learners (Stansberry, Thompson, Dalpias, & Hathcock, 2015).

**Feeling Challenged and Outside of Comfort Zone.** Kashden et al. (2009) discussed a key element in a curious learner is that they feel challenged and enjoy learning outside of their comfort zone. The students in the study did not specifically express they enjoyed learning outside their comfort zone or thriving in challenging learning environments, however, their personal reflections would often allude to their growth in this type of learning environment. Knowles (2011) discussed that adult learners engaging in SDL encourages the process of learning evolving into positive learning habits, developing knowledge, and enhancing attitudes. One example is Cara. She was visibly nervous during the first session, however during session three she stated,

> This week was different than other weeks. It seemed more relaxed, and all the different presentations were unique yet highly enjoyable. I become more and more comfortable in the environment every week. I look forward to coming to this class.

This was a common theme in the early sessions with many of the students. The uncertainty faded for them over time, and they expressed their view of challenging themselves had shifted as well. That even though the SOLE learning environment was different than what they were used to, this did not mean they were not able to learn just as well and, in some cases, demonstrate a more in-depth understanding of the content. This was revealed in many of Zara's reflections, "I feel like I grew because I did something that was slightly out of my comfort zone." This is an example of both how Zara was demonstrating enhanced curiosity as well as how she was growing as a person.

**Personal Growth through Cognitive Dissonance.** SOLE should naturally elicit curios tendencies in learners as well as enhance their want for discovering new knowledge for personal growth and lifelong learning (Mitra, 2014; School in the Cloud, 2016). Further, Kashden et al., (2009) described personal growth as an important element of curiosity. Several students also discussed how they were "curious" about where SOLE would take them in their learning. After the first SOLE session, some students reflected they were uncertain they could learn in a student-led learning environment, and were curious to see what the following SOLE sessions would look like for their learning. Being outside their comfort zone was challenging for them. Rylee seemed to be one of the most hesitant students at the beginning of the sessions. She stated she did not do well in a learning environment that "lacked structure." However, a self-reflection towards the end of the SOLE sessions revealed she was beginning to understand the concept of student-directed versus teacher-directed, and that did not necessarily mean there was not structure; it meant she was in charge of her learning. Further, she expressed she enjoyed making these decisions for herself and felt she really grew as a learner. Evolving as a

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learner into being more dependent and self-directed are central aspects of the adult learning process (Knowles, 1980).

Many stated they enjoyed the SOLE learning experiences and looked forward to the next session. After the last session Rylee worked by herself for the first time during the sessions and expressed, "I think that my curiosity was elevated in that I had to work by myself to come up with my own individual creativity… for this specific project I felt like the uniqueness was necessary for developing my own understanding as a learner and a teacher." Becoming more independent as a learner is part of the adult learning process (Knowles, 1980). Further, SOLE learning supports exploration and enhances curiosity through the learner engaging in activities that sparks creativity, curiosity, and inspiration (Inamdar, 2004; Mitra, 2003, 2004, 2014; Mitra et al., 2005; *School in the Cloud*, 2016).

Another common element that was revealed through the SOLE sessions was students' curiosity on how educational technology concepts would fit in their classroom. Making connections to real-life are part of being an adult learner and an important element of curiosity (Kashdan et al., 2009; Knowles, 1980). Sarah reflected in an early session she initially felt technology did not have a place in her classroom, however, after the first couple of SOLE sessions her understanding of educational technology was more clear and she expressed she was now "excited" to see how it fit into her pedagogy. Students also expressed their curiosity "sparked" excitement and encouraged them to want to learn. Cara stated she was eager to "learn all about the different ways to teach different students and how technology would help. The more that we did the more excited I got for the future." Other students stated their curiosity was elevated each time one of their peers presented. George's consistent personal reflection revealed he was

growing through the SOLE sessions. After the third SOLE session, George reflected,

"I've learned about growth mindset the most during this presentation. I am able to make

mistakes and continue to grow after making them."

**Research Question 3:  How do students and instructor experience a SOLE activity?**

There were a variety of ways that both students and the instructor jointly

experienced SOLE activities. Many elements of curiosity and principles of adult learning

(Knowles, 1975) were observed as part of the students and instructor experiences during

SOLE. Below are descriptions of first how students and instructor experienced SOLE.

**Students**

**Hesitancy.** From the first session, I observed hesitancy within all of the students.

Knowles (1990) explained that many adult learners may be hesitant to learn in a SDL

environment. Zara, George, and Raven expressed their tentativeness because they were

"nervous" or unsure whether or not I would approve of their presentation. During the first

focus group, Ryan stated he was nervous in this type of learning because he was used to a

more "traditional" format and it "stressed" him out because he was unsure his group

would "find the information that we were supposed to learn." This seemed to be a shared

sentiment of many students. During the first focus group, these concerns were addressed,

and as the sessions went on, the hesitancy seemed to disappear and many students felt

very comfortable learning in SOLE. Further, many expressed they preferred this learning

environment. One student stated,

> I felt like I was part of a learning community. Because I really felt like in this
>
> classroom, everybody came together for the question to get more knowledge out
>
> of it. And I really felt like we did that as a class.

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This transition in the students' attitudes and feelings towards SOLE may describe how an adult learning environment with SOLE activities can help students feel more comfortable and benefit more from their learning (Knowles, 1975).

  **Self-Discovery.** By providing opportunities and empowering students to take control of their learning, they may develop self-confidence (Knowles, 1975) and enhance self-discovery (Knowles, 1980; *School in the Cloud*, 2016). Many students demonstrated their self-discovery in areas of their teaching and learning. It seemed as though their engagement in self-directed methods and collaborations assisted in developing their understanding of themselves as a learner. Evidence of this was observed through their understanding of how to integrate technology into their instruction. Many students often reflected they learned about themselves through investigating the question, presenting their findings, as well as their peers presentations. Most of the students' confidence in teaching in front of the class increased as the sessions went on. Many students did not have any teaching experience prior to taking this course, which can make students nervous when teaching in front of their peers for the first time. This could be an indication of their self-discovery within the teaching profession.  There were less sentence fillers such as "um," an increase in eye contact, louder speaking voices, and an increase in personal reflection and peer feedback.

  One student who appeared to be consistently improving her teaching was Zara. She demonstrated elements of self-discovery in all of the sessions. She was shaking slightly during the first session, but after she relaxed and understood how the course was going to function she was much more confident in her learning and development. After every session, Zara reflected on what she did well and how she could improve her

instruction. She would acknowledge her strengths and recognize where her group could increase the effectiveness of their instruction. Knowles (1980) discussed the importance of adults being involved in their learning by setting goals and evaluating their own learning outcome.

Raven was also someone who demonstrated elements of learning with self-directed methods resulting in an increase self-concept. After the first session her confidence in working with others and trusting her group significantly increased, and she gradually began consciously improving her teaching to the class. Raven was interesting because she evolved and adjusted to a SOLE environment, which allowed her to learn about herself even more as a learner. She was able to work with her peers and release the reins when needed, take charge and provide her valuable insight when appropriate, and was diligent in working by herself in other coursework throughout the semester. She learned to value SDL as well as understand where it fit into her life as a learner as well as an educator.

One student who surprised me was Mabel. She was always a leader within her group, but when it came to the group discussions in the earlier sessions she was typically quiet, and it appeared as though she was not fully grasping the concept. By the end of the second session I noticed a subtle change, which was validated in her reflection at the end of the class. She said, "I enjoyed this type of work because I liked the creativity behind it and the openness for the project." Mabel seemed to grow even more by the end of the third session when she said,

As a group, we enjoyed doing a song because it provided our classmates a

different way to look at the material instead of more conventional ways. This was

by far my favorite question so far because it seemed more fun than the prior ones.

Mabel's self-concept was elevated through personal investigation as well as the

familiarity and comfort of working with a group.

Cara also seemed to increase her self-concept and self-discovery through a SOLE

experience. The first couple of sessions, I observed a confused look on Cara's face. When

she presented her presentation after those investigations, she seemed as though she was

unsure about what she was talking about and was soft spoken. She also referenced the

board frequently to check what she was saying. Session three seemed to be a turning

point for Cara. She expressed,

This week was different than other weeks. It seemed more relaxed, and all the

different presentations were unique yet highly enjoyable. I become more and

more comfortable in the environment every week. I look forward to coming to

this class.

At the end of the sessions, Cara was confident contributing to focus group discussions,

comfortable asking questions, and seemed to work harder when investigating the question

to challenge herself. Knowles (1975) proposed that SDL in adult learning could foster

confidence and take control of their learning

Zed and Brock both came into class with self-confidence. This was observed

through their willingness to not only contribute to class discussions, but also to lead

discussions. Zed demonstrated self-confidence through his ease of working with others

and talking to the class. However, at the beginning sessions he seemed to be less

confident with his findings from investigating the question. As the sessions went on, Zed's confidence and curiosity seemed to be elevated. This was observed through an increased interest in topics we discussed in class; more verbal about how he was processing information, and more in depth presentations. Towards the end of the SOLE sessions, Zed also began to integrate his other coursework into his presentations and connect them to the content we were learning in class. An example of Zed's self-concept becoming more self-directing was through his academic work: one day both members of his group were absent, but he chose to work alone and expressed he wanted to challenge himself and felt confident he would be able to investigate the question on his own.

**Collaborative experience.** Many elements of enhanced learning were observed through collaboration during the sessions and seemed to manifest in an amalgamation of ways. Students expressed they enjoyed collaborating with each other because it made them "more comfortable" when approaching an "open ended" question. During the first focus group, one student said

> Sometimes whenever I am doing all of the work myself, I'm not sure what direction I should go and may be getting off track, but whenever I get to work and talk with other people then we can bounce ideas off of each other come up with what we feel is the best product.

Raven described it as a "group conscious". Knowles (1975) described SDL instructional practices where the role of the instructor becomes a facilitator, adult learners are intrinsically motivated to become more self-directing and take initiative for their own learning as well as make appropriate strategic learning decisions. During every focus session, one or more students expressed they enjoyed and valued the collaboration and

freedom they were having with their peers through both group work and presentations. For instance, there were often times students who felt uneasy about answering the question, but once they heard from the rest of the class they felt they fully understood. During one of the focus groups, a student expressed they were confused about the questions, but "watching everyone else's presentations just opened my eyes." This is an example of Mitra's SOLE philosophy. Within a SOLE learning environment, self-discovery and open mindedness should be experienced by the students. During an early focus group, one student described an "aha moment" while listening to the other groups present their findings, which also seemed to be a shared sentiment by many of his peers.

I also observed the students were motivated through exploration of different technology tools for a variety of uses. This was observed during the SOLE sessions and seemed to carry over into their teaching teams. Zara stated

I felt it was almost like we knew the answers kind of, but we were able to manipulate them in a way that we were able to get the point across. And kind of like mold our own presentation and mold to our own teaching styles.

They were very good at articulating their thought processes, insecurities about technology tools, and presenting their materials (Knowles, 1975; Mitra, 2014; *School in the Cloud, 2016*). They "valued" this time to talk it through with their peers. One student stated, "I've noticed that if we, as a group, don't enjoy putting the presentation together, the class does not have very much fun watching it either."

**Enhance learning through personal experiences.** A significant element of an adult learner is their ability to use their own experiences to enhance their learning (Knowles, 1975). As discussed in Chapter IV, Raven, Zara, and George consistently used

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prior experiences to investigate and put together their presentation. Other groups discussed they often used "personal examples" from their past to add another dimension to their presentations. One student stated the SOLE labs were "enlightening" and understood how the information in the sessions were beginning to link together stating it was "interesting."

I observed many students enjoying the learning experience through SOLE. Their work, confidence, and body language all demonstrated they were comfortable with the process and their learning was enhanced. Zara seemed to consistently want to improve her group's presentation as well as challenge herself as a teacher. Many times she would express this in the focus groups and it was often a highlight in her reflections. After session three she said, "I'm really glad that my group took our presentation in a new route this week. I felt more creative, and I feel like I grew because I did something that was slightly out of my comfort zone." These observations are examples of SDL, SOLE, and curiosity. Further, Zara's technology skills were enhanced through her drive to explore new technologies and presentation formats. Several other students seemed to experience a similar enhancement of technology skills through SOLE exploration and being persistent until they felt their goals for that tool were met (Loewenstein, 1994).

According to Knowles (1975), learning through self-directed methods can enhance retention and help students feel comfortable taking control of their own learning. I observed this in the students with content we were learning as well as developing teaching methods. During focus groups students would often make reference to previous SOLE sessions and made connections between content in those sessions. I observed students' retention of content during their presentations as well as a heightened sense of

self-confidence. A good example of this was in one of the later sessions, Zara, George, and Raven described they were able to present material they learned without referencing the board the entire time, and this experience helped them process the information they were investigating. Their body languages and tones of voice suggested they were confident in approaching the questions. Zara validated this by stating they just "tackled them [the questions] all at once" and each of them felt confident presenting the information. Other students expressed in their reflections that SOLE was an "effective" way to learn, and they valued they were able to "take control" of their own learning (Knowles, 1975; Mitra, 2014; *School in the Cloud, 2016*).

Out of all of the students, Justin was the only student who verbally expressed multiple times that he did not see the point of having technology in the classroom. His view on technology never faltered. He expressed this could be because he grew up in a school that did not use technology and he was happy learning without it. Justin's body language indicated that he was not interested in learning about technology. He would consistently arrive to class late, always sat at the back of the classroom, and would sit with his arms crossed and unengaged. Throughout the sessions, Justin appeared to show more engagement when discussing with his peers during the investigative process, but continued to be quiet during focus group sessions. After the last session, Justin stated,

> The SOLE process to me made it hard to retain the information because I feel like I need to be told what information is relevant and this type of education doesn't appeal to me. That being said, this week was better about it.

Justin's lack of interest in SOLE experiences could be an indication that his curiosity was not enhanced through this process, that he was not comfortable learning in SDL, or he

was not accepting of this type of learning environment (Kashden, et al., 2009; Knowles, 1975).

**Instructor**

As an instructor, I experienced SOLE in both similar and different ways than the students. There were characteristics I experienced as an adult learner such as an increase in self-confidence, incorporating my life experiences, and learning from others (Knowles, 1975, 1980; Mitra, 2014; *School in the Cloud, 2016*). I have always been knowledgeable and understood self-directed learning methods as well as student-directed instructional strategies, but most of this was theory based. My self reflections during SOLE revealed an increase in confidence with facilitating SDL environments (Herrington, Hmelo-Silver, 2004; Knowles, 1975; Loyens, Magda, & Rikers, 2008; Mitra, 2014). After the first sessions, I experienced an increase in self-confidence in asking probing questions and recognizing elements of SDL in an adult learning environment. Facilitating the SOLE sessions helped shape my pedagogy.

During SOLE, I found incorporating life experiences into the SOLE sessions were ways to enhance the learning experience for myself as well as the other students. Knowles (1980) described an important part of the adult learning process is to consider experiences. I often referenced my previous experiences as a learner and instructor to enhance the SOLE sessions. Examples of this were my experience as a learner in elementary school, student teaching, and substitute teaching. I also used my experience as a graduate student to help articulate what an adult learning environment looks like in an educational setting.

Another way I experienced SOLE as a teacher was learning from the students, making

me part of the learning community (Harri-Augstein & Thomas, 2013; Mitra, 2012, 2014;

Sharma & Fiedler, 2007). As previously outlined, the students repeatedly expressed their

appreciation and increased understanding of concepts through their peers. According to

SOLE philosophy, collaboration was an imperative element in the SOLE process (*School*

*in the Cloud,* 2016). The reasons for this were illuminated through my enhanced

knowledge of concepts. While I taught the content previously, as well as studied it as a

student, I still felt as though the students and I were co-learners. Further, I also learned

more about how adult students learn.

Another indication that the students and I were co-learners and part of the same

learning community was towards the end of the SOLE sessions. I noticed that when a

student would ask me a question, there would be others who felt comfortable answering

those questions for me. They also felt comfortable engaging in conversations with me

about phrasing of the "big questions" and ways to make it better. These observations

could indicate that students involved in an adult learning environment that facilitate self-

direction can foster self-confidence and positive collaboration. I was consistently

modeling how to give and receive constructive feedback in an educational setting, and I

observed by session three the students were comfortable engaging in discussions with me

about how to improve the sessions.

**Research Question 4: How do Knowles' (1975) Principles of Adult, Self-Directed**

**Learning Explain the Role of Curiosity in this Environment?**

Many principles of adult, self-directed learning were observed during SOLE

sessions, and further illuminated how curiosity may be elevated during SOLE

experiences. One student expressed that SOLE sessions "makes me curious to find out

and dig more" (Kashden, et al, 2009; Mitra, 2014; *School in the Cloud, 2016*). This was

often a sentiment shared by students throughout the sessions. During and after SOLE

sessions, students expressed their interest in learning through SOLE and appreciated the

uniqueness of this learning environment within a college classroom setting (Knowles,

1980, 2011; Millard, 2007).

Tara stated, "I found this process very different and interesting." Molly expressed

her excitement by saying, "I really enjoy this new way of instruction, and I'm excited to

see how this class adjusts to SOLE and what we all take away from it!" Cara seemed to

represent many of the classmates' enthusiasm when she stated, "I really enjoyed how this

class is set up! It is unique and awesome!" Their eagerness to learn in an environment

that employs adult learning elements with SDL methods is an indication that they were

curious (Kashden et al., 2009; Knowles, 1975; Mitra, 2014). Brock was also someone

who seemed to thrive and was eager to engage in SOLE sessions. He consistently

enjoyed the challenge and expressed he was encouraged to investigate by concepts he

was not familiar with to learn more. Brock stated the unknown was "exciting" to him.

Cara was also consistently demonstrating growth throughout the SOLE sessions, and her

body language and discussions seemed to show curiosity. She validated this in her last

reflection when she said, "This whole SOLE process has taught me to think curiously and

explore questions that I would not ordinarily do. This process made me question how I

look at questions and different ways to think outside the box." Cara was actively seeking

out and willing to continue her learning through exploration, which are all principles of

adult learning, SDL, and curiosity (Kashden, et al, 2009; Knowles 1975; Mitra, 2014;

Solmaz & Aydin, 2016).

Creativity, taking control of their learning, and engaging in activities that promote

curiosity were all enjoyable elements of SOLE for the students. Zara, Raven, and George

seemed to thrive with the freedom to present their findings in a way of their choosing.

Doris and Anna's group wanted to explore different tools every time, and this seemed to

be their strong point and where they grew the most. Mabel, Cara, and Justin's

presentation was typically very similar each week, but the one week they created a song

seemed as though they enjoyed the session more than the others as well as demonstrate a

deeper understanding. Casey and Sarah created a lesson plan to demonstrate both their

creativity and how they were learning for a purpose.

Being a lifelong learner derived from contextual learning experiences is a

principle of adult learning (Dunlap & Grabinger, 2003; Knapper & Cropley, 2000;

Knowles, 1975; Solmaz & Aydin, 2016). One student stated, "It's more important to

learn how to think than it is to improvise. Because if you can learn how to think, there are

so many resources that are out there." Mitra (2014) emphasised the importance of

learning how to learn, and how SOLE is a natural way to develop this self concept as a

learner. Brock, George, Zara, and Casey all described learning how to learn as important

characteristics for a learner, and that SOLE may be a way to facilitate this in their

classrooms. Casey described the SOLE process as helping her "think curiously" and

recognized this as a valuable tool to use in her own instruction. Through the SOLE

experience, these adult learners were learning about themselves as learners and how these

methods can facilitate lifelong learning as well as encouraging their curiosity was

elevated (Dunlap & Grabinger, 2003; Knapper & Cropley, 2000; Kashden, et al;, 2009; Knowles, 1975; Mitra, 2014; Solmaz & Aydin, 2016).

**Research Question 5: What Other Findings are Pertinent to the Role of Curiosity and Adult Self-Organized Learning?**

**Shaping Pedagogy**

One of the most enlightening findings was that the students developed a concept for how this experience could shape their pedagogy. Many elements within SDL, curiosity, SOLE, and adult learning constructs discuss how experiences in these learning environments can shape the learning process (Kashden, et al, 2009; Knowles, 1975; Mitra, 2014). At the end of the last session, George reflected, "Overall, the SOLE labs were enlightening. It is one thing to be taught new pedagogy, but it is an incredible experience to be a student in the new pedagogy." Casey expressed she valued her freedom to develop her ideas and how this process taught her to,

> Think curiously…[and] this process made me question how I look at questions and different ways to think outside the box. I would use this process in my elementary classroom but maybe shorten the time and not give such free reign on what kind of presentations they could do, I feel like with elementary children structure is needed.

George and Casey are both examples of how they gained insight to themselves as learners (Harri-Augstein & Thomas, 2013) through their SOLE experiences (Knowles, 1975; Mitra, 2014).

Casey was an example of how the SOLE experience can aide in developing an understanding of how SDL, SOLE, and curiosity can be integrated into her own

instruction. Many of the other students also expressed they would "love" to set up a SOLE lab in their classrooms stating it would be great for children. These students also made comments about ideas on how to adjust it to their classrooms needs. Raven said she valued SOLE and could envision using this in her classroom by

> Introducing units in order to see what areas of a topic students get most curious about and what areas that some may already be familiar with as well as at the end seeing where else this topic could take them in relation to real world applications.

Learners who develop LLL strategies should be able to demonstrate how they integrate varying disciplines to prepare them both professionally and personally (Dunlap & Grabinger, 2003; Knapper & Cropley, 2000; Solmaz & Aydin, 2016). Also, curiosity in learners should elicit a thirst for seeking out knowledge (Kashden, et al., 2009). Zara also indicated she would like to further her knowledge of SOLE by conducting her own research on the topic (Kashden, et al, 2009; Solmaz & Aydin, 2016). Further, within a self-organized learning community, the learning fosters critical and reflective thinking in relation to "self, knowledge, and the world" (Sharma & Fiedler, 2007, p. 4), and creates an environment where learners construct their own meanings (Harri-Augstein & Thomas, 2013).

**Peer Team Teaching**

During the second portion of the course, the students engaged in their peer team teaching activities. During this time, students demonstrated their learning with the SOLE experience through their eagerness to explore in a variety of ways of teaching and assessment in their peer team teaching. As outlined in chapter IV, the peer team teaching assignment includes the development of a pre- and post-assessment, lesson, and a self-

reflection. All of the teams chose to create assessments that were open-ended questions as opposed to using multiple-choice questions as teams had done in previous semesters. Further, the students added a focus group session or some type of self-reflection element to their post-assessment, similar to our SOLE sessions, which was not outlined in the assignment nor had it been an element students had done in previous semesters. Another example of students developing their teaching methods and instructional strategies was demonstrated when one teaching team decided to use SOLE as a teaching method for their lesson. These findings are an indication that through SOLE experiences, the students felt confident in their ability to choose their learning strategies (Dangwal, Jha, & Kapur, 2006; Mitra & Rana, 2001)

I observed that after the students had participated in SOLE sessions, their confidence in creating lessons and teaching it to the class appeared much higher when compared to my students in the past. How prepared they were for the lesson, their understanding of how to engage their peers through stimulating material, their ability to command the student's attention, and their ability to receive and give constructive feedback were evidence of this. Their body language and the flow of the lesson were much more refined and their reflections at the end of their teaching demonstrated a more intrinsic view of what was going on in the class. This evidence could demonstrate that students involved in SOLE sessions experience elements of SDL, curiosity, and adult learning and are able to apply these to their own teaching and learning (Kashden, et a.l, 2009; Knowles, 1975; Mitra, 2014; Sharma & Fideler, 2007).

**Implications**

Findings from this qualitative case study have implications for theory, research, and practice. Below, examples of these implications are provided.

**Implications for Theory**

Knowles's (1975) principles of adult learning provided the theoretical framework for this study. This study contributed to the adult learning theory by focusing on how pre-service teachers learn through SOLE practices adapted for adult learners, which had not been done previously. Findings from this study suggested how curriculum specifically designed to foster adult learning could be a preferable method for students when compared to their more teacher-directed courses. Principles of adult learning were observed throughout the sessions, and showed how an environment designed with andragogy can enhance an understanding of how adults learn. Further, findings from this study demonstrated that facilitating an adult learning environment for pre-service teachers shows relationships between elements of SDL, SOLE, curiosity, and principles of adult learning. This study aided in validating how SOLE methodology can be an effective instructional strategy for adult learners. Future research on how to design adult learning environments based off of these principles could aide in the instructional practices of universities and enhance the adult learning experience.

**Implications for Research**

This study adds to the body of literature on both SOLE and adult learning. The research was conducted with an adult population, whereas other published SOLE research studies have been conducted with children. Findings within the study indicated that undergraduate pre-service teachers valued the SOLE experience and were eager to

implement SOLE principles into their own instruction. Future longitudinal studies could explore how these SOLE experiences with pre-service teachers impacted their pedagogy as teachers. Conducting another study could provide a deeper understanding how pre-service teachers experience SOLE in an adult learning environment and how those experiences influence other areas of their lives.

Another area for future research is designing a study for post undergraduate students such as graduate students and in-service teachers. A similar qualitative case study with a different age group who have been in the teaching profession could provide a deeper understanding of how adult learners experience SOLE. Observing how graduate students respond in a SOLE could provide further implications for SOLE research with adult learners. Discovering how graduate students experience a SOLE could add to the body of research for SOLE, adult learning theory, and teaching pedagogies. Details from this study could describe how teachers can learn how to enhance or add to their teaching pedagogy.

**Implications for Practice**

SOLE is valuable in bringing SDL, curiosity and AL together for a learning experience that works well adults. In this study, transforming existing curriculum for pre-service teachers and transforming it into an environment that fosters SDL, curiosity, and principles of adult learning elicited positive learning outcomes. Other pre-service adult learning courses could be constructed to adapt adult learning principles and SOLE philosophies into the existing curriculum.

**Implications for Service**

In order to provide SOLE learning opportunities within adult learning environments, instructors must be aware and understand how to implement both andragogy and SOLE principles in their curriculum. One way to accomplish this is through workshops. There is a need for instructors at higher education initiations to provide opportunities for students that are more student-led as opposed to teacher-directed. By providing a training workshop to higher education faculty, instructors across many disciplines may learn how to implement SOLE into their curriculum. Further, in-service teacher workshops for teachers in K-12 classrooms can also provide dynamic to their instructional practices.

**Conclusion**

The purpose of this case study was to explore a SOLE experience for adult learners, in a pre-service teacher education classroom and describe their response in relation to self-directed learning and curiosity. This study observed 39 pre-service teachers in two sections of an educational technology course at a Midwestern University.

All data were gathered during the 2016-2017 academic year and included a pre- and post-curiosity assessment, seven focus group sessions, observations, students' work, and students' reflections during one semester of the course. The results from *The Curiosity and Exploration Inventory II (*Kashden et al., 2009) were calculated to find the mean of each question as well as an overall pre- and post-assessment average. All other data were recorded, transcribed, and coded to look for themes.

The findings revealed the pre-service teachers experience through SOLE demonstrated many elements of SDL and curiosity, adult learning. Further, findings

described that using adult learning principles as a guide, learning was enhanced by many of the participants in the study. Findings from the *The Curiosity and Exploration Inventory II (*Kashden et al., 2009) suggested curiosity was slightly enhanced through SOLE in an adult learning environment. When adult learners are in learning environments that model principles of adult learning, the learner may encounter more favorable learning experiences. Elements of SDL, SOLE, curiosity and adult learning were analyzed for the pre-service teachers to determine how these elements manifested and were supported, or not supported, in an adult learning environment. Other findings from this study indicated that students' curiosity may have been elevated during SOLE, and further research is suggested on how curiosity may manifest in adult learners in this type of learning environment.

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APPENDICES

Appendix A
Script for Recruiting Participants


Hello, my name is Cates Schwark.  I am a graduate student at OSU in the

Education Department. I am conducting research on self-directed learning and curiosity

in adult learners.

Participation in this research includes taking a curiosity inventory and participating in

a self-organized learning environment. The study is built into the curriculum enabling

you to learn in a creative and innovative way about technology and how you might use it

in your own classroom. The content will be the exact same as the other sections, but the

way it is presented will be different. You will be involved in self-directed, collaborative

learning with your peers. Each class will follow the same schedule, but the content and

technology used may differ. There will be no time commitment outside of the course.

Your participation is voluntary, and will not affect your grade in this course.

Informed Consent

**Title:** Examining Self-Directed Learning in an Educational Technology Class for Pre-Service Teachers: A Qualitative Case Study
**Investigator(s):** Cates Schwark, M.S., Oklahoma State University Graduate Student, Educational Technology
Dr. Susan Stansberry, Ph.D., Oklahoma State University School of Educational Studies
**Purpose:**
The purpose of this case study is to explore the role of curiosity in an adult self-organized learning environment.
**Procedures:**
This research study is administered in two sections of the first nine weeks of an undergraduate educational technology course. Participation in this research will involve participation in SOLE sessions, focus groups, a pre- and post-curiosity inventory, and observations. Each SOLE session will last approximately one hour to one and half hours. You will be expected to participate in the SOLE sessions and focus groups during class time. There is no time commitment outside of the course.
**Risks:**
There are no risks associated with this project which are expected to be greater than those ordinarily encountered in daily life.
**Benefits:**
Your participation in this research will help better understand self-organized learning and curiosity in adult learners, as well as contribute to the wider body of research regarding self-directed learning, curiosity, and learning with technology in adult learners.
**Confidentiality:**
The records of this study will be kept private. Data will be stored in a locked file cabinet in the doctoral student's (principal researcher) OSU office or on the researcher's computer that is password protected. No one else will have access to the data. No names or other identifiable information will be obtained in order to maintain confidentiality. Any written results will not include information that will identify you. It is possible that the consent process and data collection will be observed by research oversight staff responsible for safeguarding the rights and wellbeing of people who participate in research. Data will be destroyed three years after the study has been completed. Any recordings will be transcribed and destroyed as soon as they have been transcribed. You will not be identified individually; we will be looking at the group as a whole.
**Compensation:**
Participants will not be compensated for participation in this study.

**Contacts:**
You  may contact any of the researchers at the following addresses and phone numbers, should you desire to discuss your participation in the study and/or request information about the results of the study: Cates Schwark, MS., Willard Hall, Dept. of Education Oklahoma State University, Stillwater, OK 74078, (405) 747-5502. If you have questions

about your rights as a research volunteer, you may contact the IRB Office at 223 Scott Hall, Stillwater, OK 74078, 405-744-3377 or irb@okstate.edu

**PARTICIPANT  RIGHTS:**

I understand that my participation is voluntary, that there is no penalty for refusal to participate, and that I am free to withdraw my consent and participation in this project at any time, without penalty.

**CONSENT DOCUMENTATION:**

I have been fully informed about the procedures listed here. I am aware of what I will be asked to do and of the benefits of my participation. I affirm that I am 18 years of age or older.

I have read and fully understand this consent form. I sign it freely and voluntarily. A copy of this form will be given to me. I hereby give permission for my participation in this study.

_____    _____

Signature of Participant                           Date

I certify that I have personally explained this document before requesting that the participant sign it.

_____            _____

Signature of Researcher                                Date

Appendix C

The Curiosity and Exploration Inventory II

**Instructions:** Rate the statements below for how accurately they reflect the way you generally feel and behave. Do not rate what you think you should do, or wish you do, or things you no longer do. Please be as honest as possible. Items 1, 3, 5, 7, and 9 reflect stretching. Items 2, 4, 6, 8, and 10 reflect embracing.
Items are anchored on the following scale:
1= very slightly or not at all;
2 = a little
3 = moderately
4 = quite a bit
5 = extremely

1. I actively seek as much information as I can in new situations.
2. I am the type of person who really enjoys the uncertainty of everyday life.
3. I am at my best when doing something that is complex or challenging.
4. Everywhere I go, I am out looking for new things or experiences.
5. I view challenging situations as an opportunity to grow and learn.
6. I like to do things that are a little frightening.
7. I am always looking for experiences that challenge how I think about myself and the world.
8. I prefer jobs that are excitingly unpredictable.
9. I frequently seek out opportunities to challenge myself and grow as a person.
10. I am the kind of person who embraces unfamiliar people, events, and places.

Appendix D

Focus Group Questions


How did this experience make you feel?
How did you feel when you were investigating the question?
What did you learn about yourself as a learner?
How would you describe your thought process?
What do you think you will do differently for next time?
What will you do the same?
How was your curiosity elevated or not elevated?
Were there periods where you were confused? Confident? What were they?

Appendix E

SOLE Session Timeline

| Time | Activity |
|---|---|
| First 5 Minutes: Questions | Pose a "big question" The question will be framed as a genuine process of discovery in order to promote curiosity Explain the SOLE Process |
| 30-45 Minutes: Investigation | Students work in groups to find answers to the big question online. Encourage students to resolve any group issues themselves. Observe and document the SOLE: take notes, photos, ask questions, etc. |
| 10-20 Minutes: Review | Invite the students to share their stories of collective discovery. Talk about similarities/differences between their answers, help to see links to other areas. Encourage debate. Facilitate discussion about the question and investigative process Engage the students in their own review: What would they do differently next time? What do they think others did well? |

*Note.* Adapted from "The School in the Cloud" 2016.

Appendix F

Timeline of Study

| Week | Class Period | Big Question |
|------|-------------|--------------|
| Week 1 | Talk about class<br>Introduce study<br>Sign consent forms | |
| Week 2 | Session 1 | What is the purpose of having technology in the classroom? |
| Week 3 | Session 2 | Consider you are given only three technologies to have in your classroom. Your administrator would like you to provide a critical examination of (a) what they would be, (b) why you chose them, and (c) how would you use them. |
| Week 4 | Session 3 | What is a learning ecosystem?<br>What role does instructional design play in this? |
| Week 5 | Session 4 | What is assessment and what are the essential elements?<br>How do you know what to assess?<br>How would assessments change if the Internet/technology resources were allowed in the examination room/during test taking? |
| Week 6 | Session 5 | What is "meaningful differentiation" and what does that look like in a classroom?<br>How do we prepare students for jobs that do not yet exist?<br>Hypothesize what would the academic and social outcome be of a student taught in a technology free classroom versus a student taught in a technology equipped classroom. |
| Week 7 | Session 6 | How do I teach my students to research Internet resources effectively and efficiently?<br>What is "information fluency", and how does that apply to research?<br>If KNOWING is obsolete, what would you |

teach and how would you teach it?
TED Talk: Talk Sugata Mitra: Build a
School in the Cloud

| | | |
|---|---|---|
| Week 8 | Final "big question" and Wrapping Everything Up | Based off of findings and experiences: How would you design a setting for learning that does not resemble a classroom? How would you transform a lesson that integrates technology? How would you use innovation, differentiation, and engagement in this lesson? Final reflections Post-assessment |

VITA

Cates Kimberli Schwark

Candidate for the Degree of

Doctor of Philosophy/Education

Thesis: EXAMINING SELF-DIRECTED LEARNING IN AN EDUCATIONAL TECHNOLOGY CLASS FOR PRE-SERVICE TEACHERS: A QUALITATIVE CASE STUDY

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Education:

Completed the requirements for the Doctor of Philosophy in Educational Technology at Oklahoma State University, Stillwater, Oklahoma in December, 2017.

Completed the requirements for the Master of Science in Educational Technology with an emphasis in Library Media Science at Oklahoma State University, Stillwater, Oklahoma in 2011.

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