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Assessing Learning Styles of Adult Students in Online, Classroom, and Combination Learning Environments

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Walden University
2017

Abstract

Assessing Learning Styles of Adult Students in Online, Classroom, and Combination

Learning Environments

by

Theresa M. Bane

MS, Walden University, 2007

BA, California State University Sacramento, 2002

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Psychology

Walden University

May 2017

Abstract

This study was an investigation of Kolb's experiential learning model and learning styles (LS) in adult students of different learning environments. Previous research utilizing Kolb's Learning Styles Inventory (LSI) produced results that were often contradictory to expectations based on Kolb's model. Many of these studies were limited in sample sizes or to particular participant education or career fields. The purpose of this study was to identify significant differences in LS of adult students of 3 different learning environments–online, classroom, and combination (blended). A convenience sample of adult learners ($N = 180$) from a social media site and an online university's participant pool were divided into the 3 learning groups and administered the LSI-3 online. The research questions explored the relationship between LS and demographics (age, sex, ethnicity, course level, and grade point average) and sought to identify differences in LS between learning environments. The results of Spearman's rho suggested that LS may be related to age in online learners and to grade level in classroom students, supporting earlier research suggesting that LS change as one progresses in his or her education program. No relationship between any demographic and LS was identified in the combination group. Results of Kruskal-Wallis analysis showed no significant difference in LS between learning groups, though the majority of the sample population were identified as divergent learners in all groups, also supporting results found in earlier research. This research is significant and may lead to positive social change by aiding in the development of more effective learning environments to provide for better learning experiences by students as well as identifying areas in need of future research.

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Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

Introduction

Many universities are focusing efforts on helping students prepare to step directly into careers, creating a need for universities to emphasize the development of critical thinking more than just the cultivation of skills. Centering learning on critical thinking development is especially important given increasing globalization, which results in the need for sophisticated thinking in both the business and civic realms (Miller, 2006). The need for higher-level thinking has resulted in a shift in adult education toward workplace applicability of coursework (Miller, 2006). The necessity for workers possessing the ability for sophisticated thinking has made critical thinking a prime objective in many universities as well as a commonly-researched topic in education.

At the same time as universities are shifting learning objectives toward critical thinking development, many are also expanding the options for course delivery by developing online or mixed environment classrooms. The question arises as to how learning environments may contribute to or influence student learning. While there are many variables that may contribute to a learner's success in any particular classroom, one of the most researched areas is in the fundamental concept of learning styles (LS), with many researchers referencing Kolb's (1984) model of experiential learning (Akkoynunlu & Soylu, 2008; Almeida & Mendes, 2010; Kolb, Boyatzis, & Mainemelis, 2001; Massey, Kim, & Mitchell, 2011; Topçu, 2008). I developed this study to continue the exploration of LS by focusing on the relationship between LS and different learning environments,

with the intention that further research can be developed to investigate the association of LS and learning environments to critical thinking.

In this chapter, I will present a description of the background of the problem, the problem statement, and the purpose of the study before introducing my research questions and hypotheses. These are followed by the theoretical framework and nature of the study. I will also provide a definition of terms and an overview of the study assumptions and limitations, scope and delimitations, and significance before ending the chapter with a summary.

Background

Within the broad field of adult learning, researchers have been recently seeking to identify how adults learn, and ultimately, how to support their learning. Popular research topics in adult learning are LS and critical thinking disposition (CTD; see Andreou, Papastavrou, & Merkouris, 2013; Suliman, 2006; Wessel, & Williams 2004; Yenice, 2012; Zhang & Lambert, 2008). Many researchers have based their ideas on Kolb's experiential learning theory (ELT) and the related Learning Style Inventory (LSI; see Akkoynunlu & Soylu, 2008; Almeida & Mendes, 2010; Kolb et al., 2001; Massey et al., 2011; Topçu, 2008). My study further extends the literature on ELT.

While experiential learning is not a concept attributable to only one theorist, many could argue that Kolb's (1984) work in the development of this constructively-based learning example was seminal to the theory, resulting in Kolb being considered the most notable theorist of experiential learning (Hedin, 2010). Kolb based the theory on the works of several earlier scholars including William James, Carl Jung, Carl Rogers, and

Jean Piaget (Kolb & Kolb, 2005). Kolb's model incorporated the ideas that learning is an active experience, and one that requires a relationship between the material and the learner (Kolb & Kolb, 2005). It is with this active relationship that experiential learning differs from conventional education. Whereas conventional education tended to rest on information given to the learner by the instructor (Pew, 2007), experiential learning requires the learner to utilize one's experiences to take in, formulate, and use the material on a more personal level (Kolb, 1984). This personal relationship with learning describes ELT as a form of constructivism.

Many researchers in the area of LS have used participant groups limited to particular fields of study, and results between studies have varied in terms of successfully supporting expected hypotheses, regardless of the participant demographics used. Unexpected results have been frequently seen in studies guided by Kolb's (1984) model of experiential learning (see Akkoynunlu & Soylu, 2008; Spears et al., 2008), and these results have sometimes led to conflicting conclusions. These conflicts have often been associated with the use of Kolb's model and related test, the LSI. The LSI has also been critically examined by researchers, with mixed levels of support for the validity and use of the model and test due to the variability of results attained through its use (Bergsteiner, Avery, & Neumann, 2010; Hedin, 2010; Platsidou & Metallidou, 2009). This variability has created the opportunity for further research using the LSI, as results can then be compared to previous study results to further argue for either support or concern of the LSI as a valid and reliable test.

With this study, I have contributed to the literature in this area by furthering research into the relationship between LS and learning environments, using Kolb's (1984) ELT and LSI. My results also contribute to the discussion of the validity and use of Kolb's experiential learning model and the LSI. Finally, I have added to the current focus of research in the area of adult education by emphasizing learning environments rather than particular fields of study in my analysis.

Problem Statement

Current research into LS guided by Kolb's (1984) ELT has been limited in scope with often unexpected results (Akkoynunku & Soylu, 2008; Almeida & Mendes, 2010; Spears et al., 2008; Topçu, 2008). Further research using Kolb's theory to expand on current research into LS is needed to add to the knowledge base as it applies to the useful application of Kolb's theory to research variables. Furthermore, inconsistencies in study results and researcher conclusions have been identified in the literature (Almeida & Mendes, 2010). This lack of consistency has created a gap in knowledge regarding the effectiveness of Kolb's theory and the LSI, and therefore, the applicability of the theory to creating effective learning experiences. It was my intention to address this weakness by using Kolb's LSI to identify LS in different environments and contribute to the current discussion regarding the use of the LSI in research. I applied Zhang and Lambert's (2008) recommendation that future research include diverse population samples, as well as Yenice's (2012) recommendation to consider learning environment in future research in the development of my study.

Purpose of the Study

The purpose of this nonexperimental quantitative survey study was to identify whether a difference exists in LS between students' learning environments for adult students attending courses online, on ground, or through a combination of courses in both learning environments at universities based in the United States. I defined the independent variable, learning environment, as being either online, on ground (classroom), or combination (courses taken in both online and on ground classrooms). The dependent variable, LS, is a participant's LS as determined by Kolb's LSI (The Hay Group, n.d.).

Research Questions and Hypotheses

I developed the following research questions and hypotheses to guide this study:

Research Question 1: Is there a significant correlation between any demographic variable collected (age range, sex, ethnicity, course level, or grade point average [GPA]) and LS?

$H_0 1$: There is not a statistically significant correlation between one or more demographic variables (age range, sex, ethnicity, course level, or GPA) and LS in any learning environment group (online, classroom, or combination).

$H_A 1$: There is a statistically significant correlation between at least one demographic variable (age range, sex, ethnicity, course level, or GPA) and LS in one or more learning environment groups (online, classroom, or combination).

Research Question 2: Are LS different between students in different learning

environments (classroom, online, or combination)?

$H_0 2$: There is not a statistically significant difference in LS as measured by

the LSI between learning environment groups (classroom, online, or

combination).

$H_A 2$: There is a statistically significant difference in LS between learning

environment groups (classroom, online, or combination) as measured by

the LSI.

The purpose of Hypothesis 1 was to test for any significant association between

demographic variables and the testing variable (LS) for each group. I used Spearman's

rho to determine if any demographic data correlate with LS. I tested Hypotheses 2 with

the Kruskal-Wallis analysis to determine any significant differences in means between

learning environments. For Hypothesis 2, the mean scores from the LSI were compared

using Kruskal-Wallis to determine if a predominant (statistically significant) LS was

identified in each of the three learning environments (online, classroom, and

combination).

Theoretical Framework

The theory that I used to guide this study was Kolb's (1984) ELT, which suggests

that learning is a holistic process, with a person's experiences forming the core of that

person's understanding (Kolb et al., 2001). This process of learning is a combination of

grasping and transforming experience (Kolb et al., 2001) and is a constructivist approach

to learning (Brooks, 1990; Harasim, 2000). I will discuss this concept in more detail in

Chapter 2. As applied to my study, ELT suggests that a learner's environment may affect the person's learning as different environments allow for different experiences and methods of information sharing.

Nature of the Study

I conducted this study on learning styles using a nonexperimental, between-subjects, survey design. Quantitative analysis reduces researcher bias and allows for well-defined comparisons between research groups (Creswell, 2014). Furthermore, this method is in line with previous research with similar research questions (Wineman, 2005). I selected a survey-type measure because the majority of current, related studies also used this study design; several of these studies will be presented in Chapter 2. The standardized test, the LSI (The Hay Group, n.d.), was used to collect data. I chose to use a standardized measure to reduce test design concerns associated with test creation, mainly regarding validity and reliability. I selected the LSI as it was developed specifically to measure LS and has been previously used in several studies of LS (Akkoynunku & Soylu, 2008; Almeida & Mendes, 2010; Massey et al., 2011; Topçu, 2008).

I selected participants through convenience sampling from respondants to social media ads and a large, online university's research participant pool. All respondants were recruited online and directed to a website specifically created to give potential participants information on the study and participation requirements, collect demographic information, and provide instructions and the link to complete the survey. All participants completed the online version of the LSI-3 (The Hay Group, n.d.). The sample

population consisted of adult students taking courses in a classroom, taking courses online, or taking courses through a combination of both learning environments. Courses must have have been conducted in English, at insitutions based in the United States. Students must also have been taking courses toward a bachelor degree or higher. Demographic information was obtained and analyzed with the test variables. Results of the standardized test were analyzed with ANOVA to determine LS in the three different learning environments. The independent variable for the second hypothesis was learning environment, and the dependent variable was LS. I will discuss the methods and hypotheses in further detail in Chapter 3.

Definition of Terms

Adult learning theory: Inclusive umbrella term for multiple theories regarding needs and procedures of adult learning (Cercone, 2008).

Andragogy: Theoretical description of the processes of adult learning and instruction. Andragogy expanded from the more general term *pedagogy* to focus on the planning and execution of learner-centered adult education (Merriam, 2001a; Pew, 2007; Taylor & Kroth, 2009).

Classroom learners: For the purposes of this study, classroom learners are identified as students who attend classes in a physical classroom rather than virtually. Classroom learners are limited to students who have not recently completed an online course.

Constructivism: Theoretical description of learning as being experiential, compounding, and meaningful as it is created by the learner through critical thought

processes and incorporating previous knowledge (Belzer, 2004; Huang, 2002; Spigner-Littles & Anderson, 1999).

Experiential learning: A learning theory based on the belief that learning results from the interpretation, understanding, and application of individuals' experiences (Kolb, 1984; Kolb & Kolb, 2005).

Learning styles (LS): A student's preferences for how they learn in any given learning situation (Kolb & Kolb, 2005), as measured by the LSI (The Hay Group, n.d.).

Online learners: For the purposes of this study, online learners are identified as students who attend classes virtually rather than in a physical classroom. Online learners are limited to students who not recently attended an on ground (physical classroom) course.

Pedagogy: A theory of learning and teaching using teacher-centered methods (Muirhead, 2007; Taylor & Kroth, 2009).

Assumptions and Limitations

I made a few assumptions related to this study. My first assumption was that participants would answer all questions truthfully and to the best of their ability. I also assumed that only the participants who met all qualifying criteria would participate and would not manipulate their qualifications in order to participate themselves, or for someone else. Finally, it was my assumption that the LSI (The Hay Group, n.d.) was an appropriate measure to identify any significance concerning the research hypotheses.

Limitations for this study included a difficulty in assessing accurate demographic information, as the LSI (The Hay Group, n.d.) was administered, and demographic data

were collected, online. Because participants could not be personally identified, there was the potential that unqualified individuals participated. I addressed this limitation in recruitment with the presentation of specific requirements for participation upfront to limit interest in the study of ineligible participants. Another limitation was in regards to the voluntary nature of the study and the fact that participants had the right to leave the study at any time. This resulted in a few participants logging in to the testing website without completing the study or providing a usable data set. This limitation was lessened, however, through the combination of detailed recruitment information regarding participant requirements and the fact that the test chosen was simple to use.

The generalizability of this study was also limited as recruitment was limited to those participating in a select social media site and students with access to the online participant pool administered through a particular university. Because the outreach possible through online recruitment is vast, it was expected that a demographically diverse population was reached, and therefore, increasing demographic variability between participants. However, my study was not designed to analyze demographic effects of LS, and therefore, I did not seek out participants of any particular demographic.

Scope and Delimitations

My goal for this study was to build upon the body of knowledge contained in the current literature regarding LS and their relationship to learning environments. With my study, I have advanced this understanding through an exploration of these variables in a couple of ways, recommended by previous researchers. While I did not place an emphasis on demographic information for analysis, Zhang and Lambert (2008) have

stated the need for research to include diverse populations. Similarly, much of the current literature tends to be limited to participants of a chosen field or discipline. I focused instead on learning environment, a study variable recommended by Yenice (2012). I obtained a sample for my study through a social media site as well as a participant pool through a university with a large, diverse, online student population. By not limiting participants to demographic requirements (besides those required to ensure correct grouping of data for analysis and verification of participant eligibility) and addressing learning environment rather than learning major, both Zhang and Lambert's and Yenice's recommendations were undertaken.

Kolb's (1984) ELT was the guiding theory for my study. I selected ELT because the literature provides a controversial debate around it, as to both its effectiveness as a theoretical model and the sometimes unpredictable results that researchers referencing ELT in their studies have identified. I will provide further discussion on these issues in Chapter 2. As I focused solely on ELT for consistency, I used the LSI (The Hay Group, n.d.) and its defined LS to address my research questions, though other models of learning have also been applied in research. For instance, Kalkan (2008) used the visual, aural, reading and writing, and kinesthetic model in an effort to determine participants' LS and if these LS affected cognition and metacognition. Similarly, Emir (2013) referred to the theory of mental self-government when studying the relationship between thinking style and critical thinking disposition.

Significance of the Study

This research is significant in a couple of major areas. First, I addressed an identified gap in the literature with my study. By expanding on current research and adding recommended study variables to be researched, I contributed to the current body of knowledge. Second, by addressing learning environment in the chosen university, there is potential for practical and social significance as well. Yenice (2012) has stated the need to consider LS when developing learning environments. The potential effects of this study are that the results can be used within universities to help identify areas for improvement and aid in the altering of learning environments to meet university students' needs. Doing so can have profound social significance as Kolb and Kolb (2005) have stated, there is a direct relationship between learning and an individual's environment. Massey et al. (2011) also recognized this relationship arguing that the development of supportive learning environments is dependent on the recognition of differences in LS. The creation of such learning environments, however, can only be achieved when student needs are understood. The significance then is that the use of my results can aid in the development of more effective learning environments for adult students, which would have the potential for better learning experiences by students.

Summary

Research of LS has been limited in nature with respects to population sample demographics and size. I also identified the need for research addressing learning environment. I addressed these gaps by exploring the relationship between LS and learning environments using a population sample of adult students without emphasizing

major of study or field of work. The contributions of my study included an expansion of the current body of literature and the potential for the application of my study results and consequent recommendations to improve the learning environments for adult students.

In this chapter, I introduced the study and research objective, questions, and hypotheses tested. I will provide more details into the theoretical constructs, current literature, and methods of the study in the following chapters. The first major discussion I will provide in Chapter 2 is of the theoretical foundation for my study. I will then provide a review of related literature. Specifically, I will discuss previous research utilizing ELT and the LSI. I will conclude the chapter with a summary.

In Chapter 3, I will describe the research design including the population, measurement, research procedures, and analyses. I will also discuss the statistical method for the study design and testing measurement. Chapter 4 will include my research results, which are discussed along with my conclusions and recommendations in Chapter 5.

Chapter 2: Literature Review

Introduction

The purpose of this nonexperimental quantitative survey study was to identify if a difference exists in LS between students' learning environments for adult students attending courses online, on ground, or through a combination of courses in both learning environments at universities based in the United States. I defined the independent variable, learning environment, as either online, classroom, or combination. The dependent variable was defined as an individual's LS as determined by the results of the LSI (The Hay Group, n.d.).

With this research, I expanded on the studies of LS conducted by Suliman (2006) and Wessel and Williams (2004) in that I assessed students regardless of their chosen major. The previous studies were similar in their natures, placing emphasis on a particular major for analysis, whereas I focused on the learning environment for analysis. In this study, I followed recommendations by Yenice (2012), which included research of LS in learning environments that are designed based on LS and CTD. These recommendations support the social change potential of using the results of this study to create learning environments designed around student's LS, with the recommendation that further research be conducted in the area of LS and CTD in different learning environments.

Description of Literature Search

The foundation for this study rested in the theoretical framework of Kolb's (1984) model of experiential learning. My initial search of the literature using EBSCO multi-

database search and Advanced Search Complete multidisciplinary database through the Walden University Library included the primary terms *critical thinking* and *disposition, learning styles* and *Kolb's learning styles, experiential learning* and *theory,* and *distance education.* I ascertained additional search results through local libraries and a search of individually-identified resources that I located through articles referencing particular sources. Most of the literature search was limited to the previous 5 years. Sources that I used for this review were acquired both digitally and traditionally through printed versions of journal articles and books.

Organization of the Chapter

This chapter will consist of a description of the literature search and a discussion of the theoretical framework guiding this study. I will also present a discussion on the current literature related to my study variables. I will end the chapter with a summary.

Theoretical Framework

The guiding theory of this study was experiential learning, which has its roots in constructivism. The overarching theory, however, is adult learning theory (ALT). ALT is a multidimensional approach to explaining adult learning (Cercone, 2008). For this reason, I will explain its origins from the broad perspectives of pedagogy and andragogy to facilitate a clear understanding of the theory and its relativity to the proposed hypotheses and sample population. I will begin this section with an overview of ALT and its origins, followed by a presentation of empirical literature based on constructivist approaches to learning. I will conclude with an examination of the current literature focusing on the guiding theory of experiential learning.

Adult Learning Theory (ALT)

The term ALT is misleading, as scholars have argued that there is not a single

theory strong enough to explicate all the complexities of adult learning and the resultant

behavioral effects of it (e.g., Cercone, 2008; Merriam, 2001b). Rather, ALT is comprised

of several components, each based on cognitive theories that collectively are used to

provide guidance as to the nature and needs of adult learners (Cercone, 2008). This

understanding has since evolved to recognize individual learners and their need for self-

direction in education (Merriam, 2008). This movement has recently been expanded to

what is transformational learning, or an individual's ability to generate new meaning

through critical and independent reflection (Merriam, 2001b; Wickett, 2005). This

process results in a person identifying relationships to himself or herself in new

information and acquiring it in a way to apply to their unique experiences and

circumstances (Cercone, 2008; King, 2007; Mezirow, 1997). The incorporation and

application of previous experience and knowledge are necessities upon which adult

learners can build new knowledge (Belzer, 2004; Cercone, 2008; Wickett, 2005).

The development of ALT stemmed from the recognition that the learning needs of

adults and children differ. *Pedagogy* describes teaching and learning (Muirhead, 2007),

where a *pedagogue* references one who teaches (Pew, 2007). As traditional adult

education still follows the one-way instructional delivery method – courses composed

mainly of lectures and exams – the pedagogue is one who instructs based on learning

decisions produced by the instructor rather than the student (Pew, 2007). Because of this,

and the sequential research into adult cognition and learning, pedagogy was discovered to

be weak in recognizing the individual differences and needs of adult learners (Muirhead, 2007). As adult learners' unique needs and reasons for learning were becoming more recognized, the broader term pedagogy gave way to a more relevant term, *andragogy* (Merriam, 2001a).

Andragogy was developed from the need for adult learners to distinguish themselves from their younger counterparts (Merriam, 2001a) as pedagogy was an inclusive term recognizing learners of all ages. This focus on the needs of an older learning demographic has resulted in andragogy being described as "the art and science of helping adults learn" (Pew, 2007, p. 17). New concepts regarding adult learning developed with the departure from pedagogy.

The separation of pedagogy and andragogy has been described in several concepts developed by Knowles and described by Cercone (2008). The first of Knowles's concepts is that adults should be participants in the development of their education, as opposed to being led by a pedagogue. The second states that learning should be based on experience, and the third clarifies, stating that the learning be relative and applicable to the learners' life. The fourth concept of the differentiation between andragogy and pedagogy is that learning should focus on problem solving as opposed to general content (Muirhead, 2007). Finally, the fifth concept is that adult learners are motivated to learn internally as opposed to extrinsically (Aderinto, 2006; Cercone, 2008; Merriam, 2001a).

This distance between pedagogy and andragogy became blurred as scholars began to recognize that these concepts could not apply to all adult learners and may even apply to some childhood learners. Because of this, the definition of andragogy was modified

from being in opposition to pedagogy to being connected to pedagogy by a continuum on which both adult and child learners are found (Merriam, 2001a). It is from this continuum spanning from teacher-directed to self-directed learning that ALT can be explained. Self-direction in adult learning is a concept that is forefront in constructivist learning theories, including experiential learning, the concept that guided my study.

Constructivist Approaches

Constructivism incorporates the ideology that learning is personal, experiential, and based on problem solving (Huang, 2002). According to the constructivist approach, knowledge is created by individuals based on their previous experiences (Belzer, 2004), and the understanding of such experiences can then be made personally meaningful (Spigner-Littles & Anderson, 1999). Radical constructivism explains that all things possible to know are created in the reality of the observer (Terhart, 2003). In other words, constructivism is the process in which a person learns through participation (Harasim, 2000) to create an explanation of the person's observations (Brooks, 1990). Therefore, the learner is an observer who constructs knowledge based on how he or she perceives the educational situation. Constructivism is effectively demonstrated in the application of self-directed learning and self-regulation constructivist approaches.

Constructivism as demonstrated through self-directed learning. One theory demonstrating the constructivist approach to learning and one on which the broader ALT and andragogy finds central is that of *self-directed learning*. Self-directed learning, as a learning theory, explains that as an individual grows, his or her identity in learning changes from the receiver to the creator of his or her education (Cercone, 2008), thereby

demonstrating a constructivist process. The theory of self-direction in learning can be argued to be the most directing of ALT as it requires learners to participate independently in the direction of their education to transform knowledge from new to applicable by means of critical thinking and is guided by the person's needs and experiences to reach an individual learning goal (DeTure, 2004; Weigand, 2000; Wickett, 2005).

The emphasis on independent learning was particularly important to this study, as I examined the LS of online students, some coming from a solely online university that requires, through curriculum and academic standards, self-direction in students' learning. Even though many traditional institutions are incorporating more opportunity for self-direction in their offerings, such as including more contemporary approaches to material delivery and greater opportunities for online learning, when compared to classroom-based students, online students must be even more self-directed in their learning. While classroom students have the benefit of immediate feedback from instructors and peers and a somewhat more structured learning environment, online learners must create their own structure with few guidelines on doing so beyond the online classroom and have even less access to direct and immediate contact with their classmates and instructors. This lack of immediacy and structure can be argued to result in online learners focusing and applying course information as they see most useful and meaningful to them, more so than as prescribed by an instructor (Johnson, 2008; Kumar, 2006).

The impact of self-direction on learning has been demonstrated through research by Chakravarthi and Vijayan (2010), who identified it as a maturation process that increases over time in an individual's learning program. However, the method has also

been argued to be less effective than traditional methods in certain circumstances (Shneeweiss & Ratnapalan, 2007). Chakravarthi and Vijayan addressed self-directed learning in the maturation of adult learners. Conducting a study with 170 students in a medical education program and using the Self-Directed Learning Readiness Scale (SDLR; Guglielmino & Associates, LLC, n.d.) throughout five semesters of the program, Chakravarthi and Vijayan discovered an increase in student scores on the SDLR throughout the longitudinal study.

Though the results of Chakravarthi and Vijayan's (2010) study suggested that mature students might find learning success through self-directed approaches, Schneeweiss and Ratnapalan (2007) suggested that a multifaceted approach to learning was more effective than with strictly self-directed learning. In research intended to "compare the effectiveness of a formal procedural sedation course with unstructured, self-directed learning" (Schneeweiss & Ratnapalan, 2007, p. 94), physicians and fourth-year residents were assigned to either a formal teaching group attending a 4-hour course or a self-study group. Schneeweiss and Ratnapalan argued that the formal teaching group demonstrated significantly higher scores than the self-study group.

While the results of these last two studies are in opposition to each other as to the effectiveness of self-directed learning in mature learners and a direct comparison of results between the two studies is difficult given the difference in experience with the testing topics and size of population samples used, it was my position in this study to support the arguments by Chakravathi and Vijayan (2010) for a few reasons. First, Schneeweiss and Ratnapalan's (2007) study did not include any form of instruction or

teacher guidance for their self-study group. This is in opposition to the commonly-described role of the teacher in self-directed learning, which is to provide support for students during the learning process by facilitating learning and being an expert resource (Chakravathi & Vijayan, 2010; Kell & Van Deursen, 2000; Lunyk-Child et al., 2001). Second, Schneeweiss and Ratnapalan did not conduct a pre- and posttest with the participants, arguing that having a pretest may have produced posttest results that demonstrated knowledge of the pretest items, as opposed to knowledge gained from the course. The question of what knowledge the participants had prior to the start of the course, though their self-perceived levels of knowledge were not significantly different, remains. While the participants were a mix of practicing professionals and advanced medical residents, a person cannot conclude personal knowledge and understanding based only on practical experience. Finally, the statistics presented in the Schneeweiss and Ratnapalan article were not detailed enough to allow for comfortable acceptance of the argued results. Because of this, I found that Chakravathi and Vijayan's presentation of study results were more valid than those presented by Schneeweiss and Ratnapalan. This finding relates to my study population as Chakravathi and Vijayan suggested that mature learners could benefit from self-directed learning. In this study, I emphasized the adult learner in constructivist environments, as online courses are designed in such a way as to require students to be responsible for their learning (self-directed).

Constructivism as demonstrated through the social cognitive theory of self-regulation. Another theory exhibiting the constructivist approach is the social cognitive theory of self-regulation. Self-regulation integrates motivation, behavior, and cognition

that set the framework for individualistic and personally accountable learning (Artino, 2008). In this way, constructivism allows knowledge to be created, orientated, and integrated based on an individual's own self-regulated and self-directed interpretation requiring students to be the core of the learning process (Spigner-Littles & Anderson, 1999).

Self-regulated constructivist approaches to learning have been argued to be successful in creating long-term learning. In a study by Heafner and Friedman (2008), secondary school students were provided with a personal, individually created web page, called a wiki, which they designed in a way to represent their understanding of their social studies materials. The use of wikis allowed students to refrain from the conventions of teacher-centered learning experiences in order to approach their studies in whatever way was most meaningful to them. Because the wikis were web based, students were able to share their wikis with other students, comment on them, and then learn from each other.

There was concern with this abundance of personalized opportunity, however, in that while students were able to concentrate on the areas of importance and interest to them and establish a personal relationship with the material, such broad constructivist opportunities negated uniform learning and preparation for end-of-course testing. The test results confirmed this concern as the group of students using wikis scored lower than the control group students. Interestingly, however, while students in the control group demonstrated better recall of the material covered through traditional learning experiences, on 8 month posttest, the control group scored lower than the wiki student

group. This result suggested that while traditional teacher-centered methods of instruction may be more successful in the short term, students learning under a constructivist approach might be more able to continue their association with material in the long term (Heafner & Friedman, 2008).

These results of greater long-term learning by students learning constructively were supported by Akar and Yildirim (2010). Similar to the Heafner and Friedman (2008) study, adult students were assigned to a control (traditionally instructed) and an experimental (constructively instructed) group. On a multiple-choice posttest to the experiment, Akar and Yildirim found no significant difference between the groups, suggesting that a constructivist approach may not result in greater short-term learning than a traditional approach. Additionally, however, they, as did Heafner and Friedman, found significantly greater retention of the material by students taught with a constructivist approach when students were retested 3months following the experiment's posttest.

When considering these studies, it is important to remember the goal of using a constructivist approach, which can be described as to create meaning in an individual's learning. This personal creation of meaning by learners results in a deeper understanding through critical analysis and problem solving (Huang, 2002) and a relationship to the material based on individual experiences (Belzer, 2004; Springer-Littles & Anderson, 1999). As constructivist learning follows this interaction between material and student, a student's sense of meaning of the material comes from a personal construction of the student's understanding of it (Brooks, 1990; Harasim, 2000). Because of this relationship,

it can be argued that the reason for long-term understanding in constructively instructed students is a result of the development of continued personal understanding and application to students' new experiences. In other words, while a foundation is set in both traditional and constructivist approaches (Akar & Yildirim, 2010; Heafner & Friedman, 2008), students learning through constructivist means have greater opportunity for continued application, and therefore, deeper understanding of the material than traditionally instructed students following predetermined study materials in an effort to meet an end-of-term goal (passing a test). This deep understanding and continued association with the material learned can then be argued to be more accessible for application.

Social implication. There is a second point brought about by a review of these studies that needs to be addressed here as well. In support of the argument by Akar and Yildirim (2010) that short-term learning is in opposition of universities' goals for student application of learned material, a move toward constructivist approaches to education can allow for a greater connection of university and student goals. These constructivist approaches are demonstrated with online learning in general, but also with the classroom environments at some less traditional campus-based institutions.

There is currently a mismatch between what university education prescribes and what it intends. Adults undertaking university level studies do so for the collective reason of personal improvement. The majority of adult students seeking this level of education do so with the intention of using what is learned in a working environment, and sometimes, in their personal lives (Cercone, 2008; Wendt, 1999). University curriculum

is designed to enhance a person's applicable knowledge in a particular field to allow for personal improvements, but the delivery of instruction is such as to foster only short-term knowledge consistently. Akar and Yildirim (2010), as well as Heafner and Friedman (2008) suggested that with a constructivist approach to education, one will be allowed greater opportunity for the application of materials which can then lead to greater motivation and long-term understanding, thereby fully meeting university teaching objectives and student goals.

Experiential Learning Theory

Perhaps the most directly related learning theory to constructivism, and one that clearly demonstrates a constructivist approach to learning, is experiential learning. While there are several examples of experiential learning theory, the most well-known model of experiential learning and the one guiding my research is that by Kolb (Hedin, 2010). I chose ELT as the guiding theory for this study because of both its history in research and the fact it is still a frequently used theory in the current body of literature with direct association to my research questions.

Kolb's (1984) experiential learning theory is based on six propositions that were shared by scholars whose work Kolb based the model on, including Dewey, Freire, James, Jung, Lewin, Piaget, and Rogers. The six propositions are that learning is a process that is best realized when students are engaged. Learning is also relearning through the practice of examining and testing an individual's ideas. Also, conflicts drive the learning process and these conflicts require resolution between "dialectically opposed modes of adaptation to the world" (p. 194). Learning is also holistic and involves the

processes of thinking, perceiving, feeling, and behaving. Furthermore, learning requires a relationship with an individual's environment where experience can combine with current concepts, and those concepts form a new experience. Finally, "learning is the process of creating knowledge" (Kolb & Kolb, 2005, p. 194), resulting in ELT being formed as a constructivist theory (Kolb & Kolb, 2005).

Kolb's model of LS and the LSI. Kolb et al. (2001) identified the intent of ELT as presenting a model that represents holistic learning, with a person's experience being at the core of the person's understanding. ELT describes a learner as moving between poles of learning acquisition in a circular pattern, one of which is compulsory in movement, but directed by the person's learning situation. This results in nine learning styles that can be placed on a grid, representing the position of an individual's learning preference in a region within the circle and between the poles. An individual's learning space (position) is not stationary, as both disposition and learning environment affect a person's movement (Kolb & Kolb, 2005). A person can grasp their experience through concrete experience (CE) or abstract conceptualization (AC; north and south poles of the circle, respectively), and can transform their experience through reflective observation (RO) or active experimentation (AE; east and west poles, respectively; Kolb et al., 2001; Kolb & Kolb, 2005).

If an individual tends to grasp their experience through the reliance of senses, focusing on reality, and experiencing through tangible means, that person would be taking in new information through CE. If, however, the individual relied on symbolic representation, analyzing, and systematic planning to take in new information, that person

would be utilizing AC. To transform this information, one would choose between observing others and reflecting on that observation (RO), or to participate and experience the situation first-hand (AE). Learners must choose how to grasp and transform their experiences. This choice between grasping through CE or AC and transforming between RO and AE tends to happen in patterned ways. These patterns define a person's LS (Kolb et al., 2001; Kolb & Kolb, 2005).

The original LSI (The Hay Group, n.d.) was created to identify these learning styles, with four styles being the most prevalent. These include diverging, assimilating, converging, and accommodating. Each style of learning is associated with learning abilities and preferences. Diverging learners are described as being interested in culture, the arts, and people. They prefer to work in groups while remaining open-minded. These learners are most often associated with CE and RO and are often found working in social service, the arts, and communications professions (Kolb et al., 2001; Massey et al., 2011). The assimilating learners tend to learn through AC and RO. These learners are associated with precision and logic while focusing on ideas and abstract concepts. Assimilating learners prefer taking time for thinking, enjoy reading and lectures, and are often found in professions surrounding science and research. The converging learners tend to focus on problem solving and generating practical solutions. These learners prefer to work with technical problems as opposed to social issues, enjoy experimenting, simulations, and lab work. Converging learners are mostly associated with AC and AE and are frequently identified within technology professions, economics, and environmental sciences. The accommodating style is associated with CE and AE and tends to be observed in hands-on

learners. These learners appreciate new experiences, challenge, and working with others. Accommodating learners are often found working in business and organizations (Kolb et al., 2001; Massey et al., 2011).

While Kolb's (1984) model has been, and is still frequently, used to guide research, there have been challenges and recommendations for strengthening the learning model. Platsidou and Metallidou (2009) examined the psychometric properties of both Kolb's LSI (The Hay Group, n.d.) and Felder and Silverman's Index of Learning Styles (North Carolina State University, n.d.). The study specifically sought to identify the internal consistency reliability, the construct validity, and the discriminant validity of the two inventories. Results indicated satisfactory reliability for the LSI with validity results that supported pairings not proposed by Kolb. Discriminant validity of the LSI did not yield any significant main effects of discipline for any learning styles in any of the four groups, although the authors noted that two of the groups (education students and teachers) did not demonstrate significant differences in learning styles (Platsidou & Metallidou, 2009).

The results of this study both support and contradict the majority of the literature on Kolb's LSI (The Hay Group n,d,). Differences with relation to international results and preference for LS based on discipline were acknowledged. The authors recommended that though reliability seems to be consistent between studies, the inconsistencies regarding validity should limit researchers from using the inventory for assigning students to particular learning styles (Platsidou & Metallidou, 2009). While this recommendation makes sense, it is not expected that doing so will impede the strength of

results gained from my study. This decision is based on the similarities of my study to other research that is much more closely aligned with the study and that have stated the validity of the measure. I will present these studies later in the chapter.

Providing a critical look at Kolb's (1984) learning model and a critical analysis of what the authors considered shortcomings, Bergsteiner et al. (2010) presented Kolb's learning approach as consisting of three major components. These included the theory of experiential learning, the graphical model of the learning cycle according to the theory, and the LSI (The Hay Group, n.d.). The major concerns pointed to the graphical model, especially given the suggestion that the theory itself is "unclear and contradictory, since the nature of what is being measured continually changes between flexible or stable states" (p. 31). The authors identified the biggest flaw in Kolb's learning model as "a highly muddled typology of what constitutes concrete and abstract learning" (p. 32). As this is a fundamental element of the theory, it was argued that not only does this lead to problems with Kolb's model, but also results in a lack of integration throughout the field.

Kolb's (1984) model shows a four stage learning process consisting of CE, RO, AC, and AE, with CE – AC and AE – RO arranged as bipolarities. The cylindrical presentation of the model does not give any hint as to timing of steps, which the authors state is needed to meet model requirements and be in line with the theory (Bergsteiner et al., 2010). There were additional concerns regarding the labeling of model components as well as a couple relationships that were argued to not be in line with each other and others that do not make sense. For instance, the authors identified that several components cannot be achieved without thinking, making thinking an unnecessary

discriminator. The conclusion made was that Kolb's model is a presentation of styles of learning, not stages of learning, even though Kolb considered the transitioning between LS to result in recognizable patterns that identify LS (Kolb et al., 2001).

Bergsteiner et al. (2010) further argued that the bipolarity of the model resulted in two major forms of learning: behavior and observation of behavior. It cannot be determined based on the current model who, when, and how these actually occur - is not observation behavior? The authors stated that the model is flawed to the point that it is "less holistic than it claims to be" (p. 43), and therefore any related theory and measurement (the LSI [The Hay Group, n.d.] in particular) is subject to criticism, with a complete redesign of the model suggested.

While there have been concerns that Kolb's (1984) foundation, being based on a mix of influences, may weaken Kolb's own understanding of the system Kolb uses, Hedin (2010) pointed out that Kolb was consistent in the references to social psychology, philosophy, and cognitive psychology as having provided the basis for his model. Hedin also acknowledged Kolb's model as being the "most well-known" (p. 111), identifying the multiple uses of the model, despite the concerns surrounding its fundamental validity concerns and the broad perspectives used in its development. Furthermore, Hedin recognized the use of Kolb's test instrument, the LSI (The Hay Group, n.d.), as extensive. In respect to concerns, such as those previously described, the LSI has been updated to address some of them, in an effort to provide a useful and valid measure. I will present a detailed description of the LSI in Chapter 3. I will also present several recent studies utilizing the LSI throughout the rest of the Chapter.

Literature Regarding Experiential Learning and the Learning Styles Inventory

Reviews by Kolb et al. (2001) suggested that research on ELT and the LSI (The Hay Group, n.d.) have been undertaken in several fields, and studies are often interdisciplinary in nature. For instance, in a simple study conducted by Massey et al. (2011) the data identified LS of social work students using the LSI and was undertaken in an attempt to recognize differences in students' LS so supportive learning environments could be created for them. The authors explained that there is potential to create experiential-based learning environments for many disciplines. This statement can be further supported by the acknowledgement that students' LS can vary given the learning situation. The result of the basic assessment was that 81% of the participants ($N = 86$) were determined to have either a diverging or accommodating learning style. This finding is supported in previously presented research by Kolb et al. that identified the divergent LS as the most common in students of social work and other psychology-based fields, while accommodators were mostly associated with business-based fields.

Almeida and Mendes (2010) sought to analyze the relationship between learning styles and multiple disciplinary fields of university students. Participants included "186 Portuguese students from education, languages, biology, biochemistry, biotechnology and multimedia" (p. 285). Results indicated that, in terms of LS preference, elementary education students showed a preference for accommodating and diverging LS, which were the predominant types, though neither was dominant. The rest of the results, however, conflicted with Kolb's (1984) positioning further as all other disciplines associated mostly with the accommodating learning style. Following Kolb's model, a

researcher might have expected to find the biology and biochemistry students preferring the assimilating LS, biotechnology students preferring the converging LS, and the elementary education students preferring the accommodating LS, but not the diverging LS. Almeida and Mendes suggested that this alteration may be due to students being in the first half of their studies, and therefore, not fully implanted in their respective disciplines yet. The results also only partially supported Kolb et al.'s (2001) assertion that accommodating style tends to align with AE and CE as overall students preferred AC and AE, while CE was the least preferred learning mode, with the exception of elementary education. A possible reason for this difference to Kolb's model may be an overall low sample size. Almeida and Mendes suggested that further research be conducted in additional universities as well as to address culture further as this study was limited by the sampling of participants.

Research in the fields of management and information, computer science, and psychology has contributed considerably to the literature on ELT and the LSI (The Hay Group, n.d.). Additionally, research has also been conducted in the fields of accounting and law. However, the majority of research of ETL and the LSI has been seen in the education field (Akkoynunlu & Soylu, 2008; Aliakbari & Qasemi, 2012; Kolb et al., 2001; Topçu, 2008).

Akkoynunku and Soylu (2008) and Topçu (2008) both addressed Kolb's (1984) ELT with online learners. Akkoynunku and Soylu examined students' perceptions of a blended learning environment and sought to determine if there were differences in these perceptions due to differences in LS. Additionally, Akkoynunku and Soylu investigated

the relationship between achievement scores and LS as well as participation frequency in the online forum and classroom sessions and LS. Participants were identified as being either divergent learners or assimilators and were therefore placed into those two groups. Student records and Kolb's LSI (The Hay Group, n.d.) were used to measure LS and achievement while a questionnaire was developed to attain students' perceptions of their blended learning environment. Results of t tests indicated significant differences of means in the assimilator groups with regard to perception of blended learning; however, no significant differences were found concerning LS and achievement scores. The results also demonstrated that participation frequency was highest in the classroom component for both LS groups. The authors noted the limitation to this study that only two of the four LS were identified. In addition, the teaching styles of the instructors were not taken into account, though a longitudinal study to do so was planned. While the strength of this study did not rely on heavy statistics by utilizing only t tests, the recommendations for future research were detailed. These included contributions of LS on experience in both online and classroom environments, student engagement in online courses based on LS, potential changes in LS due to the introduction of a long-term blended learning environment, and the impact of teaching style preferences on achievement and experiences in online and classroom courses.

Aliakbari and Qasemi's (2012) study provided some support for Akkoynunlu and Soylu (2008). Assessing LS with relation to achievement scores, gender, and English proficiency levels in Iranian nonacademic English as a foreign language learners ($N = 327$), Aliakbari and Qasemi also found that participants were either identified as having

assimilator or divergent LS. Their results differed, however, in that unlike Akkoynunlu and Soylu, Aliakbari and Qasemi found a low association between LS and achievement scores.

Focusing on asynchronous online discussions, Topçu (2008) presented a study examining "the effect of 'intentional repetition' on the interaction in asynchronous online discussions and measured its effect in relation to the students' learning styles" (p.902). Kolb's LSI (the Hay Group, n.d.) and the Attitude Towards World Wide Web Scale (see Yildirim, 2000) were used. Preservice teachers were placed into two groups, one being the experimental group where intentional repetition was implemented in the online discussions. Results indicated a significant difference in online interactions due to the treatment and no significant difference in LS between the two groups. Furthermore, no significant effect was identified with regards to the interaction between treatment and LS on interactions of participants, although the experimental group's mean scores of interaction were higher than the control group for each of the four LS (assimilating, converging, accommodating, and diverging).

One of the lesser researched fields for ELT/LSI historically, but appears to be expanding recently in the current literature, is in medicine and nursing (Lisko & O'Fell, 2010; Spears et al., 2008; Yardley, Teunissen, & Dornann, 2010). As ELT stresses the importance of experience in learning, in medical education, this would be the clinical experiences students participate in before finishing their formal education and moving into their internships and residencies. This fieldwork involvement provides even more real-life experiences to learn from (Yardley et al., 2010).

Combining elements of both the Topçu (2008), and Akkoynunku and Soylu (2008) studies, Spears et al. (2008) published a brief article wherein they presented the results of a study intended to determine the relationship between LS and academic achievement in dental hygiene students. Kolb's LSI (The Hay Group, n.d.) and the Witkin's Group Embedded Figures Test (Mind Garden, 2014) were used. No statistically significant relationship between LS and achievement was identified. Based on this result, the authors supported the position that LS does not influence achievement in the online learning environment. Furthermore, it was stated that students could adjust their LS as needed in order to succeed in an online learning environment. Unfortunately, the single page of information did not present any further details or actual statistical results. Additionally, the sample population consisted of only 27 students at a single dental school. The lack of details and small sample size do not lend to a strong presentation.

In a larger study (N = 291) of dental students in Saudi Arabia and LS, ALQahtani and Al-Gahtani (2014) identified that the divergent LS was dominant, and those who were identified as assimilating in preclinical years were later identified as divergent in clinical years. This supports the previously presented study in a couple ways. First, while there were differences seen in terms of codominance between the divergent and either the assimilating or the accommodating LS, it was clear that there was a widespread dominance of divergent LS, being identified routinely in participants from a variety of different educational fields. Second, AlQahtani and Al-Gahtani support the suggestion that learners in the early stages of their education program may demonstrate a change in LS identification as they progress, resulting in the acknowledgement that LS are variable

as was suggested by Akkoynunku and Soylu (2008), Almeida and Mendes (2010), and Spears et al. (2008).

Also finding no difference in LS between students' LS and achievement when compared to a physical classroom of the same course, Knapke et al. (2016) presented additional results of their study of online epidemiology graduate students. The researchers also assessed LS, demographics, and satisfaction. Their results showed no difference in LS between the online and classroom groups. This resulted in the suggestion that students may not choose learning environments based on their LS, age, or experience, but rather on personal lifestyle factors.

In my study, I gathered the sample population from both an online university that emphasizes practical application of learned material and through social media, seeking both online and classroom learner participants. There was one caveat, however, that was considered when assessing the results of my study: Experiential learning is based on the participation of the learner. Because of this, even though all participants were tested online, I expected that the classroom students would be more in line with the requirements of experiential learning than the online students given the differences in delivery of information and participation requirements of students from both learning environments. It is my position here, for the purposes of my study, that this difference be recognized only as a level of student discipline based on the requirements for experiential learning to occur.

These elements are identified by Yardley, et al. (2010) as directly affecting the quality of learning. The first requirement is that learners identify similarities of newly

learned material to previous knowledge. The second is to identify the differences between the two, emphasizing the reasons for those differences. Only after the first two steps are successfully passed can a learner then proceed to the final element, extension of the person's learning. The authors described this expansion of knowledge as relying on an individual's ability to judge a situation, recognize similar circumstances to previous experiences, and then apply knowledge learned in a new way that is applicable to the situation. While the classroom students would be challenged to meet these requirements, being limited within a structured learning environment, it can be argued that the online students might find them more challenging as they must rely more on themselves to be aware of the association between their learning and the application of it to the workplace. It must be noted, however, that this is not unreachable by any means, especially given the requirement that online learners be self-motivated.

Summary

I expanded on the literature related to LS and the LSI by investigating the relationship between LS and learning environments. I selected the LSI as it was developed in line with Kolb's (1984) ELT. I will describe this test in detail in Chapter 3.

Although the literature that I presented in this chapter included summaries of both support and criticism for Kolb's (1984) learning model, it is not expected to adversely affect the strength of my study. The purpose of selecting Kolb's model was that it provides a well-researched theory that has both historical and current research applicability. The use of Kolb's LS was to provide a commonly used categorization for the analysis of results.

In this chapter, I presented a discussion on ELT as being a clear constructivist theory of adult learning. This discussion was followed by a review of the literature and applicable research studies identifying current trends in research on LS and identifying the contributions to the literature I intended my study to create. In Chapter 3, I will discuss my desired research method of my study by presenting the selected test in detail, providing a framework for data collection and analysis, and addressing ethical considerations.

Chapter 3: Research Method

Introduction

The purpose of this study was to determine whether a relationship exists between LS and different learning environments. A relationship was to be determined by answering the primary research question guiding this study (Research Question 2). Research Question 2 helped me determine whether students who learn in different learning environments demonstrate different LS.

In this chapter, I will provide a detailed plan to answer the research question. I will begin by discussing the research design and approach followed by a presentation of the methods, procedures, and ethical procedures. The chapter concludes with a summary.

Research Design and Approach

For this study, I used a nonexperimental, quantitative, survey design. I selected this approach for several reasons. First, quantitative researchers seek to generalize results obtained from a sample population to the whole (Creswell, 2014), which suited the goal of this study. Second, as I discussed in Chapter 2, a survey method was often employed in similar studies. Third, the use of this approach provided for a design format that was simple for participants to follow, resulting in clear, statistically based results to report (Creswell, 2014). As quantitative researchers examine the relationship between variables (Creswell, 2014), a quantitative approach was an appropriate choice for this study. To address the primary research question through a comparison of group means, I sought to determine whether any of Kolb's (1984) LS (dependent variable) were directly associated with a particular learning environment (independent variable).

Methods

Population and Sampling

The target population for this study included adult students taking courses at institutions that were based in the United States, either on campus or online. I used convenience sampling to recruit participants through online means--social media sites and a large, international, online university's participant pool. Participants were placed into one of three research groups. A desired sample size was obtained through power analysis (using G*Power 3 software) for ANOVA, which I intended to use given my assumption that the data collected would be normally distributed. I will provide more details on the method used in Chapter 4. The sample size required for the three groups was 159 total participants (power $= .80$, effect size $f = 0.25$). The preferred sample size to account for potential fallout and incomplete participation was 190 total participants (159 $+ 20\%$).

My inclusion criteria for participants included a minimum age of 18 years, and students must have been currently enrolled in a course for credit toward a bachelor's degree or higher at an institution based in the United States. Students must have been taking courses delivered in English. Because I was focusing on learning environment, I did not be specifically focus on the grade level, major of study, or age distinctions. These variables have been previously studied in similar studies and will be considered for future extensions of this study. Demographic data were still obtained and analyzed, however, to provide descriptive information as well as to determine if any demographic information

correlated to LS in the population sample. No student that did not provide informed consent could participate in this study.

Recruitment

I recruited participants through social media ads, a personal research page created on a major social media site strictly for this study, and through a large midwestern online university's participant pool. Recruitment began only after I received Institutional Review Board (IRB) approval from my institution (approval #06-10-15-0025046). As I recently facilitated courses at a large university in northern California, it was possible that a few previous students may have participated. If they did participate they did so online, anonymously, and without any consideration for their course grades; participating in the study was voluntary, regardless of learning institution, and no credit was given for doing so.

I required all potential participants to agree to the informed consent document online prior to being linked to the LSI assessment site upon submission of a demographic survey. In the informed consent, I provided a description of the study and voluntary participation requirements and time, including the statement that participants may voluntarily withdrawal at any time. I also specified the requirements for remuneration that I provided upon verification of successful completion of participation. My contact information, and that of the IRB, was also included for questions regarding the study and participant requirements. Once students decided to participate, they answered demographic questions, chose their research group, and provided a first and last name. Participants were informed that they may provide a false name and that all names

provided were assumed to be fictitious. While participants were not required to provide their real names, names were required for them to access the LSI on the test holder's site, which I then used to verify participation. General demographic information collected included age range, sex, ethnicity, course level, GPA, their learning environment, an e-mail address (to receive an incentive) and their user name. Data were collected by the test holder (Hay Group) and subsequently retrieved by myself. Participants did not have access to their test scores.

I provided possible participants with information regarding the study goals and reinforcing participants' roles in achieving those goals on the study website. Participants were also informed that upon completion of the study, a summary of results would be uploaded to the study website so that they could review them. Upon completion of the study, participants received a statement of gratitude for participating with their remuneration, in the form of a $10 Amazon E-gift card, for completing participation requirements. No follow-up participation was required for this study. Students identified as not meeting inclusion criteria received a notice informing them that they did not meet the requirements of the study and thanking them for their interest.

Instrumentation

I selected the standardized test for this study, Kolb's LSI (The Hay Group, n.d.). In the following subsections, I will further describe this test. I will also discuss its use in my study.

LSI. The LSI was developed by Kolb and was based on Kolb's research dating back to 1971 (The Hay Group, n.d.; Kayes, 2005). Although the most recent version of

this assessment is Version 4, I selected to use Version 3 for this study for a couple of reasons. First, many more researchers have used Version 3 than Version 4, most likely due to the simple fact that it has been around longer. In addition, Version 4 has placed its focus on identifying all nine experiential LS/preferences. While this would have value for many applications, it is not in line with the standard four preferred LS that are routinely discussed in experiential learning theory, nor are they the LS that have been previously researched and upon which this study was based. Version 3 is an updated version in its own right, as it includes randomized items to increase test-retest reliability and to reduce bias (Kayes, 2005).

Kayes (2005) conducted reliability and validity testing on the LSI-3 and determined Cronbach's alpha scores ranging from .77 to .82 for each construct and combined AC-CE and AE-RO scores from .77 and .84, which suggested the test has sufficient internal reliability. In the study, construct validity was tested through correlational analysis. Kayes found that scale correlations ranged between -.18 and -.48, while inter-scale correlations ranged from .76 to .82. Because the correlations within scales were greater than the scores between scales, the constructs are considered to be distinct, and validity is supported (Kayes, 2005).

As with previous versions, Version 3 seeks to identify LS based on the four preferred phases of experiencing, reflecting, thinking, and acting (The Hay Group, n.d.). The LSI-3 presents 48 items in total, with the test taker ranking four sentence endings, following each of 12 sentence stems, in order of preference. For instance, the test taker would read a sentence stem, and then rank the four sentence endings in order from *most*

preferred (4) to *least preferred* (1). A total score is identified for each of the four learning

preferences. A combined score is then tabulated for each of the "two bipolar

dimensions…resulting in two dimensional scores that measure relative preference for the

CE-AC mode and the AE-RO dimensions" (Kayes, 2005, p. 251). These scores place the

test taker into one of the LS categories, as I have discussed previously in Chapter 2.

The LSI is administered by The Hay Group (n.d.), and as a potential researcher, I

completed an application and agreed to the sharing of study results with the organization

and chose the online test delivery method. While online administration was desired for

this study, The Hay Group charges an additional fee for this service, though I was

approved for a discount upon approval of my grant application through their website (The

Hay Group, n.d.). Even though paper-based administration of the LSI would be simple

for classroom-based students, it could have potentially resulted in a longer study overall

as the test would have to have been sent and received from online students through the

mail. Doing so could have also created a potential for additional study liability concerns,

as there would have been no way to guarantee anonymity of data. To save on study costs,

an alternative option would have been to administer paper-based tests to students

currently in the classroom, administered at a brick-and-mortar testing site and online

administration to current online students. This method, however, was still not ideal as it

creates the potential for additional study liability concerns from the unknown but

potential affect that the inherent biases of unique test administration methods yield. This

procedure option would have been more desirable for this study than a fully paper-based

administration would have been though, as it would not only cost less, but would have

also resulted in a quicker overall timeframe to study completion. The potential for the different test administration methods to significantly affect study results was minimal and were not perceived to have occurred, but should be mentioned nonetheless.

Analysis

I conducted descriptive statistics on demographic information, and Spearman's rho was conducted to identify any correlations between demographic data and LS (Research Question 1). In Research Question 2, I asked what the predominant LS are for each of the three learning environments (online, classroom, and combination) and if a significant difference exists. A comparison of means, specifically a one-way ANOVA, was intended to be used to determine if there was a statistically significant LS that was identified in each learning environment. For instance, through a comparison of means, one possible outcome was that the assimilator LS is predominant in online learners. I will present details on data analysis in Chapter 4.

Threats to Conclusion Validity

Threats to validity can result in two types of errors occurring. A Type I error results when the null hypothesis was true, but rejected (Mitchell & Jolley, 2004). A Type II error occurs when the null was false, but not rejected (Mitchell & Jolley, 2004). Many threats to validity, especially internal threats, are more commonly associated with experimental studies; however, several concerns still existed for this nonexperimental, survey study, especially those regarding conclusion validity.

The first threat was the random heterogeneity of respondents, which refers to the potential of variability in responses due to a diverse population (Trochim, 2006).

Participants in this study were adults over the age of 18, regularly attending courses in

any field of study through any number of colleges or universities, recruited from a pool of

millions of social media users and a large, international, online university based in the

United States, with a diverse student body. I reduced this threat by limiting the pool of

applicable participants by placing students into groups based on learning environment

and selecting students associated with universities located in the United States who are

taking courses in the English language. Even with the online option, this would have

reduced geographic variability. The possibility of cultural influences on participant

responses was expected to be considered in the case of unexpected results. Culture,

however, is a potential study variable for future research related to LS and learning

environments.

The second threat was that violated assumptions of statistical tests (Trochin,

2006) can occur when the procedures and assumptions as to the nature of the data do not

match. For instance, in this study, I assumed that data would be distributed on a normal

curve. An error might have occurred as this assumption was incorrect. To remedy this, I

conducted tests of normality prior to data analyses to ensure I utilized the proper

constructs.

Third, threats based on the reliability of the instrument were concerns for this type

of study. Using a standardized, related assessment with previously identified measures of

validity and reliability in this study reduced reliability threats. Finally, sample size can

also affect error rates. I conducted a power analysis for sample size, using GPower3

software, to reduce this threat by ensuring enough participant data were included in the analysis.

Ethical Procedures

There were three major concerns regarding ethics for this study. These included ethical procedures including IRB agreements, data protection, and the potential for conflicts of interest. As this study was noninvasive in nature and the topic should have been negligibly sensitive for participants, ethical concerns were minimal. No relationship, legal, or physical risks were expected nor was the participation by vulnerable individuals.

The main concern was that participants were given correct information through recruitment and prior to their assessment as to the requirements of participating, the requirements for remuneration, and the confidentiality of results. I addressed these issues in both recruiting materials and provided informed consent prior to the actual taking of the test. Furthermore, should participants have found the questions overly stressful or traumatic in any way, the participants were free to leave the study at any time, as was disclosed as part of the informed consent agreement required for participation.

Confidential data was stored offline on a password protected encrypted disk (USB), and is accessible only by me, with permission from the test holders. I will share raw data and results with The Hay Group, as is required by their use agreement for the test; however, as no personally identifying information was required, and user names were assumed to be fictitious, confidentially will remain secured. Testing data in my possession will be destroyed after 5 years.

Procedures

I conducted this study following approval by my institution's IRB to ensure

ethical considerations were accounted for and properly addressed. Once approvals were

granted I began actively recruiting for participants. During this process basic information

regarding this study was disclosed to them. I informed potential participants of the nature

and purpose of the study, the requirements to participate, what participants could expect

during the study, requirements for receiving an incentive for participating, and provided a

statement regarding their confidentiality. Confidentiality was assured in this study since

no personally identifying qualification questions were required of participants, and it was

assumed that all names provided were false. Participants were assigned to a research

group based on their learning environments. Their assignments, along with their chosen

participant names, were the only participant identification that was used in the study,

though general demographic data were collected and analyzed. No personally identifiable

information was required or specifically obtained. Participants were asked to select their

learning environments as part of the demographic survey, which participants completed

after reviewing the informed consent and prior to being given a link to the LSI.

Participants were notified that by submitting their demographic survey and continuing to

the test site, they were providing their consent to participate. The testing was conducted

online eliminating the potential for participant recognition on my part.

Participants were provided an online informed consent agreement, with the

statement that their continuation in the study would be evidence of their acceptance to it,

prior to being admitted to the LSI testing site. The informed consent document included

detailed information regarding the study's purpose and what the participants could expect (time requirement, etc.). The document also identified the potential benefits and risks of participation including a statement regarding the requirements for receiving an incentive for participating. I also clearly stated that participants had the right to withdrawal from the study at any time and for any reason, without penalty. Finally, contact information was included so the participants could contact me, as the researcher, for any questions or concerns they might have had.

Dissemination of Findings

It is of great importance that results of all scholarly research be shared, regardless of the significance of results. In an effort to fill the gap in the literature this study addressed, dissemination of the findings will occur in a couple of ways. First, a summary of the results will be provided on the social media page developed for this study. Second, the initial presentation will be made at my university's annual research symposium. Third, the dissertation will be published in its entirety upon completion. Finally, I will submit an abridged version to meet the requirements of an undisclosed peer-reviewed journal. It is also intended that this study, while providing additional information in the area of LS and learning environments, will provide for future studies through its expansion and modification. A specific recommendation for future examination of the relationship between LS, learning environment, and critical thinking disposition will be provided in Chapter 5.

Summary

In this nonexperimental, quantitative study, I sought to identify significant differences in LS between students of different learning environments. In Chapter 3, I discussed the methodology for this study. Participant requirements and test administration methods were presented, as were details on the LSI (The Hay Group, n.d.), including reliability and validity statistics. A desired total sample size of 190 was found using GPower3 software for a power of .80, $p < .05$, plus consideration for potential participant drop out to result in 159 counted assessments needed. I identified the use of ANOVA for this study, and threats to validity were presented. Additionally, I discussed ethical considerations and procedures, as well as plans for dissemination of the findings, which concluded the chapter.

Chapter 4 will include detailed data collection and test result information. In this chapter, I will provide specific descriptive and inferential statistics of the data used to test the hypotheses. Additional statistics beyond ANOVA will also be presented, such as with post hoc analyses as tests for nonnormally distributed data.

Chapter 4: Results

Introduction

An important aspect of recent learning research has been how adults learn and what is needed to support their learning more effectively. Much of this research has been based on Kolb's (1984) model of experiential learning while incorporating the associated LSI (see Akkoynunlu & Soylu, 2008; Almeida & Mendes, 2010; Kolb et al., 2001; Massey et al., 2011; Topçu, 2008.) Although Kolb's model can be argued to be one of the most prominent contributions to the discussion of LS and experiential learning, research results using Kolb's model of ELT and the LSI have been limited and with often inconsistent results (Akkoynunku & Soylu, 2008; Almeida & Mendes, 2010; Spears et al., 2008; Topçu, 2008). To investigate Kolb's model when applied to adult learners, I designed this study to expand the literature in this area by using the LSI in a lesser-explored area of research and LS – learning environments. The purpose of this study was to identify a significant difference in LS of students in different learning environments. The research was guided by two research questions. The first question was focused on whether LS and any demographic markers were correlated. The second was focused on determining if there were any significant differences in LS in different learning environments.

In this chapter, I will present the results of my study and provide a description of the demographics and analyses of data. I will include a presentation of final data collection procedures and demographics of the sample, as well as the results related to the research hypotheses. I will conclude the chapter with a summary.

Data Collection

I collected data over a period of 2 months in the summer and fall of 2016. Recruitment for participants was done through social media with the use of pay-per-click ads in a large social media site. Convenience sampling was used; however, participants were not limited to physical location. Furthermore, I conducted recruitment online through a very large, popular, internationally available social media site that did not limit membership to any particular ethnicity, age, gender, education, socioeconomic status, etc. The only true membership requirement is Internet access. This allowed for a very large target population pool to be reached and recruited. Advertisements were promoted only on pages with visitors meeting desired criteria. Some designators for ad placement included items such as *adult education, university,* and *learning,* with the beginning desired audience age of 18. Interested individuals clicked on the ad and were taken to a website specifically designed to recruit participants and collect demographic information. The study website included information regarding participation requirements, background information, instructions for participating, and remuneration requirements. Participants were also directed to read the informed consent page on the site and were informed that they were providing their consent by participating. Once participants chose to begin the study, they were directed to the instructions page where they completed the demographic survey. Upon completing and submitting the demographic survey, participants were taken to the sign-in page for The Hay Group (n.d.) to begin the LSI.

As I described in Chapter 3, the LSI Version 3 is comprised of 12 questions with 48 total items. There are 12 sentence stems, each with four possible sentence endings that

the participant ranks in order of preference from *most preferred* (4) to *least preferred* (1).
The LSI has shown reliable results with Cronbach's alpha scores between .77 to .82 for
each learning preference and with combined scores for the AC-CE and AE-RO axes
ranging from .77 to .84 (Kayes, 2005). Kayes (2005) also conducted correlation analysis
to determine construct validity and found scale correlations ranging between -.18 and -.48
and inter-scale correlations ranging from .76 to .82. Kayes determined the assessment to
be valid as correlation results indicated distinct test constructs.

To verify study completion, I compared my demographic surveys received to the
list of completed assessments through my administrator page for The Hay Group. Once
verified, I sent all participants who provided a valid e-mail address a $10 Amazon E-gift
card. Assessment data were collected by the copyright holders and forwarded to me upon
completion of my data collection. No answers to individual questions were provided.

Results

Sample Demographics

My analysis of the pay-per-click advertisements indicated that 96,148 people of
the targeted population were reached. Of those, 2,909 (3%) clicked on the ad and were
taken to the study website. From those reviewing the study information and informed
consent on the site, a total of 192 (6.6%) participants signed into the assessment site,
while 180 (93.75%) of those participants completed the assessment.

The demographics of the 180 participants completing the LSI included mostly
females (72.8%). The majority (87.3%) of participants were between 18 and 30 years old
with about half of the participants identifying as White (55%). Most participants were

undergraduates, with only 6.7% completing graduate or doctoral courses. Participants

appeared to be successful students as the majority (79.4%) indicated GPAs over 3.0. The

online group included 61 (33.9%) participants, the classroom group included 62 (34.4%)

participants, and the combination group included 57 (31.7%) participants. Tables 1 and 2

provide more detailed summaries of participant demographics as they pertain to the

overall study (Table 1) and each learning group (Table 2).

Hypothesis 1: Demographics

I expected to find a relationship between at least one demographic variable and

LS in one or more learning environments. I used Spearman's correlation for each learning

environment group as it provides a useful analysis even when data are not normally

distributed (George & Mallery, 2008). A nonnormal distribution was indicated by

analysis with the Kolmogorov-Smirnov one-sample test: All demographic categories

returned significant results with $p < .05$ for all measures in each learning environment

group.

Table 1

Demographic Summary of Study Sample (N=180)

Characteristic	N	%
Age		
18–24	91	50.6
25–30	66	36.7
31–40	9	5.0
41–50	3	1.7
51+	8	4.4
No response	3	1.7
Gender		
Male	48	26.7
Female	131	72.8
No response	1	.6
Ethnicity		
White	100	55.6
Black	33	18.3
Asian	14	7.8
Hispanic	22	12.2
Other/no response	11	6.1
Grade Level		
Lower division undergraduate	99	55.0
Upper division undergraduate	65	36.1
Graduate	7	3.9
Doctoral	5	2.8
Other/no response	4	2.3
GPA		
2.0–2.49	1	.6
2.5–2.99	33	18.3
3.0–3.49	90	50.0
3.5–4.0	53	29.4
No response	3	1.7

Table 2

Demographic Summary of Learning Environment Samples

Characteristic	Gr. 1 *n* (%)	Gr. 2 *n* (%)	Gr 3. *n* (%)
Sample Size (*N*)	61 (100)	62 (100)	57 (100)
Age			
18–24	19 (10.6)	39 (62.9)	33 (57.9)
25–30	25 (13.9)	17 (27.4)	24 (42.1)
31–40	5 (2.8)	4 (6.5)	0 (0)
41–50	3 (1.7)	0 (0)	0 (0)
51+	6 (3.3)	2 (3.2)	0 (0)
No response	3 (1.7)	0 (0)	0 (0)
Gender			
Male	13 (7.2)	17 (27.4)	18 (31.6)
Female	47 (26.1)	45 (72.6)	39 (68.4)
No response	1 (.6)	0 (0)	0 (0)
Ethnicity			
White	37 (20.6)	38 (61.3)	25 (43.9)
Black	10 (5.6)	11 (17.7)	12 (21.1)
Asian	6 (3.3)	5 (8.1)	3 (5.3)
Hispanic	4 (2.2)	6 (9.7)	12 (21.1)
Other/no response	4 (2.2)	2 (3.2)	5 (8.8)
Grade Level			
Lower division	25 (13.9)	31 (50.0)	43 (75.4)
Upper division	22 (12.2)	29 (46.8)	14 (24.6)
Graduate	6 (3.3)	1 (1.6)	0 (0)
Doctoral	4 (2.2)	1 (1.6)	0 (0)
Other/no response	3 (1.7)	2 (3.2)	0 (0)
GPA			
2.0–2.49	1 (.6)	0 (0)	0 (0)
2.5–2.99	9 (5.0)	14 (22.6)	10 (17.5)
3.0–3.49	22 (12.2)	35 (56.5)	33 (57.9)
3.5–4.0	26 (14.1)	13 (21.0)	14 (24.6)
No response	3 (1.7)	0 (0)	0 (0)

Note. Gr. 1 = online learning group; Gr. 2 = classroom learning group; Gr. 3 = combination learning group. Percentages included in parentheses. Lower division/upper division = lower/upper division undergraduate.

Online learning environment. Results of the Spearman's correlation for the online group ($n = 61$) indicated that a significant relationship existed between LS and age ($r_s = .256, p < .05$). Nearly three-quarters (73.8%) of the online group participants were identified as having a diverging LS, while most participants were between 25–30 (41.0%) or 18–24 (31.1%) years old. No other demographics were significantly correlated with LS in the online group. Figure 1 shows a comparison of distributions for age and learning styles.
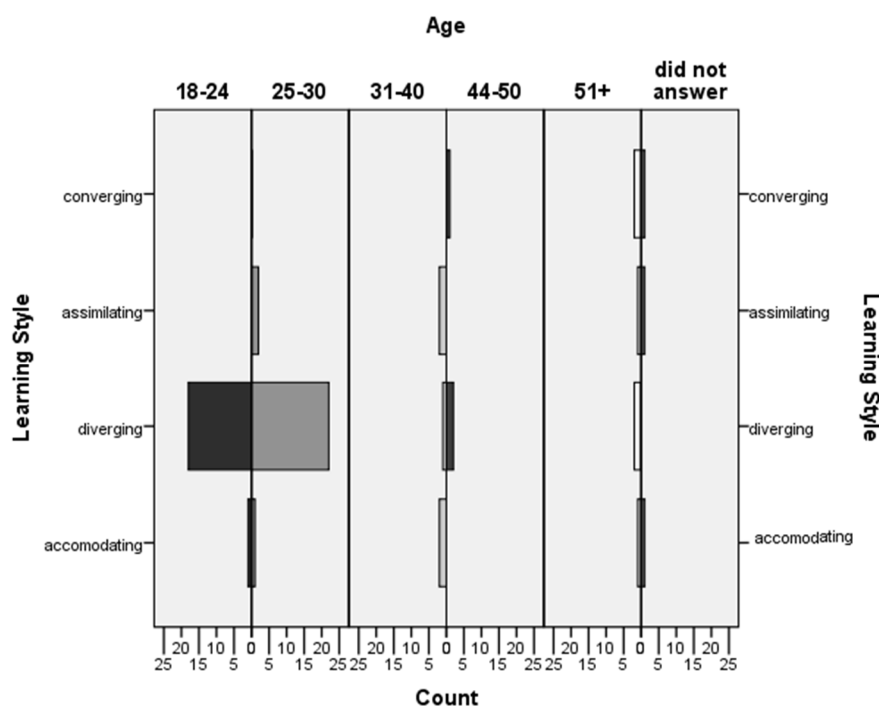

Figure 1. Frequency distribution of learning styles and age ranges for participants in the online group ($n = 61$).

Classroom learning environment. Spearman's correlation identified a significant relationship between LS and grade level ($r_s = .305, p < .05$) in the classroom ($n = 62$) learning environment. The majority of participants in this group were identified as divergent learners (83.9%). Nearly all participants in this group were undergraduates,

either lower division (50%) or upper division (46.8%). Only two participants (3.2%)

reported being graduate or doctoral students. No other significant correlations between

LS and demographic categories were identified. Figure 2 shows a graph representing the

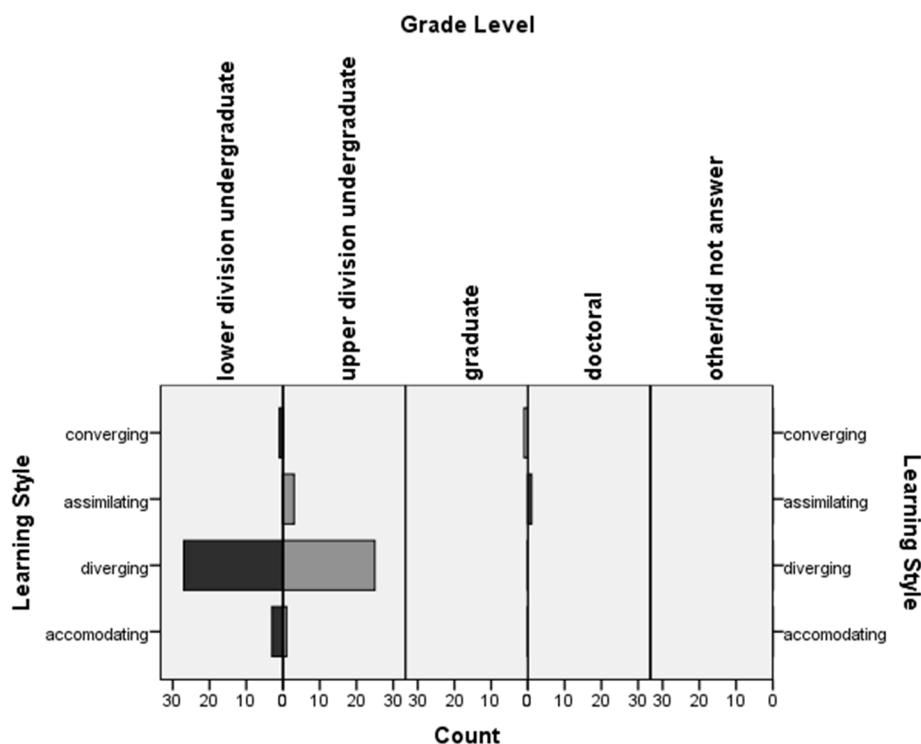frequency distributions of the LS and grade level categories.

Figure 2. Frequency distribution of learning styles and grade levels for participants in the classroom learning environment group (*n* = 62).

Combination learning environment. Results of my Spearman's correlation

analysis indicated there were no significant relationships between any demographic

category and LS in the combination (*n* = 57) learning environment group at the *p* < .05

level. All of the participants in this group were between 18 and 30 years old. This group

was also the most diverse with the majority identifying as White (43.9%) while both the Black and Hispanic categories each included just over 21% of the group participants.

Summary. Results of my correlation analysis for LS and demographics in each learning environment provided statistically significant results in two of the three learning environment groups. Research Hypothesis 1 focused on the correlation between one or more demographic categories and LS. Since LS was correlated with age in the online group and grade level in the classroom group, Research Hypothesis 1 was supported.

Hypothesis 2: Learning Styles

In the second hypothesis, I predicted a significant difference in LS between learning environment groups, based on participants' responses to the LSI. Data showed a kurtosis measure > 2.0. The Kolmogorov-Smirnov test at $p < .05$ indicated significant results for the learning environment groups and LS supporting my assumption that data were not normally distributed. Because of the nonnormal distribution of data, I used a Kruskal-Wallis H test to compare the three groups instead of the planned one-way ANOVA (BBN Corporation, 1997). There was no significant difference in LS between the three learning environment groups $H(2) = .473, p = .789$.

I conducted an additional analysis using the Kruskal-Wallis to look for any differences in specific learning preferences between learning groups. No significance was found for any learning preference - AC, CE, AE, nor RE. AE was nearing significance $H(2) = .5182, p = .075$ with mean ranks of 102.43 for online learners, 81.89 for classroom learners, and 87.10 for combination learners. Tables 3 and 4 provide results for all five learning preferences in detail.

Table 3

Results of Kruskal-Wallis Test for Learning Preferences between Learning Groups ($N = 180$).

Learning Preference	Group	N	Mean Rank
Abstract Conceptualization	Online	61	88.48
	Classroom	62	88.03
	Combination	57	95.35
Concrete Experience	Online	61	81.18
	Classroom	62	98.37
	Combination	57	91.91
Active Experimentation	Online	61	102.43
	Classroom	62	81.89
	Combination	57	87.10
Reflective Observation	Online	61	91.39
	Classroom	62	90.83
	Combination	57	89.18

Table 4

Test Statistics for Kruskal Wallis Test of Learning Preferences between Learning Groups (N = 180).

_____

	AC	CE	AE	RO
Chi-Square	.737	3.439	5.182	.057
df	2	2	2	2
Asymp. Sig.	.692	.179	.075	.972

_____

Note. AC = Abstract Conceptualization; CE = Concrete Experience; AE = Active Experimentation; RO = Reflective Observation.

Summary. No significant results were found when measuring LS between learning environment groups. As such, I was unable to reject $H_0 2$. I therefore concluded that there was not a significant LS associated with a particular learning environment with the given study design.

Summary

In this chapter, I presented information relating to the data collection procedures and demographics of participants as well as the results of statistical analyses relating to Hypotheses 1 and 2. Data were collected through the test holder's website for the LSI (The Hay Group, n.d.). Participants were recruited with pay-per-click ads on a widely known social media site and through submission to a single university's participant pool. Interested participants were taken to a website designed specifically for recruitment purposes where they reviewed information on participating and providing consent. Participants were then routed to the assessment site after completing a demographic survey.

I received a total of 180 completed assessments. My Spearman's correlation analysis provided support for Hypothesis 1 indicating significant relationships between LS in both the online and classroom groups based on demographics (with age showing

significant in the online group and grade level showing significant in the classroom

group). The Kruskal-Wallis did not provide results supporting Research Hypothesis 2,

however. As such, $H_0 2$ was not rejected as I identified no significant LS in any learning

environment. Upon deeper examination of the data, the only learning preference nearing

significance with the nonparametric Kruskal-Wallis test at the $p < .05$ level was AE. I

identified no difference between the classroom and combination groups.

In the next chapter, I will present a discussion on my interpretation of these

findings. I will also discuss the limitations and implications of the study. Additionally, I

will provide my recommendations for future research.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of the present study was to determine if there were significant differences in LS between adult students of different learning environments; the goal was to provide direction to those creating and/or altering curricula or teaching methods to better support student learning in each learning environment. I conducted this study using Kolb's LSI (The Hay Group, n.d.), with 180 assessments included in analyses ($p < .05$). Participants were adult students (at least 18 years old) taking courses counting toward a bachelor's degree or higher, taking courses either online, in a traditional classroom, or through a combination of both online and classroom courses.

I addressed two research questions in this study. I developed the first to determine if there was a significant correlation between any analyzed demographic factor and LS. I used the second to identify significant differences in LS between learning environment groups. My results, presented in Chapter 4, suggested that there were some relationships between LS and age and grade level in different learning environments; however, I was unable to identify a significant difference in LS between groups.

In this chapter, I will provide a discussion of my results. The following sections will include my interpretation of the findings and limitations of the study. I will also provide recommendations for future research and discuss study implications.

Interpretation of the Findings

Previous research using Kolb's (1984) model of experiential learning and the LSI was often limited in scope, with several studies having small sample sizes (Almeida &

Mendes, 2010; Knapke et al., 2016; Spears, 2008), a limited range of demographics or participant areas of interest such as learning majors (Aliakbari & Qasemi, 2012; Almeida & Mendes, 2010; ALQahtani & Al-Gahtani, 2014; Knapke et al., 2016; Spears, 2008; Topçu, 2008), or providing contradictory results to Kolb's model (Almeida & Mendes, 2010; Platsidou & Metallidou, 2009). I designed this study to further the discussion in this area while providing a larger sample size than some previous studies, eliminating the emphasis on limited demographics or learning major, while focusing on learning environment and further contributing to the discussion regarding Kolb's model and the LSI. My ultimate goal, however, was that educators could use the results to help develop or modify learning environments to better support student learning. The following sections will include a discussion of the results presented in Chapter 4 as they relate to the research hypotheses of this study.

Hypothesis 1: Demographics

The first hypothesis expressed my expectation that LS would significantly correlate with at least one demographic measure in one or more learning environments. I used Spearman's correlation analysis to measure the relationship between LS and the demographics of age, gender, ethnicity, grade level, and GPA in each of the three learning groups (online, classroom, combination). While the research hypothesis was supported, the results still provided for a series of conjectures.

Results for the online group ($n = 61$) identified that the majority (73.8%) of group participants were divergent learners between the ages of 18 and 30 years old. While there was a significant correlation between LS and age ($r_s = .256, p < .05$), LS did not

significantly correlate with any other demographic in this group, nor was age

significantly correlated with LS in any other learning environment group. This result

challenged Knapke et al.'s (2016) suggestion that learning environment is determined by

lifestyle factors and not LS; however, just over a quarter of participants were over 30, and

a wider spread of participant ages may yield different results.

In the classroom group ($n = 62$), only grade level was significantly correlated with

LS ($r_s = .305, p < .05$). The majority (96.8%) of participants in this group were

undergraduates. As with the online group, most learners (83.9%) were identified as

divergent. This was a somewhat unexpected result. On the one hand, many previous

studies identified most participants as divergent learners, so this was not a wholly

unexpected result in this study. Some researchers have suggested that students may lean

toward the divergent style more consistently the longer they spend in their learning

programs (Almeida & Mendes, 2010; ALQahtani & Al-Gahtani, 2014). If this were the

case, then I would expect to see more variation in LS in the undergraduate group as only

a very small number of participants were graduate or doctoral students ($n = 12$), making

up only 6.7% of the total sample size. Interestingly, when compared to the online group,

the classroom group showed a higher percentage of divergent learners. It might be

expected that the majority of undergraduates are younger on average than graduate

students; however, the majority of participants in this study, across all groups, were under

30, but age was correlated with LS in the online group only.

Further fueling the discussion on the validity of Kolb's (1984) model is the fact

that no demographic was correlated with LS in the combination ($n = 57$) group even

though 100% of the participants in this group were both under 30 and undergraduates. Given the results in the online and classroom groups, I initially expected that at least one of the variables, age or grade level, would correlate with LS in the combination group as well. Upon further review of the literature, however, I cannot support my initial assumption given the validity concerns of Kolb's model and LSI. Also weakening my initial assumption was the identification of different needs between online and classroom learners.

For instance, in a discussion presented by Knapke et al. (2016) based on their study results, there was a disparity between learning level and learning environment, suggesting that established professionals working full time or attending courses to improve skills or other personal reasons other than obtaining a degree may gravitate toward the online learning environment. Alternately, those who are working part time and are degree seeking may be more prevalent in classroom courses as they are more flexible in their availability (Knapke et al., 2016). Although the participants in this study were all under 30 years old and degree-seeking undergraduates in the combination group, the employment conditions were unknown. This variable could have influenced the results with regard to learning environments. Furthermore, even though there was a noticeable difference in student body between the online and classroom courses, Knapke et al. also stated that LS were fairly even between learning environments. This supports my findings that did not identify a dominant LS in the combination group.

Hypothesis 2: LS

In the second hypothesis, I stated the expectation that a significant difference in LS would exist between learning environments. The null hypothesis failed to be rejected as there was no significant difference in LS between the three learning environment groups with $H(2) = .473$, $p = .789$. This seems counterintuitive, as I expected a difference in online learners' LS from classroom learners' LS given potential differences in lifestyles (Knapke et al., 2016), though earlier studies had similar results. For instance, Knapke et al. (2016) reported no significant difference in LS between the online or classroom groups.

Interestingly, although in this study I did not identify participants' major fields of study, the majority of participants in this study as well as in previous studies (Akkoyunlu & Soylum 2008; Aliakbari & Qasemi, 2012; Almeida & Mendes, 2010; ALQahtani & Al-Gahtani, 2014; Knapke et al., 2016; Massey et al., 2011) were identified as predominantly divergent learners, with the second predominant groups being assimilating and accommodating. Even though the discovery of the divergent LS being predominant in this study supported findings in earlier studies, it raised some questions regarding the validity of Kolb's (1984) model.

According to Kolb et al. (2001), it is expected that most learners in psychology or social work fields would be divergent learners, while most learners in business fields are accommodating. Assimilating learners would be expected to be involved in science and research-based fields (Kolb et al., 2001). The literature, however, showed mixed results. For instance, Massey et al. (2011) and Almeida and Mendes (2010) demonstrated that

diverging and accommodating LS were predominant, while only the participants in the Massey et al. study were in social work. In addition, even in the participant group of this study, there was a large accommodating group. Alternately, in the Almeida and Mendes study, most participants in language and science-based fields were accommodating learners, including the biotechnology group that Kolb's (1984) model would suggest to be converging. Additionally, ALQahtani and Al-Gahtani (2014) stated that the divergent LS was predominant among their participants and identified that most assimilating learners were in their preclinical years of their dental program. Even so, they reported that the majority of assimilator learners were later identified as divergent once they had reached their clinical years.

Alternately, there have been some studies that were more in line with Kolb's (1984) model. These include research conducted by Akkoyunlu and Soylu (2008) and Aliakbari and Qasemi (2012). In both studies, the authors identified participants as being divergent or assimilating learners. Akkoyunlu and Soylu included participants in education, while Aliakbari and Qasemi's participants were language learners.

As the literature showed a predominance for the diverging LS with no true consistency in learning fields, the fact that I did not obtain learning major information of the participants in this study, but still recognized the majority of participants as divergent both supported the previous body of literature and further challenged Kolb's (1984) learning model. In this study, I either attracted mostly students in the social sciences, art, or communication fields or had a majority of divergent learners from potentially varied

learning fields, which would support the need for continued debate regarding the validity of Kolb's learning model.

Limitations of the Study

Several limitations arose during this study. The first was with generalizability. As I conducted this study with participants obtained through convenience sampling, it inherently lacks the level of generalizability that true random sampling may provide. The participants were limited to members of a social media site where recruitment ads ran and to students participating in a single university's participant pool. While this resulted in the opportunity for a largely diverse participant pool, there was surprisingly limited variability in the participants' ages, grade levels, and LS of those who completed the survey. One speculation for this may be that younger students found the remuneration offered appealing and were more willing to participate. Another may be that the majority of participants were obtained through the social media site as opposed to the online university participant pool. The social media site, with members of all ages, appears to be made up of a younger population of active members, which may have limited the exposure of the recruitment ad to older adults who may participate less frequently. Additionally, some members may not have realized that they could click on the ad to participate in the study.

Another limitation was that there are questions as to the reliability and validity of the LSI, even though it was previously determined to be valid (Kayes, 2005). Previous researchers (Almeida & Mendes, 2010; ALQahtani & Al-Gahtani, 2014; Massey et al., 2011) identified LS in sample populations that did not align with Kolb's (1984) model. In

this study, I also found a limited range of LS in the sample population, with the divergent style being predominant. While this was similar to previous studies (Akkoyunlu & Soylum 2008; Aliakbari & Qasemi, 2012; Almeida & Mendes, 2010; ALQahtani & Al-Gahtani, 2014; Knapke et al., 2016; Massey et al., 2011), it may not be as representative of participants' learning preferences and learning needs. For instance, if LS are fluid and can change given an individual's learning situation (Massey et al., 2011) or learning experience (Bergsteiner et al., 2010), the fact that the majority of participants in this study were similar in age and grade level may have limited the LS identified. In other words, if I had obtained a more varied sample in terms of age and grade level, there might also have been more variability in LS. Additionally, there were participants who did not complete the survey and whose data were not included in the analysis. If they were included, they may have provided for a slightly more varied sample population.

The method of anonymous recruiting and testing online also presented limitations. Even though participant requirements were clearly expressed, without being able to visually identify and verify participation, there may have been participants not meeting the requirements. If this occurred, this would have reduced the reliability of this study.

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

As mentioned in Chapter 1, this study was intended to precede additional research in the area of LS by examining its relationship to critical thinking and critical thinking disposition. As previously discussed, increasing globalization and the need for higher level thinking have created a shift in adult education to prepare students for the workplace (Miller, 2006). Furthermore, Andreou et al. (2013) cited in their review of the

literature that experiential learning can affect critical thinking. As such, my primary recommendation is that future research be developed to investigate the association of LS and critical thinking in different learning environments. Similar to the research presented earlier regarding Kolb's (1984) model and the LSI, research in the area of critical thinking and LS has been plentiful, although the literature demonstrated mixed results in both data and presentation of results.

For instance, Zhang and Lambert (2008) and Beşoluk and Önder (2010) found significant correlations between critical thinking disposition and LS. However, following Kolb's (1984) model and utilizing the LSI were studies by Suliman (2006), Yenice (2012), and Wessel and Williams (2004) that all addressed the relationship between critical thinking disposition and LS in their studies, but their chosen student populations were limited to specific majors. In one study, Yenice attempted to answer three questions related to critical thinking disposition and LS in a sample of preservice science teachers and found significant results between critical thinking disposition and LS. Unlike the studies by Zhang and Lambert, Beşoluk and Önder, and Yenice, however, Suliman's (2006) research to determine the thinking styles and critical thinking disposition of nursing students in conventional and accelerated programs and to determine a correlation between critical thinking disposition and LS in nursing students demonstrated nonsignificant results between the programs with regard to the relationship between critical thinking disposition and LS. Similarly, Wessel and Williams's research of a physical therapy program to examine the effects on its students' critical thinking and disposition, as well as to determine a relationship between critical thinking and LS,

concluded with the authors finding no correlation between critical thinking and critical thinking disposition, nor between the LSI categories.

In addition to research of LS and critical thinking disposition in different learning environments, I recommend future research stemming directly from the results of the present study. Based on previous research presented, I recommend future researchers incorporate large sample sizes focusing on LS in major areas of study. While the quantity of previous studies in this area is plentiful, they were often limited in sample size, or to a particular field of study or recruitment location. A large-scale, multidisciplinary study including participants from multiple universities may provide for a more reliable determination of the validity of Kolb's (1984) model. Furthermore, I suggest that researchers focus on employment conditions, student status, and LS, as the present study did not account for these variables but still provided results that raised questions when compared to current arguments in the literature (Knapke et al., 2016).

Given the limitations previously described of online recruitment and administration, I recommend replicating the present study but administering the instrument face-to-face. This would reduce the reliability concern that participant requirements may not have been met by all participants. In addition, I recommend recruitment through multiple universities. While it would be ideal to replicate this study in person in universities across the nation, it may not be practical. Multiple future studies, however, might focus on LS and learning environments regionally, with a meta-analysis being conducted for a national comparison.

Implications

I designed this study to provide guidance toward the development and alterations of learning environments to meet adult students' learning needs based on their LS preferences. The development of supportive learning environments to adult learners could greatly impact social change if students are not only more successful based on achievement scores, but are able to use what they learn effectively in real world applications, which is a current focus in adult education (Miller, 2006). This has shown to be difficult, however, as the literature, and indeed this study, have identified inconsistencies in the variables affecting LS. For instance, the results of the present study support previous research (Almeida & Mendes, 2010; ALQahtani & Al-Gahtani, 2014; Knapke et al., 2016) in that it identified correlations between LS and age or grade level in online or classroom environments. The present study did not, however, identify differences in LS between groups though the divergent LS was predominant in all three learning environment groups. Previous research has also identified the divergent LS as being predominant (Akkoyunlu & Soylum 2008; Aliakbari & Qasemi, 2012; Almeida & Mendes, 2010; ALQahtani & Al-Gahtani, 2014; Knapke et al., 2016; Massey et al., 2011) even though this LS conflicted with Kolb's expectations in several instances with relation to education field and LS associations. Further investigation is needed regarding Kolb's (1984) model and the LSI to ensure understanding and limitations, and to provide suggestions for model and assessment improvements so it may be used more effectively to foster greater adult learning.

Additionally, further research is needed to identify the variables affecting LS, which could influence the development of learning environments. For instance, based on the results of earlier research (Almeida & Mendes, 2010; ALQahtani & Al-Gahtani, 2014) the needs of adult students established in their programs may be different from those just beginning their studies. If so, this might suggest that learning environments be altered for advanced courses. The present study was unable to argue against ALQahtani and Al-Gahtani (2014) and Almeida and Mendes' (2010) findings, as even though there was not a large variability in age or grade level in the sample population, there were significant correlations between them and LS. It is my determination that only after consistency in research is achieved can Kolb's (1984) model and results on the LSI be confidently used to impart recommendations directly informing social change.

Conclusion

Adult education is evolving to reflect the need of learners to apply what they know in the workplace (Miller, 2006). With this comes the responsibility of creating and administering learning programs that are more suited to today's education needs. The research in adult education at this time is extensive, though there is one area that has received much interest given its perceived direct association with learning and the conflicting results being generated in current studies. This research focus is LS, namely LS based on Kolb's (1984) model and LSI.

Previous research has indicated weaknesses in Kolb's design of the LSI, and even in his learning model itself (Bergsteiner et al., 2010; Platsidou & Metallidou, 2009), Still, Kolb's (1984) ELT and LSI are widely used to guide studies of adult learning. This has

created a debate in the literature as to its validity since several studies have found conflicting results to Kolb's expectations (Almeida & Mendes, 2010; ALQahtani & Al-Gahtani, 2014; Massey et al., 2011).

To address a gap in current research related to adult learning while contributing to the discussion of Kolb's (1984) model and LSI, I designed this study to identify if LS could be correlated to a number of different demographic characteristics. I also sought to determine if there was a difference in LS between online, classroom, and combination learning environments. The LSI-3 online was used and the results provided support for some earlier studies that conflicted with Kolb's model.

Age or grade level was correlated with LS in online or classroom groups. This supports the suggestion by ALQahtani and Al-Gahtani (2014), and Almeida and Mendes (2010), that LS may change as the learner becomes established in the individual's learning program. This has significance as it indicates a need for reevaluation of advanced courses or programs to ensure they are suitably designed for experienced learners. Further research is needed in this area, however, to determine if this suggestion should be applied to all learning environments as both age and grade level were correlated with different learning groups.

The predominant LS in this study was the divergent LS. This is supported by previous studies that also identified the divergent LS as predominant, even when the sample population assessed did not meet demographic expectations prescribed by Kolb (Almeida & Mendes, 2010; ALQahtani & Al-Gahtani, 2014; Massey et al., 2011). Understanding the divergent LS may be useful in establishing learning programs as it was

widely identified as a preferred LS. The results of this study support the questions

regarding the validity of Kolb's (1984) model and the LSI. Further research is needed to

identify where consistencies lay to be used to improve Kolb's model and the LSI so that

it may be used more confidently in support of current learning needs.

References

Aderinto, J. A. (2006). An overview of selected theories of adult learning. *International Journal of Learning, 12*(12), 139–143. Retrieved from Education Source database. (Accession No. 24964325)

Akar, H., & Yidirim, A. (2010). Effect of constuctivist learning on student achievement in pre-service teacher education. *New Educational Review, 21*(2), 57–70. Retrieved from http://www.educationalrev.us.edu.pl/

Akkoyunlu, B., & Soylu, M. Y. (2008). A study of students' perceptions in a blended learning environment based on different learning styles. *Educational Technology & Society, 11*(1), 183–193. Retrieved from http://www.ifets.info/

Aliakbari, M., & Qasemi, N. (2012). On the relationship between Iranian EFL learners' learning style preference and their gender, proficiency level and achievement score. *International Journal of Pedagogies & Learning, 7*(3), 275–283. doi:10.5172/ijpl.2012.7.3.275

Almeida, P. A., & Mendes, R. (2010). Learning style preferences across disciplines. *International Journal of Diversity in Organisations, Communities, & Nations, 10*(2), 285–302. Retrieved from SocINDEX with Full Text. (Accession No. 65534349)

ALQahtani, D. A., & Al-Gahtani, S. M. (2014). Assessing learning styles of Saudi dental students using Kolb's Learning Style Inventory. *Journal of Dental Education*, 78(6), 927–933.

Andreou, C., Papastavrou, E., & Merkouris, A. (2013). Learning styles and critical

thinking relationship in baccalaureate nursing education: A systematic review. *Nurse Education Today, 34*(3), 362–371. doi:10.1016/j.nedt.2013.06.004

Artino, A. R., Jr. (2008). Promoting academic motivation and self-regulation: Practical guidelines for online instructors. *TechTrends: Linking Research & Practice to Improve Learning, 52*(3), 37–45. doi:10.1007/s11528-008-0153-x

BBN Corporation. (1997, February 20). Prophet StatGuide. Retrieved from http://www.basic.northwestern.edu/statguidefiles/sghome.html.

Belzer, A. (2004). "It's not like normal school": The role of prior learning contexts in adult learning. *Adult Education Quarterly: A Journal of Research and Theory, 55*(1), 41–59. doi:10.1177/0741713604268893

Bergsteiner, H., Avery, G. C., & Neumann, R. (2010). Kolb's experiential learning model: Critique from a modelling perspective. *Studies in Continuing Education, 32*(1), 29–46. doi:10.1080/01580370903534355

Beşoluk, Ş., & Önder, İ. (2010). Investigation of teacher candidates' learning approaches, learning styles and critical thinking dispositions. *Ilkogretim Online, 9*(2), 679–693. Retrieved from http://ilkogretim-online.org.tr/

Brooks, J. G. (1990). Teachers and students: Constructivists forging new directions. *Educational Leadership, 47*(5), 68–71. Retrieved from http://www.ascd.org/publications/educational-leadership.aspx

Cercone, K. (2008). Characteristics of adult learners with implications for online learning design. *AACE Journal, 16*(2), 137–159. Retrieved from http://www.aace.org/pubs/

Chakravarthi, S., & Vijayan, P. (2010). Analysis of the psychological impact of problem based learning (PBL) towards self directed learning among students in undergraduate medical education. *International Journal of Psychological Studies, 2*(1), 38–43. Retrieved from http://www.ccsenet.org/journal/index.php/ijps

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Los Angeles, CA: Sage.

DeTure, M. (2004). Cognitive style and self-efficacy: Predicting student success in online distance education. *American Journal of Distance Education, 18*(1), 21–38. Retrieved from http://www.icde.org/en/resources/journals/journals_a-d/American+Journal+of+Distance+Education.9UFRvWWo.ips

Emir, S. (2013). Contributions of teachers' thinking styles to critical thinking dispositions (Istanbul-Faith sample). *Educational Sciences: Theory & Practice, 13*(1), 337–347. Retrieved from http://www.edam.com.tr/kuyeb/en/default.asp

Facione, N. C., Facione, P. A., & Sanchez, C. A. (1994). Critical thinking disposition as a measure of competent clinical judgement: The development of the California Critical Thinking Disposition Inventory. *Journal of Nursing Education, 33*(8), 345–350. Retrieved from http://www.healio.com/journals/jne

Felder, R., & Silverman, L. (1988). Learning and teaching styles in engineering education. *Engineering Education, 78,* 674–681.

George, D., & Mallery, P. (2008). *SPSS for Windows step by step* (8th ed.). Boston, MA: Pearson.

Guglielmino & Associates, LLC. (n.d.) *Learning Preference Assessment.* Retrieved from

http://www.lpasdlrs.com

Harasim, L. (2000). Shift happens. Online education as a new paradigm in learning. *Internet and Higher Education, 3*(1–2), 41–61. Retrieved from http://www.journal s.elsevier.com/the-internet-and-higher-education/

The Hay Group. (n.d.). *Kolb Learning Style Inventory (LSI), version 3.1 online.* Retrieved from http://www.haygroup.com/leadershipandtalentondemand/ourproducts/item_details .aspx?itemid=55&type=7&t=2

Heafner, T. L., & Friedman, A. M. (2008). Wikis and constructivism in secondary social studies: Fostering a deeper understanding. *Computers in the Schools, 25*(3–4), 288–302. doi:10.1080/07380560802371003

Hedin, N. (2010). Experiential learning: Theory and challenges (Report). *Christian Education Journal, 7*(1), 107–117. Retrieved from http://journals.biola.edu/cej

Huang, H.-M. (2002). Toward constructivism for adult learners in online learning environments. *British Journal of Educational Technology, 33*(1), 27–37. Retrieved from http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1467-8535

Insight Assessment. (2013). *Critical Thinking Disposition Inventory (CCTDI).* Retrieved from http://insightassessment.com/Products/Products-Summary/Critical-thinking-Attributes-Tests/California-Critical-Thinking-Disposition-Inventory-CCTDI

Johnson, D. C. (2008). Thinking critically about assessing online learning. *International Journal of Learning, 14*(12), 125–130. Retrieved from Education Source database. (Accession No. 35789245)

Kalkan, M. (2008). Learning preferences and problem-based discussion sessions: A study

    with Turkish University maritime students. *Social Behavior and Personality,*

    36(10), 1295–1302. doi:10.2224/sbp.2008.36.10.1295

Kayes, D. C. (2005). Internal validity and reliability of Kolb's Learning Style Inventory

    Version 3 (1999). *Journal of Business and Psychology, 20*(2), 249–257.

    doi:10.1007/s10869-005-8262-4

Kell, C., & Van Deursen, R. (2000). The fight against professional obsolescence should

    begin in the undergraduate curriculum. *Medical Teacher, 22*(2), 160–163. doi:

    10.1080/01421590078580

King, K. P. (2007). The transformation model. *International Journal of Information and*

    Communication Technology Education, 3(2), 26–36. Retrieved from http://www.

    igi-global.com/journal/international-journal-information-communication-

    technology/1082

Kolb, A. Y., & Kolb, D. A. (2005). Learning styles and learning spaces: Enhancing

    experiential learning in higher education. *Academy of Management Learning &*

    Education, 4(2), 193–212. doi:10.5465/AMLE.2005.17268566

Kolb, D. (1984). *Experiential learning: Experience as the source of learning*

    and development. Englewood Cliffs, NJ: Prentice Hall.

Kolb, D. A., Boyatzis, R. E., & Mainemelis, C. (2001). Experiential learning theory:

    Previous research and new directions. In R. J. Sternberg & L. Zhang (Eds.),

    *Perspectives on thinking, learning, and cognitive styles (*pp. 227–247). Mahwah,

    NJ: Lawrence Erlbaum Associates Publishers.

Knapke, J, Haynes, E., Breen, J., Kushnell, P., Smith, L., & Meinzen-Derr, J. (2016). Evaluation of online graduate epidemiology instruction and student outcomes. *Online Learning, 20*(4), 201–211.

Kumar, M. (2006). Organizing curriculum based upon constructivism: What to teach and what not to. *Journal of Thought, 41*(2), 81–93. Retrieved from http://journalof thought.com/

Lisko, S. A., & O'Dell, V. (2010). Integration of theory and practice: Experiential learning theory and nursing education. *Nursing Education Perspectives, 31*(2), 106–108. Retrieved from http://www.nln.org/nlnjournal/

Lunyk-Child, O. I., Crooks, D., Ellis, P. J., Ofosu, C., O'Mara, L., & Rideout, E. (2001). Self-directed learning: Faculty and student perceptions. *Journal of Nursing Education, 40*(3), 116–123. Retrieved from http://www.healio.com/journals/jne

Massey, M. G., Kim, S.-H., & Mitchell, C. (2011). A study of the learning styles of undergraduate social work students. *Journal of Evidence-Based Social Work, 8*(3), 294–303. doi:10.1080/15433714.2011.557977.

Merriam, S. B. (2001a). Andragogy and self-directed learning: Pillars of adult learning theory. *New Directions for Adult & Continuing Education, 89*(3), 3–13. Retrieved from http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1536-0717

Merriam, S. B. (2001b). Something old, something new: Adult learning theory for the twenty-first century. *New Directions for Adult & Continuing Education, 89*, 93–96. Retrieved from http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1536-0717

Merriam, S. B. (2008). Adult learning theory for the twenty-first century. *New Directions for Adult & Continuing Education, 119,* 93–98. doi:10.1002/ace.309

Mezirow, J. (1997). Transformative learning: Theory to practice. *New Directions for Adult and Continuing Education, 75,* 5–12. Retrieved from http://onlinelibrary. wiley.com/journal/10.1002/(ISSN)1536-0717

Miller, M. A. (2006). Assessing college-level learning. Policy alert. San Jose, CA: National Center for Public Policy and Higher Education.

Mind Garden. (2014). *Group Embedded Figures Test.* Retrieved from http://www.mindgarden.com/products/gefts.htm

Mitchell, M. L., & Jolley, J. M. (2004). *Research design explained* (5th ed.). Belmont, CA: Wadsworth.

Muirhead, R. J. (2007). E-learning: Is this teaching at students or teaching with students? *Nursing Forum, 42*(4), 178–184. doi:10.1111/j.1744-6198.2007.00085.x

North Carolina State University. (n.d.) *Index of Learning Styles (ILS).* Retrieved from http://www4.ncsu.edu/unity/lockers/users/f/felder/public/ILSpage.html

Pew, S. (2007). Andragogy and pedagogy as foundational theory for student motivation in higher education. *InSight: A Journal of Scholarly Teaching, 2*, 14–25. Retrieved from http://www.insightjournal.net/about.htm

Platsidou, M., & Metallidou, P. (2009). Validity and reliability issues of two learning style inventories in a Greek sample: Kolb's Learning Style Inventory and Felder & Solomon's Index of Learning Styles. *International Journal of Teaching and Learning in Higher Education, 20*(3), 324–335. Retrieved from http:// www.

isetl.org/ijtlhe/

Schneeweiss, S., & Ratnapalan, S. (2007). Impact of a multifaceted pediatric sedation

course: Self-directed learning versus a formal continuing medical education

course to improve knowledge of sedation guidelines. *Canadian Journal of*

Emergency Medicine, 9(2), 93–100. Retrieved from http://cjem-online.ca/

Spears, K. E., Fried, J. L., Olia, N., Manski, M., Craig, J., & Covington, B. (2008). The

effect of dental hygiene student learning styles on achievement in the online

learning setting. *Journal of Dental Hygiene, 5*(82), 56–56. Retrieved from

http://www.adha.org/jdh

Spigner-Littles, D., & Anderson, C. E. (1999). Constructivism: A paradigm for older

learners. *Educational Gerontology, 25*(3), 203–209. doi:10.1080/03601279926

7828

Suliman, W. A. (2006). Critical thinking and learning styles of students in conventional

and accelerated programmes. *International Nursing Review, 53,* 73–79. Retrieved

from http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1466-7657

Taylor, B., & Kroth, M. (2009). Andragogy's transition into the future: Meta-analysis of

andragogy and its search for a measurable instrument. *MPAEA Journal of Adult*

Education, 38(1), 1–11. Retrieved from

ttps://www.mpaea.org/?page=publications

Terhart, E. (2003). Constructivism and teaching: A new paradigm in general didactics?

Journal of Curriculum Studies, 35(1), 25–44. Retrieved from http://www.tandfon

line.com/toc/tcus20/current#.U3au7PldV8E

Topçu, A. (2008). 'Intentional repetition' and learning style: Increasing efficient and cohesive interaction in asynchronous online discussions. *British Journal of Educational Technology, 39*(5), 901–919. doi:10.1111/j.1467-8535.2007.00783.x

Weigand, K. (2000). *Adult learners and distance education evaluation: Implications for success*. Retrieved from ERIC database. (Accession No. ED441081)

Wendt, G. A. (1999). Using adult learning techniques in instruction. *Fire Engineering, 152*(5), 30–32. Retrieved from http://www.fireengineering.com/index.html

Wessel, J., & Williams, R. (2004). Critical thinking and learning styles of students in a problem-based, master's entry-level physical therapy program. *Physiotherapy Theory and Practice, 20,* 79–89. doi:10.1080/09593980490453039

Wickett, R. (2005). Adult learning theories and theological education. *Journal of Adult Theological Education, 2*(2), 153–161. doi:10.1558/jate.2005.2.2.153

Yildirim, S. (2000). Effects of an educational computing course on pre-service and in-service teachers: A discussion and analysis of attitudes and use. *Journal of Research on Computing in Education*, *32*(4), 479–496.

Yenice, N. (2012). A review on learning styles and critically thinking disposition of pre-service science teachers in terms of miscellaneous variables. *Asia-Pacific Forum on Science Learning and Teaching, 13*(2), 1–31. Retrieved from http://www.ied.edu.hk/apfslt/

Zhang, H., & Lambert, V. (2008). Critical thinking dispositions and learning styles of baccalaureate nursing students from China. *Nursing and Health Sciences, 10,* 175–181. doi:10.1111/j.1442-2018.2008.00393.x

Appendix: Sample Recruitment Ad on Social Media Site

Graduate Students Needed.
Get a $10 e-card for participating in an online study!

Complete participation requirements and get a $10 E-card to Amazon.com. To

participate, you must be 18+, attending a college/university in the USA (online students

welcome to participate), and will be applying your credits to a bachelor degree or higher.

Information and instructions for completing the survey can be found at my survey site

graduateresearchstudy.com.