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Ali J. Morris

University of Nebraska at Lincoln, amorris@huskers.unl.edu

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A Study to Determine the Influence of Student Status and Gender on the Learning Styles
of Freshmen Students

By

Ali Jo Morris

A THESIS

Presented to the Faculty of
The Graduate College at the University of Nebraska
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A Study Comparing the Learning Styles of Traditional and
Non-Traditional Freshmen Students

Ali J. Morris, M.A.

University of Nebraska, 2010

Adviser: Richard E. Hoover

The purpose of this study was to compare the learning styles, as defined by David A. Kolb, of traditional freshmen students and non-traditional freshmen students to determine if there is a significant difference between them. The researcher also collected data to determine if there is a correlation between learning styles for gender and traditional/non-traditional student status.

Kolb's Learning Style Inventory (LSI) was used as the survey instrument and was administered to all students in the sample. The stratified random sample population consisted of 550 students selected from the freshmen class and provided to the researcher by the Office of Institutional Research at the University of Nebraska-Lincoln. One half (275) of the students (traditional) in the population were first-time entering freshmen with a high school graduation year of 2009, under the age of 25, and enrolled full-time (12 or more credit hours). The remaining 275 students (non-traditional) in the sample population were classified as other freshmen and had one of the following characteristics: enrolled part-time (less than 12 credit hours), age 25 or over, or had delayed enrollment by at least one year following high school graduation. The LSI was used to determine the learning styles of the participants.

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Chapter 1

Introduction

Context of Problem

Learning style is defined as a person's preferred way of processing information within specific learning situations (Barnett & Caffarella, 1994, p. 29). The typical college professor normally engages in teaching-by-talking which usually includes questioning, student presentations, and the use of small-group strategies to teach their students (Dunn & Griggs, 2000, p. 18). However, each learner brings his or her own style of learning into the class and professors can target the senses through which the student learns best (Barnett & Caffarella, 1994, p. 31). Some may learn better through listening and reflecting, others may prefer material be visually presented, and others may want to physically manipulate materials (p. 31). Colleges and universities are comprised of many different categories of students, two of which are the traditional student and the non-traditional student. For this study the traditional student is one who earns a high school diploma, enrolls full time immediately after finishing high school, depends on parents for financial support, and either does not work during the school year or works part time (National Center for Education Statistics, 2002). A non-traditional student is defined as a student who has at least one of the following characteristics: (a) They delay postsecondary enrollment one year or more after high school graduation, (b) enroll part time, (c) are employed full time, (d) are financially independent of their parents, (e) are parents, or (f) do not have a high school diploma (National Center for Education

Statistics, 2002). In this study, the researcher attempted to discover the learning styles of these two types of students and if their learning styles are different from each other.

The researcher used David A. Kolb's (1993) learning style theory, which is one of experiential learning. Kolb developed his theory using the educational philosophy of John Dewey who is credited as being the first researcher to work with experiential learning methods (Kolb, 1984, p. 4) as well as the works of Perry and Piaget.

Purpose Statement

The purpose of this study was to compare the learning styles, as defined by David A. Kolb, of traditional freshmen students and non-traditional freshmen students to determine if there is a significant difference between them. The researcher also collected data to determine if there is a correlation between learning styles for gender and traditional/non-traditional student status.

Significance of Study

This study examined the learning style trends of first year students at the University of Nebraska-Lincoln. The study compared the learning styles of freshmen participants using David A. Kolb's (1993) Learning Style Inventory. The researcher was approved to receive the instrument free of charge from the Hay Group located in Boston, Massachusetts. The Hay Group was made aware of the purpose of the study and required that the researcher provide them with a copy of the results of the study upon its completion. The Hay Group sent a copy of Kolb's Learning Style Inventory version 3.1 as well as scoring guides via e-mail with permission to reproduce the instrument as necessary for the purposes of the study but did not grant the researcher permission to

publish the inventory. Therefore, a copy of the instrument is not located in the appendices of this document.

The instrument was administered in the first semester of the students' enrollment. The study also examined the learning style trends of males versus females as well as traditional students versus non-traditional students. This study could help faculty and staff better adapt their teaching efforts to the unique learning styles of both the traditional and the non-traditional student. Evans, Forney, & Guido-DiBrito (1998) said that it is important to include activities that match as well as mismatch each of the four learning styles. They also said helping student connect with subject matter and assisting them in developing the non-dominant aspects of their preferred styles can help to achieve the level of flexibility needed to respond to differing environmental demands (p. 213).

Population Studied

The researcher chose first year students as participants in the study because first year students would not have had the chance for factors in the college environment to change their learning style. Student success in college is, in large part, determined by their experiences during the freshmen year (Upcraft & Gardner, 1989, p. 12). The researcher obtained 550 names of first year students to survey from the Office of Institutional Research at the University of Nebraska-Lincoln. There were 275 traditional students randomly selected from the population, meaning they were first-time entering freshman with a high school graduation year of 2009, under the age of 25, and enrolled full-time (12 or more credit hours). The remaining stratified randomly selected 275 students of the total population were considered non-traditional students, meaning they

were classified as other freshman and had one of the following characteristics: enrolled part-time (less than 12 credit hours), age 25 or over, or have delayed enrollment by at least one year following high school graduation.

Research Questions

A set of research questions, research hypotheses, and null hypotheses were created to guide the study.

Research Question 1. Are there any significant differences between the learning styles of traditional freshmen students compared to the learning styles of non-traditional freshmen students?

- a. Is there a significant difference in the number of traditional students versus non-traditional students who are convergers?
- b. Is there a significant difference in the number of traditional students versus non-traditional students who are divergers?
- c. Is there a significant difference in the number of traditional students versus non-traditional students who are assimilators?
- d. Is there a significant difference in the number of traditional students versus non-traditional students who are accommodators?

Research Hypothesis 1. There is a significant difference between the learning styles of traditional freshmen students compared to the learning styles of non-traditional freshmen students.

- a. There is a significant difference in the number of traditional students versus non-traditional students who are convergers.

- b. There is a significant difference in the number of traditional students versus non-traditional students who are divergers.
- c. There is a significant difference in the number of traditional students versus non-traditional students who are assimilators.
- d. There is a significant difference in the number of traditional students versus non-traditional students who are accommodators.

Null Hypothesis 1. There is no significant difference between the learning styles of traditional freshmen students compared to the learning styles of non-traditional freshmen students.

- a. There is no significant difference in the number of traditional students versus non-traditional students who are convergers.
- b. There is no significant difference in the number of traditional students versus non-traditional students who are divergers.
- c. There is no significant difference in the number of traditional students versus non-traditional students who are assimilators.
- d. There is no significant difference in the number of traditional students versus non-traditional students who are accommodators.

Research Question 2. Are there any significant differences between the learning styles of male freshmen students compared to the learning styles of female freshmen students?

- a. Is there a significant difference in the number of male students versus female students who are convergers?

- b. Is there a significant difference in the number of male students versus female students who are divergers?
- c. Is there a significant difference in the number of male students versus female students who are assimilators?
- d. Is there a significant difference in the number of male students versus female students who are accommodators?

Research Hypothesis 2. There are no significant differences between the learning styles of male freshmen students compared to the learning styles of female freshmen students?

- a. There is no significant difference in the number of male students versus female students who are convergers.
- b. There is no significant difference in the number of male students versus female students who are divergers.
- c. There is no significant difference in the number of male students versus female students who are assimilators.
- d. There is no significant difference in the number of male students versus female students who are accommodators.

Null Hypothesis 2. There is no significant difference between the learning styles of male freshmen students compared to the learning styles of female freshmen students.

- a. There is no significant difference in the number of male students versus female students who are convergers.
- b. There is no significant difference in the number of male students versus female students who are divergers.

- c. There is no significant difference in the number of male students versus female students who are assimilators.
- d. There is no significant difference in the number of male students versus female students who are accommodators.

Research Question 3. Are there any significant differences between the learning styles of male freshmen traditional students compared to the learning styles of male freshmen non-traditional students?

- a. Is there a significant difference in the number of male traditional students versus male non-traditional students who are convergers?
- b. Is there a significant difference in the number of male traditional students versus male non-traditional students who are divergers?
- c. Is there a significant difference in the number of male traditional students versus male non-traditional students who are assimilators?
- d. Is there a significant difference in the number of male traditional students versus male non-traditional students who are accommodators?

Research Hypothesis 3. There are significant differences between the learning styles of male traditional freshmen students compared to the learning styles of male non-traditional freshmen students?

- a. There is a significant difference in the number of male traditional students versus male non-traditional students who are convergers?
- b. There is a significant difference in the number of male traditional students versus male non-traditional students who are divergers?

- c. There is a significant difference in the number of male traditional students versus male non-traditional students who are assimilators?
- d. There is a significant difference in the number of male traditional students versus male non-traditional students who are accommodators?

Null Hypothesis 3. There is no significant difference between the learning styles of male traditional freshmen students compared to the learning styles of male non-traditional freshmen students.

- a. There is no significant difference between the learning styles of male traditional students versus the learning styles of male non-traditional students who are convergers.
- b. There is no significant difference between the learning styles of male traditional students versus the learning styles of male non-traditional students who are divergers.
- c. There is no significant difference between the learning styles of male traditional students versus the learning styles of male non-traditional students who are assimilators.
- d. There is no significant difference between the learning styles of male traditional students versus the learning styles of male non-traditional students who are accommodators.

Research Question 4. Are there any significant differences between the learning styles of female freshmen traditional students compared to the learning styles of female freshmen non-traditional students?

- a. Is there a significant difference in the number of female traditional students versus female non-traditional students who are convergers?
- b. Is there a significant difference in the number of female traditional students versus female non-traditional students who are divergers?
- c. Is there a significant difference in the number of female traditional students versus female non-traditional students who are assimilators?
- d. Is there a significant difference in the number of female traditional students versus female non-traditional students who are accommodators?

Research Hypothesis 4. There are significant differences between the learning styles of female traditional freshmen students compared to the learning styles of female non-traditional freshmen students?

- a. There is a significant difference in the number of female traditional students versus female non-traditional students who are convergers?
- b. There is a significant difference in the number of female traditional students versus female non-traditional students who are divergers?
- c. There is a significant difference in the number of female traditional students versus female non-traditional students who are assimilators?
- d. There is a significant difference in the number of female traditional students versus female non-traditional students who are accommodators?

Null Hypothesis 4. There is no significant difference between the learning styles of female traditional freshmen students compared to the learning styles of female non-traditional freshmen students.

- a. There is no significant difference in the number of female traditional students versus female non-traditional students who are convergers.
- b. There is no significant difference in the number of female traditional students versus female non-traditional students who are divergers.
- c. There is no significant difference in the number of female traditional students versus female non-traditional students who are assimilators.
- d. There is no significant difference in the number of female traditional students versus female non-traditional students who are accommodators.

Definitions

The following definitions are provided to aid the reader in understanding terms used in this study.

Accommodator: This learning style is best at Concrete Experience and Active Experimentation and their greatest strength lies in doing things. An individual with this learning style is action-oriented and at ease with people, prefers trial-and-error problem solving, is good at carrying out plans, is open to new experiences, and adapts easily to change (Kolb, 1981, p. 238).

Assimilator: The dominant learning abilities for this learning style are Abstract Conceptualization and Reflective Observation. Theoretical model creation is a strength for Assimilators. An individual with this learning style emphasizes ideas rather than people, is good at inductive reasoning, creating theoretical models, and integrating observations (Kolb, 1981, p. 238).

Converger: The dominant learning abilities are Abstract Conceptualization and Active Experimentation. Their greatest strength lies in the practical application of ideas. An individual with this learning style prefers technical tasks over social or interpersonal settings, excels at problem solving, decision making, and practical applications (Kolb, 1981, p. 238).

Diverger: The dominant learning abilities are Concrete Experience and Reflective Observation. The greatest strength of a Diverger lies in imaginative ability. An individual with this learning style is people and feeling oriented, has imagination and is aware of meaning and values, and is good at generating and analyzing alternatives (Kolb, 1981, p. 238).

Learning Style: A learning style is basically the preference or predisposition of an individual to perceive and process information in a particular way or combination of ways (Sarasin, 1999, p. 3).

Non-traditional Student: Those students who have at least one of the following characteristics: they delay postsecondary enrollment one year or more after high school graduation, enroll part time, are employed full time, are financially independent of their parents, are parents, or do not have a high school diploma (National Center for Education Statistics, 2002).

Traditional Student: The traditional undergraduate is one who earns a high school diploma, enrolls full time immediately after finishing high school, depends on parents for financial support, and either does not work during the school year or works part time (National Center for Education Statistics, 2002).

Delimitations

Delimitations narrow the scope of the study based on the population used (Creswell, 1994, p. 110). For this study, there were two delimitations:

1. This study was confined to one research intensive university in the Midwest.
2. This study was delimited to a stratified random sample of 275 traditional students and 275 non-traditional students. Only first-year students were selected for the study. Banning (1989) wrote that “most freshman enter into a campus environment quite unknowingly. They have little idea what to expect, and little understanding of how the collegiate environment can affect their lives” (p. 53). Because of this, the researcher’s belief is that students who have been at the institution for a longer amount of time will have more experience adapting to learning styles other than their primary learning style.

Limitations

Limitations are used to identify potential weaknesses of the study (Creswell, 1994, p. 110). Due to the study being limited to one four-year, public research institution, the results of this study may not be applicable to other four-year, public research institutions or other types of institutions. The study was limited to students in their first year of study at the university and although the entire stratified random sample had the opportunity to participate in this study, the researcher studied only those who chose to participate.

Methodology

The design of the research study was non-experimental and quantitative. According to Creswell (1994), an experimental study involves the testing of a cause-and-effect relationship in which the researcher randomly assigns subjects to groups (p. 117). Because the researcher did not do this, nor did the researcher manipulate one or more independent variables to determine if they cause an outcome, the study design can be classified as non-experimental (p. 117). The quantitative paradigm was chosen for this study because the problem has been previously studied by other researchers thereby creating a body of literature, known variables, and existing theories from which to draw information (p. 9). The subjects, who participated in the study, completed a survey and they were not influenced by the researcher in any manner. Each participant completed the survey to identify their primary learning style.

Summary

This chapter provided the basic framework of the study including the population used, significance of the study, context of the problem, and the purpose of the study. The following chapter will review the relevant literature and previous research done regarding Kolb's Learning Style Theory.

Chapter 2

Literature Review

Introduction

The purpose of this study was to compare the learning styles, as defined by David A. Kolb, of traditional freshmen students and non-traditional freshmen students to determine if there is a significant difference between them. The researcher also collected data to determine if there is a correlation between learning styles for gender and traditional/non-traditional student status.

Background of Learning Styles

Keefe (1987) said “elements of learning style appeared in the research literature as early as 1892” (p. 6). The early research was primitive compared to the plethora of learning style research that has been done up to this point and it mainly consisted of discovering the relationship between memory and oral or visual teaching methods (p. 6). Early research refers to research conducted prior to 1940 on the subject and the findings were largely conflicting due to the differences in population, learning materials, and instruments used (p. 6). The purpose of this early research was to find one perceptual mode that would best increase learning or retention (p. 6). As the research continued and progressed, several researchers developed their own theories and instruments to study learning styles. Some of these are discussed below.

A number of learning style concepts were proposed for consideration and application during the late 1960s and early 1970s when individual difference research was widespread in psychology (Sims & Sims, 1995, p. 27). The focus of learning style

research is mainly in the area of education and improving the immediate and long-term results of teaching and learning episodes (p. 27). Sims & Sims (1995) described a few learning styles inventories that focused on the instructional preference or the individual's choice of environment in which to learn much like Kolb's Learning Style Inventory which is being utilized in this study (p. 29). Sims stated that this type of learning preference is the least stable across time and the most easily influenced level of measurement in the learning environment (p. 29).

The Canfield and Lafferty Learning Styles Inventory was designed with 120 self-report rank ordered items to investigate 20 scales grouped into four areas: "conditions of learning, content of learning, mode of learning, and expectations for learning" (Sims & Sims, 1995, p. 29). This inventory was used to identify learner preferences for instruction (p. 29).

Another learning style inventory is the Dunn, Dunn, and Price Learning Style Inventory. This is a 100 question, true or false, self-report survey which investigates 24 scales grouped into five categories, all of which are considered to affect learning: environmental elements, emotional elements, physical elements, sociological elements, and psychological elements (Sims & Sims, 1995, p. 30). The instrument was used to analyze "the condition under which students in grades three through twelve prefer to learn" (p. 30).

The Grasha and Riechmann Student Learning Style Scales is also a self-report survey with Likert-type five point scale items that describe the learner along three bipolar scale dimensions: independent-dependent, avoidant-participant, and collaborative-

competitive (p. 31). The purpose was to “develop an instrument that was based on the type of learning styles college students demonstrate in the classroom” (Sims & Sims, 1995, p. 31). It centered on how students interact with the teacher, other students, and the learning task (p. 31).

Impact of Learning Styles on Academic Success

Evans et al. (1998) suggested that “if academic disciplines are to be accessible to students with diverse learning styles, efforts must be made to provide varied methods of instruction and evaluation” and

that these methods can provide both support to aid students in connecting with subject matter and challenge to assist them in developing the non-dominant aspects of their preferred styles so that they can achieve the level of flexibility needed to respond to differing environmental demands, need to include activities that match as well as mismatch each of the four learning styles. (p. 213)

The Need to Improve Teaching Styles to Complement Learning Styles

Less than 25% of college students are auditory learners--able to remember approximately 75% of the new and difficult information they listen to during a 40- to 50-minute period. Less than 40% are visual learners--able to remember approximately 75% of what they read during the same period. (Dunn & Griggs, 1998, pp. 16-17)

After a meta-analytic evaluation of the Learning-Style model, Dunn and Griggs (2000) concluded that “for college students whose styles were accommodated, achievement was at least 75% of a standard deviation higher than for others whose styles were not addressed” (p. 52). Substantial research has provided evidence for the matching of teaching and learning styles and Dunn and Griggs (2000) stated that independent learners who capitalize on their own strengths will profit personally and excel academically (p. 52). Dunn and Griggs also claimed that teachers, as educational leaders and change agents, need to teach all students through instructional strategies responsive to their unique strengths (p. 137). Sims and Sims (1995) said, “to enhance learning, instructors and trainers must recognize that individuals learn and teach differently, and what may be an optimal learning or training method for one may discourage another” (p. 193). They also suggested that instructors and trainers should utilize a variety of training or learning opportunities to increase the likelihood of advancing learning (p. 193).

Learning Styles as Defined by David A. Kolb

David A. Kolb began his work with experiential learning theory in 1967 while a faculty member at the Massachusetts Institute of Technology (Evans et al., 1998, p. 208). He became involved in a program of research studies aimed at identifying different kinds of learning styles and their consequences in order to better understand the different ways that people learn and solve problems so that we can both make individuals aware of the consequences of their own learning style and of the alternative learning modes available to them (Kolb, 1976a, p. 23). Kolb was also involved in this research to improve the

design of learning experiences to take into account these learning-style differences (Kolb, 1976a, p. 23).

His interest in academic cultures and the issue of fit for individual students evolved into his theory of experiential learning (p. 208). Kolb (1984) defined learning as “the process whereby knowledge is created through the transformation of experience,” and regarded learning as a four-stage cycle consisting of concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE) (Kolb, 1984, p. 38). Prior to Kolb’s 1984 book detailing experiential learning, he defined a learning style as “a habitual way of responding to a learning environment” (Evans et al., 1998, p. 210). Kolb said that in order to be effective, “learners need to be able to involve themselves fully and without bias in learning experiences (CE), observe and reflect on these experiences from multiple perspectives (RO), formulate concepts that integrate their observations into theories (AC), and put such theories to use in making decisions and solving problems (AE)” (Kolb, 1984, p. 236).

An individual with an orientation toward concrete experience (CE) is likely to want to be involved in experiences and dealing with immediate human situations in a personal way (Kolb, 1984, p. 68). CE emphasizes feeling as opposed to thinking and has a concern with the uniqueness and complexity of present reality as opposed to theories and generalizations (p. 68). These individuals are generally good at relating to others and are good intuitive decision makers and function well in unstructured situations (p. 68).

An individual with an orientation toward reflective observation (RO) is likely to want to understand the meaning of ideas and situations by carefully observing and

impartially describing them (Kolb, 1984, p. 68). RO emphasizes understanding as opposed to practical application and reflection as opposed to action (p. 68). These individuals are good at looking at things from different perspectives and at appreciating different points of view and like to rely on their own thoughts and feelings (p. 68).

An individual with an orientation toward abstract conceptualization (AC) is likely to want to use logic, ideas, and concepts (Kolb, 1984, p. 69). AC emphasizes thinking as opposed to feeling and a scientific as opposed to artistic approach to problems (p. 69). These individuals are good at systematic planning and quantitative analysis and often value precision, analyzing ideas, and a neat conceptual system (p. 69).

An individual with an orientation toward active experimentation (AE) is likely to want to actively influence people and change situations (Kolb, 1984, p. 69). AE emphasizes practical applications as opposed to reflective understanding and a pragmatic concern with what works as opposed to what is absolute truth (p. 69). These individuals are good at getting this accomplished and are willing to take risk in order to achieve their objectives. They like to see results (p. 69).

Kolb (1984) theorized two distinct modes of grasping experience, called the prehension dimension – apprehension vs. comprehension (p. 43). Experience grasped by apprehension is knowing things “instantaneously without need for rational inquiry or analytical confirmation” (p. 43). Experience grasped by comprehension is a secondary and “somewhat arbitrary way of knowing” (p. 43). Comprehension lends order to knowing and can be communicated to others (p. 43). The process of grasping experience via apprehension correlates to Kolb’s concrete experience (CE) and the process of

grasping experience via comprehension correlates to Kolb's abstract conceptualization (AC) (Kolb, 1984, p. 42). Kolb (1984) uses the terms intention and extension to represent the basic transformation processes of learning as they apply to both the apprehensive and comprehensive modes of grasping experience and called this the transformation dimension (p. 51). Intention represents intellectual operations and extension represents behavioral actions that transform objects or states (p. 52). Much like the prehension dimension, the transformation dimension is dialectic in nature.

The conception that extension and intention are the basic transformation processes in learning is largely consistent with Piaget's emphasis on the operative aspects of thought, which he divides into behavioral actions (extension) that transform objects or states, and intellectual operations (intention) that are internalized actions or systems of transformation. (Piaget, 1971, p. 67)

Transformation through intention is called reflective observation (RO) and transformation by extension is called active experimentation (AE) (Kolb, 1984, p. 42).

“Over time, individuals develop unique possibility-processing structures such that the dialectic tensions between the prehension and transformation dimensions are consistently resolved in a characteristic fashion” (Kolb, 1984, p. 76). He stated that most people develop learning styles that emphasize some learning abilities over others and these learning styles are developed as a result of our hereditary equipment, our particular past life experience, and the demands of our present environment (p. 76). Kolb's four learning styles (Converging, Diverging, Accommodating, and Assimilating) are

combinations of two of his learning modes: Abstract Conceptualization-AC, Active Experimentation-AE, Concrete Experience-CE, and Reflective Observation-RO.

The converging learning style combines Active Conceptualization (AC) and Active Experimentation (AE), the diverging learning style combines Concrete experience (CE) and Reflective Observation (RO), the assimilating learning style combines Abstract Conceptualization (AC) and Reflective Observation (RO), and finally the accommodating learning style combines Concrete Experience and Active Experimentation (AE) (Kolb, 1984, pp. 77-78). Figure 1 represents these pairings.

Factors Influencing Learning Style Preference

“As a result of our hereditary equipment, our particular past life experience, and the demands of our present environment, most of us develop learning styles that

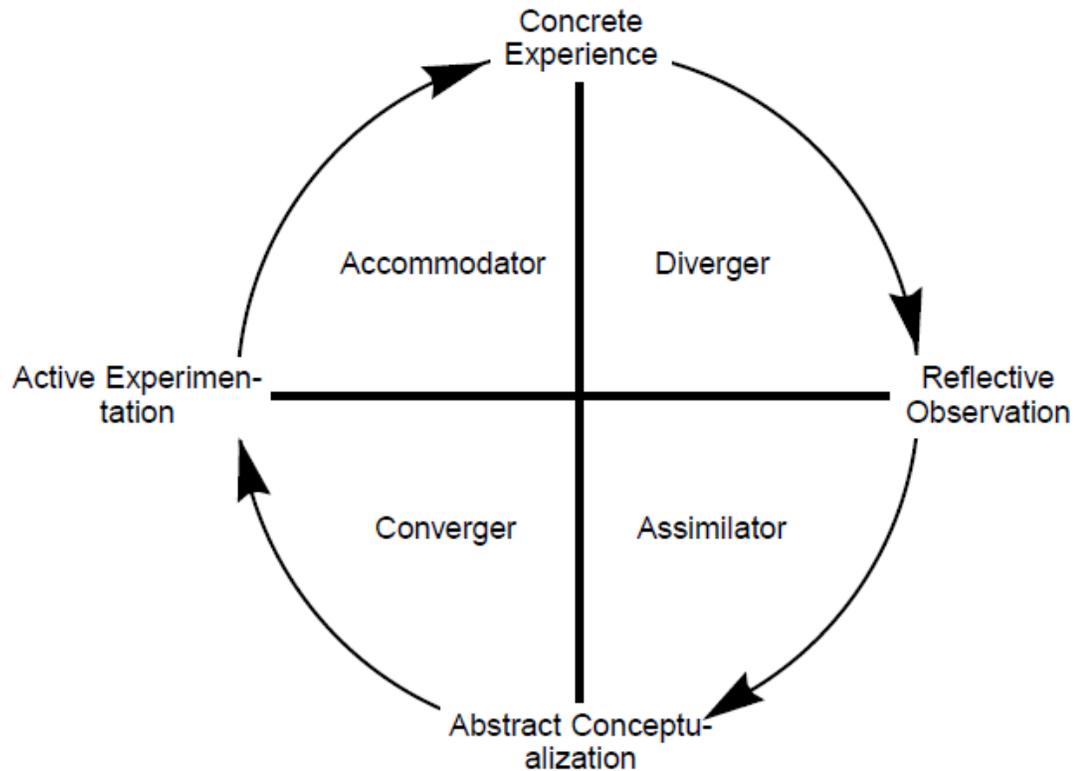


Figure 1. Kolb's two-dimensional learning model and four learning styles (adapted from Loo, 2002, p. 253).

emphasize some learning abilities over others" (Kolb, 1981, p. 237). Socialization experiences in family, work, and school lead to resolving the conflicts between action and reflection. For instance, a mathematician may emphasize abstract concepts, while a poet may value concrete experience more highly, and a manager may be more concerned with the active application of ideas while a naturalist may concentrate on developing observational skills (p. 237). Each individual has a unique learning style with strong and weak points (p. 237).

Traditional and Non-traditional Student's Learning Styles

Non-traditional students are identified as those students who have at least one of the following characteristics: they delay postsecondary enrollment one year or more after high school graduation, enroll part time, are employed full time, are financially independent of their parents, are parents, or do not have a high school diploma (National Center for Education Statistics, 2002), one of these characteristics is more likely to encourage the evolution of a learning style – age (Dunn & Griggs, 2000, p. 15). Learning styles change as individuals grow older (p. 15). “Student’s learning styles undergo transition between elementary and middle school and between middle school and secondary school” (p. 15). They continue to change in college and during adulthood (p. 15). Although it is impossible to anticipate achievement and behavioral patterns by merely knowing age, gender, and learning styles of students, we do know that individuals change uniquely and some people hardly change at all, while others experience rapid and multiple changes (p. 15).

Older students experience the college classroom environment differently from younger students (Justice, 2001, p. 237). Those non-traditional students that are returning to college after a period of time or those that are starting college for the first time as older adults have different reasons for doing so than the motivation of a traditional aged student coming straight from high school (p. 237). This decision for the non-traditional student is often triggered by critical life events or a reassessment of goals and priorities (p. 237). Justice (2001) said that older students are more likely to attend for intrinsic reasons such

as self-esteem or cognitive interest, whereas younger students cite more external motivation such as social relations or parental expectations (p. 237).

While it is clear from the literature that student status may have an effect on learning style, it is not the only factor. Another thing that may play a role is gender.

Learning Styles Related to Gender

In a study by Marcia Baxter Magolda (1989), percentages of men and women preferring each of Kolb's learning styles were almost equal (Evans et al., 1998, p. 217).

More women preferred concrete experience over abstract conceptualization (the grasping dimension), while men were evenly divided, and more men than women preferred reflective observation over active experimentation (the transforming dimension), though none of these findings based on gender was statistically significant. (p. 217)

Gerald Nunn conducted a study titled "Adult Learner's Locus of Control, Self-evaluation and Learning Temperament as a Function of Age and Gender" (1994) in which she examined the differences among 759 undergraduates (291 males and 468 females). All students were classified as non-traditional by age, full-time work status, or marital status (p. 260). Nunn utilized the Rotter I-E scale, which is an instrument that measures the degree to which students describe themselves with external or internal characteristics (p. 260). She also used the Personal Attribute Inventory to measure self-evaluation. The purpose of the instrument is to gain insight into whether the student has a positive or negative view of self. The Personal Attribute Inventory is a list of 100 positive and negative adjectives arranged alphabetically that the student used to choose

30 that best described him or herself (p. 260). Learning temperament was assessed using the Assessment of Learning Temperament (ALT) which has 50, 5-point Likert items (p. 260). Her findings were:

The results indicated differences with respect to self-concept, locus of control, and learning temperament as a function of age and gender. It appeared that the older group of students revealed tendencies to be more positive in their self-concepts, were more internally oriented, perceived less anxiety in learning, wanted more formal learning methods, preferred to learn in a variety of ways, were less impulsive and perceived themselves to be more abstract in their thinking. Younger students, on the other hand were less positive about themselves, more externally oriented, appeared more anxious about learning, preferred an informal learning approach, perceived that they learned better through one modality or the other, viewed themselves as impulsive, and were more concrete in their thinking. With respect to gender differences, females were more external than males, females were more anxious than males; and females had higher achievement orientation than males. (p. 262)

According to Kolb (1976a),

On average, men and women score differently on the Learning Style Inventory. Women tend to score higher on the Concrete Experience orientation while men tend toward Abstract Conceptualization. No consistent differences between men and women have been identified on the active/reflective dimension. (p. 24)

Marge Philbin (1995) conducted a study to test the learning styles of men and women and to determine if there was a significant learning difference between genders. Philbin distributed her survey, which consisted of Kolb's LSI and Educational Dialectics as used by Belenky et al. (1986) in their survey of women's experience of life and learning environment, to 72 subjects (Philbin, 1995, p. 487). The participants included 45 males and 25 females completing the survey and 2 subjects did not indicate gender. The ages of the participants ranged from 21 to 60+ (p. 488). Philbin concluded from the results of the surveys that "females learn better in hands-on and practical settings, emphasizing the realm of the affective and doing" (p. 491). She also said that "if females are watching and feeling or doing and thinking, they learn best; if males are thinking and watching, they learn best" (p. 491).

Conclusion

The background of learning styles, their implications, and how they are developed have been discussed in Chapter 2. Also discussed was the need to learn about the different learning styles to increase the likelihood of academic success and the differences in learning styles between traditional and non-traditional students as well as between males and females. The literature showed that learning styles can be influenced as a result of "our hereditary equipment, our past life experience, and the demands of our present environment" (Kolb, 1981, p. 237). Because of this knowledge, educators may be interested in knowing if there is a difference in the way non-traditional and traditional students learn as well as in the way females and males learn. The following chapter will provide an in-depth view of the methodology used for this study.

Chapter 3

Methodology

Purpose Statement

The purpose of this study was to compare the learning styles, as defined by David A. Kolb, of traditional freshmen students and non-traditional freshmen students to determine if there is a significant difference between them. The researcher also collected data to determine if there is a correlation between learning styles for gender and traditional/non-traditional student status.

Research Questions

A set of research questions, research hypotheses, and null hypotheses were created to guide the basis of the study.

Research Question 1. Are there any significant differences between the learning styles of traditional freshmen students compared to the learning styles of non-traditional freshmen students?

- a. Is there a significant difference in the number of traditional students versus non-traditional students who are convergers?
- b. Is there a significant difference in the number of traditional students versus non-traditional students who are divergers?
- c. Is there a significant difference in the number of traditional students versus non-traditional students who are assimilators?
- d. Is there a significant difference in the number of traditional students versus non-traditional students who are accommodators?

Research Hypothesis 1. There is a significant difference between the learning styles of traditional freshmen students compared to the learning styles of non-traditional freshmen students.

- a. There is a significant difference in the number of traditional students versus non-traditional students who are convergers.
- b. There is a significant difference in the number of traditional students versus non-traditional students who are divergers.
- c. There is a significant difference in the number of traditional students versus non-traditional students who are assimilators.
- d. There is a significant difference in the number of traditional students versus non-traditional students who are accommodators.

Null Hypothesis 1. There is no significant difference between the learning styles of traditional freshmen students compared to the learning styles of non-traditional freshmen students.

- a. There is no significant difference in the number of traditional students versus non-traditional students who are convergers.
- b. There is no significant difference in the number of traditional students versus non-traditional students who are divergers.
- c. There is no significant difference in the number of traditional students versus non-traditional students who are assimilators.
- d. There is no significant difference in the number of traditional students versus non-traditional students who are accommodators.

Research Question 2. Are there any significant differences between the learning styles of male freshmen students compared to the learning styles of female freshmen students?

- a. Is there a significant difference in the number of male students versus female students who are convergers?
- b. Is there a significant difference in the number of male students versus female students who are divergers?
- c. Is there a significant difference in the number of male students versus female students who are assimilators?
- d. Is there a significant difference in the number of male students versus female students who are accommodators?

Research Hypothesis 2. There are no significant differences between the learning styles of male freshmen students compared to the learning styles of female freshmen students?

- a. There is no significant difference in the number of male students versus female students who are convergers.
- b. There is no significant difference in the number of male students versus female students who are divergers.
- c. There is no significant difference in the number of male students versus female students who are assimilators.
- d. There is no significant difference in the number of male students versus female students who are accommodators.

Null Hypothesis 2. There is no significant difference between the learning styles of male freshmen students compared to the learning styles of female freshmen students.

- a. There is no significant difference in the number of male students versus female students who are convergers.
- b. There is no significant difference in the number of male students versus female students who are divergers.
- c. There is no significant difference in the number of male students versus female students who are assimilators.
- d. There is no significant difference in the number of male students versus female students who are accommodators.

Research Question 3. Are there any significant differences between the learning styles of male freshmen traditional students compared to the learning styles of male freshmen non-traditional students?

- a. Is there a significant difference in the number of male traditional students versus male non-traditional students who are convergers?
- b. Is there a significant difference in the number of male traditional students versus male non-traditional students who are divergers?
- c. Is there a significant difference in the number of male traditional students versus male non-traditional students who are assimilators?
- d. Is there a significant difference in the number of male traditional students versus male non-traditional students who are accommodators?

Research Hypothesis 3. There are significant differences between the learning styles of male traditional freshmen students compared to the learning styles of male non-traditional freshmen students?

- a. There is a significant difference in the number of male traditional students versus male non-traditional students who are convergers?
- b. There is a significant difference in the number of male traditional students versus male non-traditional students who are divergers?
- c. There is a significant difference in the number of male traditional students versus male non-traditional students who are assimilators?
- d. There is a significant difference in the number of male traditional students versus male non-traditional students who are accommodators?

Null Hypothesis 3. There is no significant difference between the learning styles of male traditional freshmen students compared to the learning styles of male non-traditional freshmen students.

- a. There is no significant difference between the learning styles of male traditional students versus the learning styles of male non-traditional students who are convergers.
- b. There is no significant difference between the learning styles of male traditional students versus the learning styles of male non-traditional students who are divergers.
- c. There is no significant difference between the learning styles of male traditional students versus the learning styles of male non-traditional students who are assimilators.

- d. There is no significant difference between the learning styles of male traditional students versus the learning styles of male non-traditional students who are accommodators.

Research Question 4. Are there any significant differences between the learning styles of female freshmen traditional students compared to the learning styles of female freshmen non-traditional students?

- a. Is there a significant difference in the number of female traditional students versus female non-traditional students who are convergers?
- b. Is there a significant difference in the number of female traditional students versus female non-traditional students who are divergers?
- c. Is there a significant difference in the number of female traditional students versus female non-traditional students who are assimilators?
- d. Is there a significant difference in the number of female traditional students versus female non-traditional students who are accommodators?

Research Hypothesis 4. There are significant differences between the learning styles of female traditional freshmen students compared to the learning styles of female non-traditional freshmen students?

- a. There is a significant difference in the number of female traditional students versus female non-traditional students who are convergers?
- b. There is a significant difference in the number of female traditional students versus female non-traditional students who are divergers?

- c. There is a significant difference in the number of female traditional students versus female non-traditional students who are assimilators?
- d. There is a significant difference in the number of female traditional students versus female non-traditional students who are accommodators?

Null Hypothesis 4. There is no significant difference between the learning styles of female traditional freshmen students compared to the learning styles of female non-traditional freshmen students.

- a. There is no significant difference in the number of female traditional students versus female non-traditional students who are convergers.
- b. There is no significant difference in the number of female traditional students versus female non-traditional students who are divergers.
- c. There is no significant difference in the number of female traditional students versus female non-traditional students who are assimilators.
- d. There is no significant difference in the number of female traditional students versus female non-traditional students who are accommodators.

Research Design

The design of the research study was non-experimental and quantitative. The subjects, who participated in the study, completed a survey and they were not influenced by the researcher in any manner. Each participant completed the survey to identify their primary learning style.

Setting

This study was conducted at the University of Nebraska-Lincoln, which has a Carnegie classification of HU/FT4/MS/HIT/L4/NR/RU/VH (Carnegie Foundation Website, 2009). This means that the University of Nebraska-Lincoln is an institution with a high undergraduate population, is full-time 4-year, more-selective, with high transfers in, a large four-year, primarily non-residential, research intensive university (Carnegie Foundation Website, 2009). The university is a land-grant institution that enrolls approximately 24,000 students and awards baccalaureate, masters, and doctoral degrees (UNL Fact Book, 2009, p. 37).

Population/Sample

A total sample of 550 freshman students out of a total population of 4,904 were surveyed electronically using Kolb's Learning Style Inventory (UNL Fact Book, 2009, p. 46). This population was a stratified random sample obtained from the Office of Institutional Research at the University of Nebraska-Lincoln. The traditional students were represented by 275 students of the population who were first-time entering freshman with a high school graduation year of 2009, under the age of 25, and enrolled full-time (12 or more credit hours). The remaining 275 students of the total population were non-traditional students and were classified as other freshman and had one of the following characteristics: enrolled part-time (less than 12 credit hours), age 25 or over, or have delayed enrollment by at least one year following high school graduation. The entire population of 550 students had the opportunity to participate. Of this population, only the information from volunteers who completed the online instrument was analyzed.

The original student population from which the sample was selected consisted of 4,904 first year students (see Table 1).

Table 1

First Time Student Population

Type of Students	Number of Students
Traditional Student	4,044
Non-traditional Student	860
Total	4,904

Of the 550 surveys sent to students via e-mail, 155 surveys were returned but only 123 were complete. Of the completed surveys returned 58 were classified as nontraditional students and 65 were classified as traditional; 49 of the students were male and 74 were female.

Due to the participants all being in their first year of study at the institution, there were a number of students in the sample under 19 (age of legal consent in the state of Nebraska). The Institutional Review Board granted the researcher a waiver of informed consent for those participants.

Instrument

The survey instrument used in the study was Kolb's Learning Style Inventory (LSI) version 3.1 created by David A. Kolb. The version used was created in 1993. Kolb developed the 12-item self-reported Learning Styles Inventory (LSI) to assess learning styles (Loo, 2002, p. 252). The LSI consists of 12 short statements concerning learning

situations and respondents are asked to rank-order four sentence endings that correspond to the four learning styles (p. 252). Kolb began his work with experiential learning theory in 1967 while a faculty member at the Massachusetts Institute of Technology (Evans et al., 1998, p. 208). His interest in academic cultures and the issue of fit for individual students evolved into his theory of experiential learning (p. 208). The term “experiential learning” was chosen by Kolb to note the role of experience in the learning process as well as link his ideas to the earlier works of Dewey (1958), Lewin (1951), and Piaget (1971) in which Kolb’s ideas were rooted (Evans et al., 1998, p. 208). The Learning Style Inventory (LSI) is a simple self-description test, based on experiential learning theory that is designed to measure strengths and weaknesses as a learner (Kolb, 1981, p. 237).

Kolb’s Learning Style Inventory was administered to 550 participants in this study. Participants took 10-15 minutes to complete the inventory of 12 questions. On each question, the participant ranked four sentence endings with (4) being most like the respondent, (3) being second most like the respondent, (2) being third most like the respondent, and (1) being least like the respondent.

The researcher was approved to receive the instrument free of charge from the Hay Group located in Boston, Massachusetts. The Hay Group was made aware of the purpose of the study and required that the researcher provide them with a copy of the results of the study upon its completion. The Hay Group sent a copy of Kolb’s Learning Style Inventory version 3.1 as well as scoring guides via e-mail with permission to reproduce the instrument as necessary for the purposes of the study but did not grant the

researcher permission to publish the inventory. Therefore, a copy of the instrument is not located in the appendices of this document.

Reliability and Validity Statistics of Kolb's Learning Style Inventory

Table 2 reports Cronbach's alpha coefficients for seven different studies of the LSI 3.1 adapted from Kolb's (2000) *Facilitator's Guide to Learning*. The studies included in the table are: the norm subsample of on-line LSI users, Kayes (2005) study of liberal arts college students, Wierstra and DeJong's (2002) study of psychology undergraduates, Veres, Sims, and Locklear (1991) initial and replication studies of business employees and students, and two studies by Rubie and Stout (1991) of business students (Kolb, 2000, p. 75). "These results suggest that the LSI 3.1 scales show good internal consistency reliability across a number of different populations" (p. 75).

Data Collection Procedures

The researcher first obtained approval from the Institutional Review Board (IRB) before beginning the study. Once approval from the IRB was obtained (Appendix A), the researcher obtained names of students who met the researcher's criteria from the Office

Table 2

Internal Consistency Alphas for the Scale Scores of the LSI 3.1

Source	N	CD	RO	AC	AE	AC-CE	AE-RO
On-Line Sample	5023	.77	.81	.84	.80	.82	.82
Kayes (2005)	221	.81	.78	.83	.84	.77	.84
Wierstra & DeJong (2002)	101	.81	.78	.83	.84	.83	.82

Veres et al. (1991)*	711 initial	.56	.67	.71	.52	--	--
	1042 repeated	.67	.67	.74	.58	--	--
Rubie & Stout	323 (1990)	.72	.75	.72	.73	--	--
	402 (1991)	.67	.78	.78	.78	--	--

* Alpha coefficients are the average of three repeated administrations. Alphas for the initial administration were higher (average = .70).

Table adapted from Kolb, 2000, p. 75

of Institutional Research. The criteria for traditional students were students in their first year of study at the university with a graduation year of 2009, taking at least 12 credit hours, and under the age of 25. The criteria for non-traditional students were students in their first year of study at the university with at least one of the following characteristics: graduated prior to 2009 (2008 or before), age 25 or older, or enrolled part-time (taking less than 12 credit hours). After dividing all freshmen students into either the traditional or the non-traditional category (as defined by the researcher above), the office of institutional research then randomly selected the names of 550 students, 275 traditional students and 275 non-traditional students, and provided these to the researcher. The sample was not stratified by gender. The researcher was also provided e-mail addresses for the population.

An e-mail (Appendix B) was sent to the 550 participants requesting their assistance and directing them to an online survey site, www.surveymonkey.com, to complete the instrument. This website does collect internet protocol addresses, browser type, internet service provider, operating system, exit pages, and click stream data. This information, which does not identify individual users, is used by the site to identify trends and to administer the site. Surveymonkey.com does not link this automatically-collected

data to personally identifiable information. The website does encrypt information while it is in transit. A follow-up reminder e-mail was sent, one week after the initial invitation to participate e-mail, which reminded those students who had not yet completed the survey to do so. A second reminder e-mail was sent two weeks after the initial e-mail and one week following the first reminder e-mail asking the participants again to complete the survey if they had not done so.

Of the 550 students who had the opportunity to participate, only the data from volunteers who completed the LSI were analyzed. Of the 550 possible participants, 123 completed the survey and were included in this study. The completed survey data consisted of responses from 49 male students, 74 female students, 58 non-traditional students, and 65 traditional students. Figure 2 shows the breakdown of respondents by gender and student status.

Data Analysis

For this study, the researcher examined the preferred learning styles of students in their first semester of enrollment. There were 550 students asked to complete

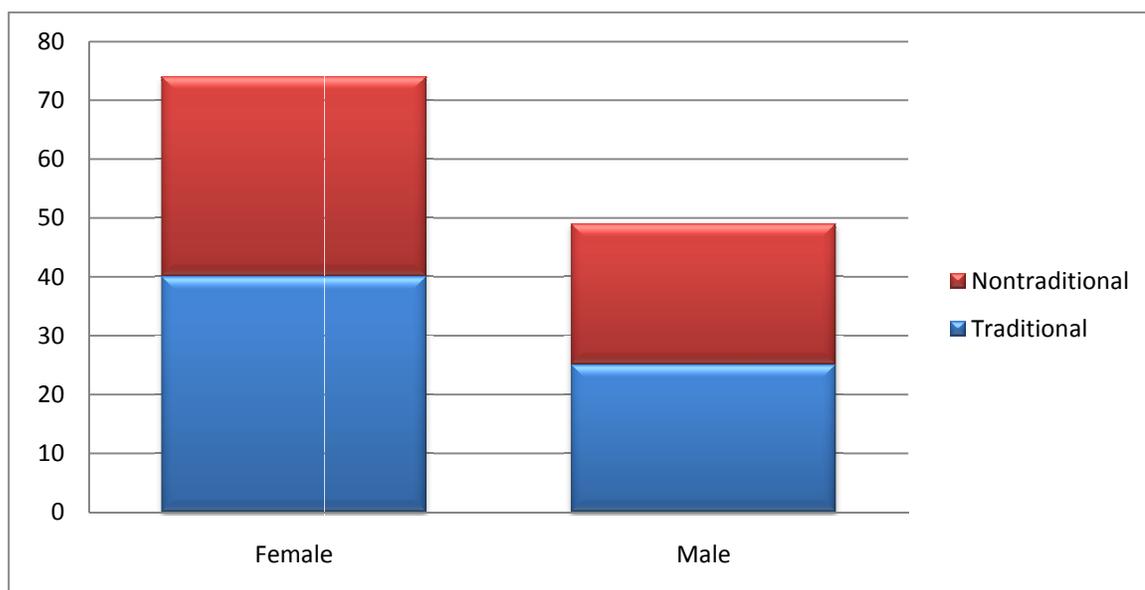


Figure 2. Respondents by gender and student status.

David A. Kolb's Learning Style Inventory. Out of the 550 possible participants, the researcher obtained a sample of 123 students who volunteered to participate. Of this 123-person sample, 41 students, or approximately 33.3%, were identified to be Accommodators, 21 students, or 17.1% were identified to be Assimilators, 29 students, or 23.6% were identified to be Convergers, and 32 students, or 26% were identified to be Divergers. Among the participants, 74 were female and 49 were male. While completing the survey online, each participant had the opportunity to provide their e-mail address in order to discover their learning style. Once data were collected and analyzed, the researcher discarded the e-mail addresses given, which were the only identifiers.

The researcher took the results to the Nebraska Evaluation and Research (NEAR) Center for evaluation. The Statistical Product and Service Solutions (SPSS) data analysis program was used to analyze and process the data. The statistical measure used to

analyze the data collected was Pearson's Chi-Square test. Pearson's chi-square is by far the most common type of chi-square significance test (North Carolina State University, 2009). This statistic is used to test the hypothesis of no association of columns and rows in tabular data. Chi-square is more likely to establish significance to the extent that (1) the relationship is strong, (2) the sample size is large, and/or (3) the number of values of the two associated variables is large. A chi-square probability of .05 or less is commonly interpreted as justification for rejecting the null hypothesis that the row variable is related to the column variable (North Carolina State University, 2009).

This chapter provided the methodology used in the study. The following chapter describes the results of the study, and examines each of the hypotheses to determine the study findings.

Chapter 4

Findings

Purpose

The purpose of this study was to compare the learning styles, as defined by David A. Kolb, of traditional freshmen students and non-traditional freshmen students to determine if there is a significant difference between them. The researcher also collected data to determine if there is a correlation between learning styles for gender and traditional/non-traditional student status.

Participant Population

A total sample of 550 freshman students out of a total population of 4,903 had the opportunity to participate in the study. This population was a stratified random sample obtained from the Office of Institutional Research at the University of Nebraska-Lincoln. One half of the students of the sample population were first-time entering freshman with a high school graduation year of 2009, under the age of 25, and enrolled full-time (12 or more credit hours). The remaining 275 students of the sample population were classified as other freshman and had one of the following characteristics: enrolled part-time (less than 12 credit hours), age 25 or over, or have delayed enrollment by at least one year following high school graduation. The sample was not stratified by gender. The researcher analyzed the data collected from the students in the population who volunteered to participate in the study. The sample consisted of 123 students from the population who voluntarily participated by completing the survey.

Of the 123 participants who completed the survey, there were 25 male traditional students, 24 male non-traditional students, 40 female traditional students, and 34 female non-traditional students (see Table 3).

Table 3

Summary of Participant Gender and Student Status

	Traditional	Non-traditional
Male	25	24
Female	40	34

Of the 123 participants, 41 students, or approximately 33.3%, were identified to be Accommodators, 21 students, or 17.1% were identified to be Assimilators, 29 students, or 23.6% were identified to be Convergers, and 32 students, or 26% were identified to be Divergers (see Table 4).

Table 4

Summary of Participant Learning Styles

	Frequency	Percent
Accommodators	41	33.3
Assimilators	21	17.1
Convergers	29	23.6
Divergers	32	26.0

Research Questions

The following research questions, research hypotheses, and null hypotheses were derived for the study.

Research Question 1. Are there any significant differences between the learning styles of traditional freshmen students compared to the learning styles of non-traditional freshmen students?

- a. Is there a significant difference in the number of traditional students versus non-traditional students who are convergers?
- b. Is there a significant difference in the number of traditional students versus non-traditional students who are divergers?
- c. Is there a significant difference in the number of traditional students versus non-traditional students who are assimilators?
- d. Is there a significant difference in the number of traditional students versus non-traditional students who are accommodators?

Research Hypothesis 1. There is a significant difference between the learning styles of traditional freshmen students compared to the learning styles of non-traditional freshmen students.

- a. There is a significant difference in the number of traditional students versus non-traditional students who are convergers.
- b. There is a significant difference in the number of traditional students versus non-traditional students who are divergers.

- c. There is a significant difference in the number of traditional students versus non-traditional students who are assimilators.
- d. There is a significant difference in the number of traditional students versus non-traditional students who are accommodators.

Null Hypothesis 1. There is no significant difference between the learning styles of traditional freshmen students compared to the learning styles of non-traditional freshmen students.

- a. There is no significant difference in the number of traditional students versus non-traditional students who are convergers.
- b. There is no significant difference in the number of traditional students versus non-traditional students who are divergers.
- c. There is no significant difference in the number of traditional students versus non-traditional students who are assimilators.
- d. There is no significant difference in the number of traditional students versus non-traditional students who are accommodators.

Research Question 2. Are there any significant differences between the learning styles of male freshmen students compared to the learning styles of female freshmen students?

- a. Is there a significant difference in the number of male students versus female students who are convergers?
- b. Is there a significant difference in the number of male students versus female students who are divergers?

- c. Is there a significant difference in the number of male students versus female students who are assimilators?
- d. Is there a significant difference in the number of male students versus female students who are accommodators?

Research Hypothesis 2. There are no significant differences between the learning styles of male freshmen students compared to the learning styles of female freshmen students?

- a. There is no significant difference in the number of male students versus female students who are convergers.
- b. There is no significant difference in the number of male students versus female students who are divergers.
- c. There is no significant difference in the number of male students versus female students who are assimilators.
- d. There is no significant difference in the number of male students versus female students who are accommodators.

Null Hypothesis 2. There is no significant difference between the learning styles of male freshmen students compared to the learning styles of female freshmen students.

- a. There is no significant difference in the number of male students versus female students who are convergers.
- b. There is no significant difference in the number of male students versus female students who are divergers.
- c. There is no significant difference in the number of male students versus female students who are assimilators.

- d. There is no significant difference in the number of male students versus female students who are accommodators.

Research Question 3. Are there any significant differences between the learning styles of male freshmen traditional students compared to the learning styles of male freshmen non-traditional students?

- a. Is there a significant difference in the number of male traditional students versus male non-traditional students who are convergers?
- b. Is there a significant difference in the number of male traditional students versus male non-traditional students who are divergers?
- c. Is there a significant difference in the number of male traditional students versus male non-traditional students who are assimilators?
- d. Is there a significant difference in the number of male traditional students versus male non-traditional students who are accommodators?

Research Hypothesis 3. There are significant differences between the learning styles of male traditional freshmen students compared to the learning styles of male non-traditional freshmen students?

- a. There is a significant difference in the number of male traditional students versus male non-traditional students who are convergers?
- b. There is a significant difference in the number of male traditional students versus male non-traditional students who are divergers?
- c. There is a significant difference in the number of male traditional students versus male non-traditional students who are assimilators?

- d. There is a significant difference in the number of male traditional students versus male non-traditional students who are accommodators?

Null Hypothesis 3. There is no significant difference between the learning styles of male traditional freshmen students compared to the learning styles of male non-traditional freshmen students.

- a. There is no significant difference between the learning styles of male traditional students versus the learning styles of male non-traditional students who are convergers.
- b. There is no significant difference between the learning styles of male traditional students versus the learning styles of male non-traditional students who are divergers.
- c. There is no significant difference between the learning styles of male traditional students versus the learning styles of male non-traditional students who are assimilators.
- d. There is no significant difference between the learning styles of male traditional students versus the learning styles of male non-traditional students who are accommodators.

Research Question 4. Are there any significant differences between the learning styles of female freshmen traditional students compared to the learning styles of female freshmen non-traditional students?

- a. Is there a significant difference in the number of female traditional students versus female non-traditional students who are convergers?

- b. Is there a significant difference in the number of female traditional students versus female non-traditional students who are divergers?
- c. Is there a significant difference in the number of female traditional students versus female non-traditional students who are assimilators?
- d. Is there a significant difference in the number of female traditional students versus female non-traditional students who are accommodators?

Research Hypothesis 4. There are significant differences between the learning styles of female traditional freshmen students compared to the learning styles of female non-traditional freshmen students?

- a. There is a significant difference in the number of female traditional students versus female non-traditional students who are convergers?
- b. There is a significant difference in the number of female traditional students versus female non-traditional students who are divergers?
- c. There is a significant difference in the number of female traditional students versus female non-traditional students who are assimilators?
- d. There is a significant difference in the number of female traditional students versus female non-traditional students who are accommodators?

Null Hypothesis 4. There is no significant difference between the learning styles of female traditional freshmen students compared to the learning styles of female non-traditional freshmen students.

- a. There is no significant difference in the number of female traditional students versus female non-traditional students who are convergers.

- b. There is no significant difference in the number of female traditional students versus female non-traditional students who are divergers.
- c. There is no significant difference in the number of female traditional students versus female non-traditional students who are assimilators.
- d. There is no significant difference in the number of female traditional students versus female non-traditional students who are accommodators.

The four null hypotheses and 16 null sub-hypotheses were tested using Pearson's Chi-Square test. This statistic is used to test the hypothesis of no association of columns and rows in tabular data. Chi-square is more likely to establish significance to the extent that (a) the relationship is strong, (b) the sample size is large, and/or (c) the number of values of the two associated variables is large. A chi-square probability of .05 or less is commonly interpreted as justification for rejecting the null hypothesis that the row variable is related to the column variable (North Carolina State University, 2009).

Learning Styles

Each participant completed Kolb's Learning Style Inventory. From this instrument, a learning style preference was determined by calculating the scores of four learning modes. The four hypotheses were tested using Pearson's Chi-Square test. Pearson's Chi-Square test is the most common type of chi-square test (Garson, 2009). This statistic is used to test the hypothesis of no association and can be used with nominal data. A chi-square value of 0.05 or less is commonly interpreted as justification for rejecting the null hypothesis and typically means that there is no relationship between the variables (Garson, 2009).

Results

Research Question 1

Are there any significant differences between the learning styles of traditional freshmen students compared to the learning styles of non-traditional freshmen students?

Null Hypothesis 1. There is no significant difference between the learning styles of traditional freshmen students compared to the learning styles of non-traditional freshmen students.

With a chi-square value of 1.308, three degrees of freedom, and a p value of 0.727, the researcher failed to reject null hypothesis 1 after analyzing the data collected (see Table 5). The SPSS crosstabulation for question one shown in Table 6.

Table 5

Hypothesis 1 Results

	Value	df	p value
Pearson's Chi Square	1.308	3	0.727

$p \leq 0.05$

Table 6

Crosstabulation of Student Status and Learning Style

Status Student Status		Style Learning Style				Total
		1 Accommodating	2 Assimilating	3 Converging	4 Diverging	
1 Non-traditional	Count	22	10	13	13	58
	% within Student Status	37.9%	17.2%	22.4%	22.4%	100.0%
	% within Learning Style	53.7%	47.6%	44.8%	40.6%	47.2%
	% of Total	17.9%	8.1%	10.6%	10.6%	47.2%
2 Traditional	Count	19	11	16	19	65
	% within Student Status	29.2%	16.9%	24.6%	29.2%	100.0%
	% within Learning Style	46.3%	52.4%	55.2%	59.4%	52.8%
	% of Total	15.4%	8.9%	13.0%	15.4%	52.8%
Total	Count	41	21	29	32	123
	% within Student Status	33.3%	17.1%	23.6%	26.0%	100.0%
	% within Learning Style	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	33.3%	17.1%	23.6%	26.0%	100.0%

Research Question 1a

Is there a significant difference in the number of traditional students versus non-traditional students who are convergers?

Null Hypothesis 1a. There is no significant difference in the number of traditional students versus non-traditional students who are convergers.

With a chi-square value of 0.310, one degree of freedom, and a p value of 0.577, the researcher failed to reject null hypothesis 1a after analyzing the data collected (see Table 7).

Table 7

Hypothesis 1a Results

	Value	df	p value
Pearson's Chi Square	0.310	1	0.577

$p \leq 0.05$

Research Question 1b

Is there a significant difference in the number of traditional students versus non-traditional students who are divergers?

Null Hypothesis 1b. There is no significant difference in the number of traditional students versus non-traditional students who are divergers.

With a chi-square value of 1.125, one degree of freedom, and a p value of 0.289, the researcher failed to reject null hypothesis 1b after analyzing the data collected (see Table 8).

Table 8

Hypothesis 1b Results

	Value	df	p value
Pearson's Chi Square	1.125	1	0.289

$p \leq 0.05$

Research Question 1c

Is there a significant difference in the number of traditional students versus non-traditional students who are assimilators?

Null Hypothesis 1c. There is no significant difference in the number of traditional students versus non-traditional students who are assimilators.

With a chi-square value of 0.048, one degree of freedom, and a p value of 0.827, the researcher failed to reject null hypothesis 1c after analyzing the data collected (see Table 9).

Table 9

Hypothesis 1c Results

	Value	df	p value
Pearson's Chi Square	0.048	1	0.827

$p \leq 0.05$

Research Question 1d

Is there a significant difference in the number of traditional students versus non-traditional students who are accommodators?

Null Hypothesis 1d. There is no significant difference in the number of traditional students versus non-traditional students who are accommodators.

With a chi-square value of 0.220, one degree of freedom, and a p value of 0.639, the researcher failed to reject null hypothesis 1d after analyzing the data collected (see Table 10).

Table 10

Hypothesis 1d Results

	Value	df	p value
Pearson's Chi Square	0.220	1	0.639

$p \leq 0.05$

The researcher failed to reject research question 1 as well as each of the sub questions. These results indicate that there is no significant difference between the learning styles of traditional freshmen student compared to the learning styles of non-traditional freshmen students.

Research Question 2

Are there any significant differences between the learning styles of male freshmen students compared to the learning styles of female freshmen students?

Null Hypothesis 2. There is no significant difference between the learning styles of male students compared to the learning styles of female students.

With a chi-square value of 9.288, three degrees of freedom, and a p value of 0.026, the researcher rejected null hypothesis 2 after analyzing the data collected (see Table 11). The SPSS crosstabulation for question two is shown in Table 12.

Table 11

Hypothesis 2 Results

	Value	df	p value
Pearson's Chi Square	9.288	3	0.026

$p \leq 0.05$

Research Question 2a

Is there a significant difference in the number of male students versus female students who are convergers?

Null Hypothesis 2a. There is no significant difference in the number of male students versus female students who are convergers.

With a chi-square value of 0.862, one degree of freedom, and a p value of 0.353, the researcher failed to reject null hypothesis 2a after analyzing the data (see Table 13).

Table 12

Crosstabulation of Gender and Learning Style

		Style Learning Style				Total
		1 Accommodating	2 Assimilating	3 Converging	4 Diverging	
1 Female	Count	26	11	12	25	74
	% within Gender	35.1%	14.9%	16.2%	33.8%	100.0%
	% within Learning Style	63.4%	52.4%	41.4%	78.1%	60.2%
	% of Total	21.1%	8.9%	9.8%	20.3%	60.2%
2 Male	Count	15	10	17	7	49
	% within Gender	30.6%	20.4%	34.7%	14.3%	100.0%
	% within Learning Style	36.6%	47.6%	58.6%	21.9%	39.8%
	% of Total	12.2%	8.1%	13.8%	5.7%	39.8%
Total	Count	41	21	29	32	123
	% within Gender	33.3%	17.1%	23.6%	26.0%	100.0%
	% within Learning Style	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	33.3%	17.1%	23.6%	26.0%	100.0%

Table 13

Hypothesis 2a Results

	Value	df	p value
Pearson's Chi Square	0.862	1	0.353

$p \leq 0.05$

Research Question 2b

Is there a significant difference in the number of male students versus female students who are divergers?

Null Hypothesis 2b. There is no significant difference in the number of male students versus female students who are divergers?

With a chi-square value of 10.125, one degree of freedom, and a p value of 0.001, the researcher rejected null hypothesis 2b. According to the data, there is a relationship between the numbers of male students versus female students who are divergers (see Table 14).

Table 14

Hypothesis 2b Results

	Value	df	p value
Pearson's Chi Square	10.125	1	0.001

$p \leq 0.05$

Research Question 2c

Is there a significant difference in the number of male students versus female students who are assimilators?

Null Hypothesis 2c. There is no significant difference in the number of male students versus female students who are assimilators?

With a chi-square value of 0.048, one degree of freedom, and a p value of 0.827, the researcher failed to reject null hypothesis 2c. The data showed no significant difference in the number of male students versus female students who were assimilators (see Table 15).

Table 15

Hypothesis 2c Results

	Value	df	p value
Pearson's Chi Square	0.048	1	0.827

$p \leq 0.05$

Research Question 2d

Is there a significant difference in the number of male students versus female students who are accommodators?

Null Hypothesis 2d. There is no significant difference in the number of male students versus female students who are accommodators?

With a chi-square value of 2.951, one degree of freedom, and a p value of 0.086, the researcher failed to reject null hypothesis 2d. The data showed no significant

difference in the number of male students versus female students who were accommodators (see Table 16).

Table 16

Hypothesis 2d Results

	Value	df	p value
Pearson's Chi Square	2.951	1	0.086

$p \leq 0.05$

The researcher rejected null hypothesis 2 and failed to reject each sub question with the exception of null hypothesis 2b. This suggested a relationship between the numbers of male students versus female students who were divergers but there was not a relationship in any other category for this question.

Research Question 3

Are there any significant differences between the learning styles of male traditional students compared to the learning styles of male non-traditional students?

Null Hypothesis 3. There is no significant difference between the learning styles of male traditional students compared to the learning styles of male non-traditional students.

With a chi-square value of 0.248, three degrees of freedom, and a p value of 0.969, the researcher failed to reject null hypothesis 3 after analyzing the data collected.

The data showed no significant difference in the learning styles of male traditional

students compared to the learning styles of male non-traditional students (see Table 17).

The SPSS crosstabulation for question three is shown in Table 18.

Table 17

Hypothesis 3 Results

	Value	df	p value
Pearson's Chi Square	0.248	3	0.969

$p \leq 0.05$

Research Question 3a

Is there a significant difference in the number of male traditional students versus male non-traditional students who are convergers?

Null Hypothesis 3a. There is no significant difference between the learning styles of male traditional students versus the learning styles of male non-traditional students who are convergers.

With a chi-square value of 0.059, one degree of freedom, and a p value of 0.808, the researcher failed to reject null hypothesis 3a. The data showed no significant difference in the learning styles of male traditional students versus the learning styles of male non-traditional students who were convergers (see Table 19).

Table 18

Crosstabulation of Males, Student Status, and Learning Style

		Style Learning Style				
		1	2	3	4	Total
		Accommodating	Assimilating	Converging	Diverging	
1 Non-traditional	Count	7	5	9	3	24
	% within Student Status	46.7%	50.0%	52.9%	42.9%	49.0%
	% within Learning Style	46.7%	50.0%	52.9%	2.9%	49.0%
	% of Total	14.3%	10.2%	18.4%	6.1%	49.0%
2 Male	Count	8	5	8	4	25
	% within Student Status	32.0%	20.0%	32.0%	16.0%	100.0%
	% within Learning Style	53.3%	50.0%	47.1%	57.1%	51.0%
	% of Total	16.3%	10.2%	16.3%	8.2%	51.0%
Total	Count	15	10	17	7	49
	% within Student Status	30.6%	20.4%	34.7%	14.3%	100.0%
	% within Learning Style	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	30.6%	20.4%	34.7%	14.3%	100.0%

Table 19

Hypothesis 3a Results

	Value	df	p value
Pearson's Chi Square	0.059	1	0.808

$p \leq 0.05$

Research Question 3b

Is there a significant difference in the number of male traditional students versus male non-traditional students who are divergers?

Null Hypothesis 3b. There is no significant difference between the learning styles of male traditional students versus the learning styles of male non-traditional students who are divergers?

With a chi-square value of 0.143, one degree of freedom, and a p value of 0.705, the researcher failed to reject null hypothesis 3b. The data showed no significant difference in the number of male traditional students versus male non-traditional students who were divergers (see Table 20).

Table 20

Hypothesis 3b Results

	Value	df	p value
Pearson's Chi Square	0.143	1	0.705

$p \leq 0.05$

Research Question 3c

Is there a significant difference in the number of male traditional students versus male non-traditional students who are assimilators?

Null Hypothesis 3c. There is no significant difference between the learning styles of male traditional students versus the learning styles of male non-traditional students who are assimilators?

With a chi-square value of 0.00, one degree of freedom, and a p value of 1.00, the researcher failed to reject null hypothesis 3c. The data showed the same percentage of male traditional students as non-traditional students who were assimilators. The data shows no significant difference (see Table 21).

Table 21

Hypothesis 3c Results

	Value	df	p value
Pearson's Chi Square	0.0	1	1.00

$p \leq 0.05$

Research Question 3d

Is there a significant difference in the number of male traditional students versus male non-traditional students who are accommodators?

Null Hypothesis 3d. There is no significant difference between the learning styles of male traditional students versus the learning styles of male non-traditional students who are accommodators?

With a chi-square value of 0.067, one degree of freedom, and a p value of 0.796, the researcher failed to reject null hypothesis 3d. The data showed no significant difference in the learning styles of male traditional students versus the learning styles of male non-traditional students who were accommodators (see Table 22).

Table 22

Hypothesis 3d Results

	Value	df	p value
Pearson's Chi Square	0.67	1	0.796

$p \leq 0.05$

The researcher failed to reject null hypothesis 3 and each of the sub questions. These results lead to the conclusion that there are no significant differences between the learning styles of male traditional freshmen students compared o the learning styles of male non-traditional freshmen students.

Research Question 4

Are there any significant differences between the learning styles of female traditional students compared to the learning styles of female non-traditional students?

Null Hypothesis 4. There is no significant difference between the learning styles of female traditional students compared to the learning styles of female non-traditional students.

With a chi-square value of 2.570, three degrees of freedom, and a p value of 0.463, the researcher failed to reject null hypothesis 4 after analyzing the data collected.

The data showed no significant difference in the learning styles of female traditional students compared to the learning styles of female non-traditional students (see Table 23). The SPSS crosstabulation for question four is shown in Table 24.

Table 23

Hypothesis 4 Results

	Value	df	p value
Pearson's Chi Square	2.570	3	0.463

$p \leq 0.05$

Research Question 4a

Is there a significant difference in the number of female traditional students versus female non-traditional students who are convergers?

Null Hypothesis 4a. There is no significant difference in the number of female traditional students versus female non-traditional students who are convergers.

With a chi-square value of 1.333, one degree of freedom, and a p value of 0.248, the researcher failed to reject null hypothesis 4a. The data showed no significant difference in the number of female traditional students versus female non-traditional students who were convergers (see Table 25).

Table 24

Crosstabulation of Females, Student Status, and Learning Style

		Style Learning Style				Total
		1 Accommodating	2 Assimilating	3 Converging	4 Diverging	
1 Non-traditional	Count	15	5	4	10	34
	% within Student Status	44.1%	14.7%	11.8%	29.4%	100.0%
	% within Learning Style	57.7%	45.5%	33.3%	40.0%	45.9%
	% of Total	20.3%	6.8%	5.4%	13.5%	45.9%
2 Male	Count	11	6	8	15	40
	% within Student Status	27.5%	15.0%	20.0%	37.5%	100.0%
	% within Learning Style	42.3%	54.5%	66.7%	60.0%	54.1%
	% of Total	14.9%	8.1%	10.8%	20.3%	54.1%
Total	Count	26	11	12	25	74
	% within Student Status	35.1%	14.9%	16.2%	33.8%	100.0%
	% within Learning Style	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	35.1%	14.9%	16.2%	33.8%	100.0%

Table 25

Hypothesis 4a Results

	Value	df	p value
Pearson's Chi Square	1.333	1	0.248

$p \leq 0.05$

Research Question 4b

Is there a significant difference in the number of female traditional students versus female non-traditional students who are divergers?

Null Hypothesis 4b. There is no significant difference in the number of female traditional students versus female non-traditional students who are divergers?

With a chi-square value of 1.00, one degree of freedom, and a p value of 0.317, the researcher failed to reject null hypothesis 4b. The data showed no significant difference in the number of female traditional students versus female non-traditional students who were divergers (see Table 26).

Table 26

Hypothesis 4b Results

	Value	df	p value
Pearson's Chi Square	1.00	1	0.317

$p \leq 0.05$

Research Question 4c

Is there a significant difference in the number of female traditional students versus female non-traditional students who are assimilators?

Null Hypothesis 4c. There is no significant difference in the number of female traditional students versus female non-traditional students who are assimilators?

With a chi-square value of 0.091, one degree of freedom, and a p value of 0.763, the researcher failed to reject null hypothesis 4c. The data showed no significant difference in the number of female traditional students versus female non-traditional students who were assimilators (see Table 27).

Table 27

Hypothesis 4c Results

	Value	df	p value
Pearson's Chi Square	0.091	1	0.763

$p \leq 0.05$

Research Question 4d

Is there a significant difference in the number of female traditional students versus female non-traditional students who are accommodators?

Null Hypothesis 4d. There is no significant difference in the number of female traditional students versus female non-traditional students who are accommodators?

With a chi-square value of 0.615, one degree of freedom, and a p value of 0.433, the researcher failed to reject null hypothesis 4d. The data showed no significant

difference in the number of female traditional students versus female non-traditional students who were accommodators (see Table 28).

Table 28

Hypothesis 4d Results

	Value	df	p value
Pearson's Chi Square	0.615	1	0.433

$p \leq 0.05$

The researcher failed to reject null hypotheses 4 as well as each of the sub questions. These results suggest that there are no significant differences between the learning styles of female traditional freshmen students compared to the learning styles of female non-traditional freshmen students.

Summary of Results

Hypothesis 1

The results of the study, based on statistical analysis, did not support hypothesis 1. The data suggested there was equal distribution among preferred learning style between traditional students and non-traditional students in their first year of study.

The results of the study, based on statistical analysis, did not support hypothesis 1a. The data suggested there was equal distribution among preferred learning style between traditional students and non-traditional students in their first year of study who were convergers.

The results of the study, based on statistical analysis, did not support hypothesis

1b. The data suggested there was equal distribution among preferred learning style between traditional students and non-traditional students in their first year of study who were divergers.

The results of the study, based on statistical analysis, did not support hypothesis

1c. The data suggested there was equal distribution among preferred learning style between traditional students and non-traditional students in their first year of study who were assimilators.

The results of the study, based on statistical analysis, did not support hypothesis

1d. The data suggested there was equal distribution among preferred learning style between traditional students and non-traditional students in their first year of study who were accommodators.

Hypothesis 2

The results of the study, based on statistical analysis, supported hypothesis 2. The data indicated that there was an unequal distribution among preferred learning styles between the learning styles of male students and female students in their first year of study.

The results of the study, based on statistical analysis, did not support hypothesis

2a. The data suggested there was an equal distribution among preferred learning style between male students and female students in their first year of study who were convergers.

The results of the study, based on statistical analysis, supported hypothesis 2b. The data indicated an unequal distribution among preferred learning style among male and female students in their first year of study who were divergers.

The results of the study, based on statistical analysis, did not support hypothesis 2c. The data suggested there was an equal distribution among preferred learning style between male students and female students in their first year of study who were assimilators.

The results of the study, based on statistical analysis, did not support hypothesis 2d. The data suggested there was an equal distribution among preferred learning style between male students and female students in their first year of study who were accommodators.

Hypothesis 3

The results of the study, based on statistical analysis, did not support hypothesis 3. The data suggested there was an equal distribution among preferred learning style between male traditional students and male non-traditional students in their first year of study.

The results of the study, based on statistical analysis, did not support hypothesis 3a. The data suggested there was an equal distribution among preferred learning style between male traditional students and male non-traditional students in their first year of study who were convergers.

The results of the study, based on statistical analysis, did not support hypothesis 3b. The data suggested there was an equal distribution among preferred learning style

between male traditional students and male non-traditional students in their first year of study who were divergers.

The results of the study, based on statistical analysis, did not support hypothesis 3c. The data suggested there was an equal distribution among preferred learning style between male traditional students and male non-traditional students in their first year of study who were assimilators.

The results of the study, based on statistical analysis, did not support hypothesis 3d. The data suggested there was an equal distribution among preferred learning style between male traditional students and male non-traditional students in their first year of study who were accommodators.

Hypothesis 4

The results of the study, based on statistical analysis, did not support hypothesis 4. The data suggested there was an equal distribution among preferred learning style between female traditional students and female non-traditional students in their first year of study.

The results of the study, based on statistical analysis, did not support hypothesis 4a. The data suggested there was an equal distribution among preferred learning style between female traditional students and female non-traditional students in their first year of study who were convergers.

The results of the study, based on statistical analysis, did not support hypothesis 4b. The data suggested there was an equal distribution among preferred learning style

between female traditional students and female non-traditional students in their first year of study who were divergers.

The results of the study, based on statistical analysis, did not support hypothesis 4c. The data suggested there was an equal distribution among preferred learning style between female traditional students and female non-traditional students in their first year of study who were assimilators.

The results of the study, based on statistical analysis, did not support hypothesis 4d. The data suggested there was an equal distribution among preferred learning style between female traditional students and female non-traditional students in their first year of study who were accommodators

The statistical analysis of the data showed a significant relationship only in the percentage of male students versus female students who were divergers which led the researcher to reject only null hypotheses 2 and 2b.

The next chapter discusses the results of this study, the implications of the results, and suggestions for additional research.

Chapter 5

Discussion

Purpose

The purpose of this study was to compare the learning styles, as defined by David A. Kolb, of traditional freshmen students and non-traditional freshmen students to determine if there is a significant difference between them. The researcher also collected data to determine if there is a correlation between learning styles for gender and traditional/non-traditional student status.

Summary of Findings

The following summarizes the findings of the study. All results are based on first-year students in their first semester of study at the University of Nebraska-Lincoln who volunteered to participate in the study and completed Kolb's Learning Style Inventory version 3.1 during the fall 2009 semester.

1. In general, at the University of Nebraska-Lincoln, there was an equal distribution among preferred learning style between traditional students and non-traditional students in their first year of study. There was no significant difference in the number of traditional or non-traditional students who were convergers, divergers, assimilators, or accommodators.
2. In general, at the University of Nebraska-Lincoln, there was an unequal distribution among preferred learning styles among the learning styles of male students and female students who were in their first year of study. Specifically there were more females than males who preferred the diverging

learning style. There was an equal distribution among male and female students in the converging, assimilating, and accommodating learning styles.

3. In general, at the University of Nebraska-Lincoln, there was an equal distribution among preferred learning style between male traditional students and male non-traditional students in their first year of study. There was not a significant relationship between learning style and student status among male students.
4. In general, at the University of Nebraska-Lincoln, there was an equal distribution among preferred learning style between female traditional students and female non-traditional students in their first year of study. There was not a significant relationship between learning style and student status among female students.

Discussion

This study adds to extensive past research regarding learning styles and specifically on those studies using Kolb's Learning Style Inventory. Because Kolb's experiential learning model and Learning Style Inventory is the most common learning style theory and commonly used learning style research instrument (Hickox, 1991) the author chose it as the instrument for the study. The following discussion will relate the findings of the study to past literature.

Research Question 1

The first research question for the study was: *Are there any significant differences between the learning styles of traditional students compared to the learning*

styles of non-traditional students? The sub questions for question number one were: (a) *Is there a significant difference in the number of traditional students versus non-traditional students who are convergers?* (b) *Is there a significant difference in the number of traditional students versus non-traditional students who are divergers?* (c) *Is there a significant difference in the number of traditional students versus non-traditional students who are assimilators?* (d) *Is there a significant difference in the number of traditional students versus non-traditional students who are accommodators?* The data suggested that there was not a significant difference between the learning styles of traditional students compared to the learning styles of non-traditional students. This suggested that learning style is not affected by student status.

The results of the first research question were not anticipated by the researcher. The literature showed that non-traditional students are identified as those students who have at least one of the following characteristics: they delay postsecondary enrollment one year or more after high school graduation, enroll part time, are employed full time, are financially independent of their parents, are parents, or do not have a high school diploma (National Center for Education Statistics, 2002), one of these characteristics is more likely to encourage the evolution of a learning style – age (Dunn & Griggs, 2000, p. 15). Learning styles change as individuals grow older (p. 15). For these reasons, the researcher predicted that there would be a significant relationship between learning style and student status.

Research Question 2

The second research question for the study was: *Are there any significant differences between the learning styles of male students compared to the learning style of female students?* The sub questions for research question number two were: (a) *Is there any significant difference between the learning styles of male students compared to the learning styles of female students who are convergers?* (b) *Is there any significant difference between the learning styles of male students compared to the learning styles of female students who are divergers?* (c) *Is there any significant difference between the learning styles of male students compared to the learning styles of female students who are assimilators?* (d) *Is there any significant difference between the learning styles of male students compared to the learning styles of female students who are accommodators?* The data suggested there was a significant difference between the learning styles of male students compared to the learning styles of female students. This suggested that learning style is affected by gender.

The results of the second research question were not anticipated by the researcher. In a study by Marcia Baxter Magolda (1989), percentages of men and women preferring each of Kolb's learning styles were almost equal (Evans et al., 1998, p. 217). Because of Baxter Magolda's study, the researcher believed that gender would not affect learning style. While the data suggested an overarching relationship between learning style and gender, a relationship was found in only one of the four sub questions. Sub question (b): *Is there a significant relationship in the number of male students versus female students who are divergers?* The data showed a much higher percentage of female students who

preferred the diverging learning style compared to male students who preferred the diverging learning style. Kolb (1984) said “the divergent learning style is associated with the personality type having introversion and feeling as the dominant process.” (p. 83). A study by Philbin (1995) corroborates the findings that there is a significant relationship between learning style and gender. Philbin’s research demonstrated that “there was a significant difference in learning styles between the genders” and that “significance was realized in the issue of concern for others being primarily a female response as opposed to the primarily male response of concern for self” (p. 491).

Research Question 3

The third research question for the study was: *Are there any significant differences between the learning styles of male traditional students compared to the learning styles of male non-traditional students?* The sub questions for research question number three were: (a) *Is there a significant difference in the number of male traditional students versus male non-traditional students who are convergers?* (b) *Is there a significant difference in the number of male traditional students versus male non-traditional students who are divergers?* (c) *Is there a significant difference in the number of male traditional students versus male non-traditional students who are assimilators?* (d) *Is there a significant difference in the number of male traditional students versus male non-traditional students who are accommodators?* The data suggested there was not a relationship between the learning styles of male traditional students versus the learning styles of male non-traditional students. The results of the third research question were not anticipated by the researcher. The researcher hypothesized that there would be a

significant difference between the learning styles of male traditional students versus the learning styles of male non-traditional students. This hypothesis came as a result of deduction. Dunn and Griggs (2000) showed that learning styles change as students grow older and gain more life experience (p. 15), for this reason, the researcher expected to see a difference in the learning styles of male traditional students versus male nontraditional students.

Research Question 4

The fourth research question for the study was: *Are there any significant differences between the learning styles of female traditional students compared to female non-traditional students?* The sub questions for research question number four were: (a) *Is there a significant difference in the number of female traditional students versus female non-traditional students who are convergers?* (b) *Is there a significant difference in the number of female traditional students versus female non-traditional students who are divergers?* (c) *Is there a significant difference in the number of female traditional students versus female non-traditional students who are assimilators?* (d) *Is there a significant difference in the number of female traditional students versus female non-traditional students who are accommodators?* The data suggested there was not a relationship between the learning styles of female traditional students compared to female non-traditional students. The results of the fourth question were not anticipated by the researcher. The researcher hypothesized that there would be a significant relationship between the learning styles of female traditional students versus the learning styles of female non-traditional students. Dunn and Griggs (2000) showed that learning styles

change as students grow older and gain more life experience (p. 15), for this reason, the researcher expected to see a difference in the learning styles of male traditional students versus male nontraditional students.

Little research was found for research questions three and four regarding the potential for relationships between specific genders and student status. The researcher used the literature discovered for research questions one and two regarding relationships between learning style and gender as well as learning style and student status to deduce that there would be no significant relationship between student status and gender. The literature showed that there was not a relationship among gender and learning style but that there was a relationship among student status and learning style. For this reason, the researcher hypothesized that significant differences would be found among gender and student status when determining learning styles. This was not the case.

Implications

The findings of this study indicated that there was not a significant relationship between learning style and student status or between learning style, student status, and gender. The findings did indicate a significant relationship between learning style and gender. Sims and Sims (1995) said, “to enhance learning, instructors and trainers must recognize that individuals learn and teach differently, and what may be an optimal learning or training method for one may discourage another” (p. 193). Sims and Sims also suggested that instructors and trainers should utilize a variety of training or learning opportunities to increase the likelihood of advancing learning (p. 193). The results of the study suggested that these techniques may be more necessary for groups who are diverse

in gender and not as necessary in classes that are diverse in terms of student status. Understanding how a person learns is a major requisite for a successful educational program (p. 50). In fact, studies have shown that “identifying a student’s learning style and providing appropriate instruction in response to that style can contribute to more effective learning” (p. 50).

In order to better meet the specific needs of each learning style within the university environment, “academic departments must become interested in making learning style research an important part of the teaching and learning process” (p. 60). Some ways to encourage the development of these skills in faculty include:

faculty development activities, promotion of classroom-based research, orientations for students on their individual learning styles and how to develop strategies for adapting them effectively, and conducting more research, relevant to the specific academic curriculum, on learning styles.

(Sims & Sims, 1995, p. 60)

The first suggestion given by Sims and Sims (1995) was faculty development activities. Typically, teachers are more likely to use instructional methods that are congruent with their learning style (p. 61) and the natural tendency can be to lecture students in a classroom but a discussion approach emphasizes social interaction as well as gives the student more of a role in the classroom structure which encourages learning (Bertini, 1980, p. 95). A faculty development session outlining the benefits of a discussion approach to teaching as well as how to implement this approach is one way to encourage the further development of teaching and learning skills in college professors.

Another suggestion given by Sims and Sims (1995) to further individual learning in the classroom was student orientations. They suggested that orientation activities designed for students should make them aware of their own learning styles, preferences, strengths, and weaknesses. Based on this, students could select courses and instructors that would lead to the most effective learning conditions for them (p. 62).

Sims and Sims (1995) also suggested classroom research as a way for teachers to gain an understanding of learning styles within the population they teach. Cross (1990) said that “classroom research is the careful, systematic, and patient study of students in the process of learning” (p. 2). Classroom research done on learning styles is an opportunity to fulfill research requirements set by departments while learning about the way students learn in order to better teach them. An example of classroom research is a professor administering Kolb’s Learning Style Inventory in order to gain a better understanding of the learning styles present in her classroom.

In general, the results of the study conflicted with previous research on the subject and suggested that further research should be done regarding the relationship among learning styles, gender, and student status.

Recommendations for Further Research

The results of this study indicated that further research is needed to clarify whether the results in learning style differences related to gender were based on actual differences in preference of learning style or as a result of the instrument used or the population that was selected. More research needs to be done specifically on those students preferring the diverging learning style and how gender impacts that preference.

For this study, the researcher sampled students in their first year of study at the University of Nebraska-Lincoln. Of the 4,904 students in the population (860 were non-traditional and 4,044 were traditional students) 500 were randomly selected and given invitations to participate in the study. Of the 500 invited, 123 students volunteered to participate in the study. This population was targeted because first year students would not have had the chance for factors in the college environment to change their learning style. Student success in college is, in large part, determined by their experiences during the freshman year (Upcraft & Gardner, 1989, p. 12). Further research should be conducted to include other populations and more study participants to confirm or disprove the results of the study. Specifically, another study should be conducted using a similar population to the one utilized in this study to determine if the results of this study were valid.

Previous research showed the learning style that least fit women was the assimilator learning style which reflects traditional education and that men tended to have a better fit with the assimilator learning style (Philbin, 1995, p. 491). In a study by Marcia Baxter Magolda (1989), percentages of men and women preferring each of Kolb's learning styles were almost equal (Evans et al., 1998, p. 217). This study, however, did not show that more men preferred the assimilator learning style. When a chi-square test was performed on the variables gender and learning style, the fewest percentage of women were found to be assimilators and the assimilator learning style proved to rank third among the male preference. The population for Philbin's (1995) study may have been slightly different than the population used for this study. Philbin's

population had more males participate and the participant's ages ranged from 21 to 60+. More research should be conducted to clarify which of the four learning styles is most preferred by males and which is most preferred by females or if there is an equal distribution as was the case in this study among the accommodating, assimilating, and converging learning styles.

Furthermore, since the results of the study in large part did not follow previous literature, the results could be a factor of poor test/re-test validity of Kolb's Learning Style Inventory and further research should be conducted regarding the validity and reliability of the instrument. Other factors that may have influenced the results of this study to conflict past research include lifestyle changes of today's student compared to those in past studies and societal changes that contributed to the upbringing of the participants, which in turn may have affected the way they learn.

Conclusion

Dunn and Griggs (2000) concluded that "for college students whose styles were accommodated, achievement was at least 75 percent of a standard deviation higher than for others whose styles were not addressed" (p. 52). Substantial research has provided evidence for the matching of teaching and learning styles and Dunn and Griggs (2000) stated that independent learners who capitalize on their own strengths will profit personally and excel academically (p. 52). Dunn and Griggs also claimed that teachers, as educational leaders and change agents, need to teach all students through instructional strategies responsive to their unique strengths (p. 137). Therefore, academic departments can enhance learning by developing and incorporating curricula that addresses

individuals learning styles as well as introduces students to other ways of learning in order to help them adapt to all types of learning and help them better learn in any environment. Therefore, teaching methods should include all learning styles in some form and avoid stereotyping based on gender or student status although learning styles can provide a basic framework for curriculum design.

This study produced data that suggested there was no significant relationship between learning styles and student status and the only significant relationship found between learning styles and gender was among females who preferred the diverger learning style. Additional quantitative research is needed to further determine the relationship between learning style and student status as well as to further determine the relationship between learning style and gender.

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Appendix A

IRB Approval Letter

IRB Number: 20091010262EP

Project ID: 10262

Project Title: Master's Thesis: Learning Styles of Nontraditional and Traditional Students

Dear Ali:

This letter is to officially notify you of the approval of your project by the Institutional Review Board (IRB) for the Protection of Human Subjects. It is the Board's opinion that you have provided adequate safeguards for the rights and welfare of the participants in this study based on the information provided. Your proposal is in compliance with this institution's Federal Wide Assurance 00002258 and the DHHS Regulations for the Protection of Human Subjects (45 CFR 46).

Your approval number is 20091010262EP. Please use this on all of your correspondence with participants. You will need to submit a copy of your informed consent letter as participants will see it with this approval number on it to our office. We will keep this with your file for future reference.

Date of EX Review: 10/19/2009

You are authorized to implement this study as of the Date of Final Approval: 10/23/2009. This approval is Valid Until: 10/22/2010.

We wish to remind you that the principal investigator is responsible for reporting to this Board any of the following events within 48 hours of the event:

- Any serious event (including on-site and off-site adverse events, injuries, side effects, deaths, or other problems) which in the opinion of the local investigator was unanticipated, involved risk to subjects or others, and was possibly related to the research procedures;
- Any serious accidental or unintentional change to the IRB-approved protocol that involves risk or has the potential to recur;
- Any publication in the literature, safety monitoring report, interim result or other finding that indicates an unexpected change to the risk/benefit ratio of the research;
- Any breach in confidentiality or compromise in data privacy related to the subject or others; or
- Any complaint of a subject that indicates an unanticipated risk or that cannot be resolved by the research staff.

For projects which continue beyond one year from the starting date, the IRB will request continuing review and update of the research project. Your study will be due for continuing review as indicated above. The investigator must also advise the Board when this study is finished or discontinued by completing the enclosed Protocol Final Report form and returning it to the Institutional Review Board.

If you have any questions, please contact the IRB office at 472-6965.

Sincerely,

Mario Scalora, Ph.D.
Chair for the IRB

Appendix B

Invitation to Participate E-mail

IRB# 20091010262EP

Dear Participant,

You are invited to participate in research being conducted to identify and compare the learning styles of traditional and non-traditional first year students. As a benefit to you, knowing your learning style can increase your learning efficiency and help you be more successful in classes.

Participation is voluntary and your answers will be anonymous. Your participation will be greatly appreciated and valuable to the university. If you agree to participate, please read the following information and proceed to the website in the link provided. The survey will take less than 15 minutes. By proceeding to the survey, you are consenting to be a participant.

The purpose of this study is to compare the learning styles of traditional students and nontraditional students to determine if there is a significant difference between them. Participation in this project includes the completion of an online survey that will take less than 15 minutes of your time. Any information obtained during this project that could be identified with you will be kept strictly confidential. The data will be stored in a locked cabinet for one year following the completion of the project. Only the researcher and the researcher's adviser will have access to the data.

There are no known risks or discomforts associated with this project. You may ask questions regarding this research and have those questions answered before agreeing to participate in the study. You may reach the investigator anytime by e-mail: amorris2@unl.edu or you may call the University of Nebraska - Lincoln Institutional Review Board at 402.472.6965 if you wish to talk with someone other than the researcher to obtain answers to questions about your rights as a research participant, to voice complaints or concerns about the research, to provide input concerning the research process, or in the event the researcher could not be reached.

By clicking the link below and proceeding to the online survey, you are consenting to be a participant in this project.

(Link to Survey was provided here)

Ali Morris, Principal Investigator

Appendix C

Example of Kolb's Learning Style Inventory

Example of Kolb's Learning Style Inventory

Rank the following sentence-endings with 4 being the most like you down to 1 being the least like you.

1. When I learn:

I like to think about how I feel.

I like to be actively engaged.

I like to think.

I like to be observant.

2. I learn best when:

I listen closely and observe keenly.

I trust my gut.

I think logically.

I persevere.

3. When I am learning:

I search for reason.

I remain quiet and contemplative.

I take responsibility.

I have strong reactions.

4. I learn by:

feeling.

watching.

thinking.

doing.