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FACTORS RELATED TO WOMEN'S UNDERGRADUATE SUCCESS

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ABSTRACT

This quantitative study examined the relationships and effects of women's learning styles and achievement and success at a Midwestern, private, Catholic, liberal arts women's undergraduate program. The primary focus was on first-year female students' learning styles and how these learning styles may affect their GPAs and decisions to persist to the next academic year. There is a lack of research dedicated to female student learning styles as they relate to student success and achievement, which prompted this endeavor. Kolb's Learning Style Inventory 3.1 was used to determine student-preferred style of learning. Experiential learning theory justified use of the theoretical model underlying this research as it encompasses the entire individual experience of learning and views learning as a process that occurs as an exchange of internal and external mechanisms. This study aimed to determine specific learning styles of women that tend to achieve and persist at higher rates as well as what specific women's learning styles require in teaching methods and environmental changes in order to assist women of different learning styles in succeeding.

The inventory was administered to 25 first-year, traditional, female students during the spring semester of 2013. GPA and registration information were gathered on each participant at the end of the spring semester and paired with the LSI she had completed at the beginning of the semester. The results of this quantitative study rendered no significance in female student learning style in predicting GPA or persistence. The results may be attributed to the low number of participants, as this reduced power within the statistical models used. However, the descriptive

statistics indicated the Assimilating style learner held the highest GPA and highest persistence rate, which may indicate a preferred teaching style used at this institution. Further research is needed with a larger group of first-year female students in order to gain insight into the effects of learning style on GPA and persistence.

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CHAPTER 1

INTRODUCTION

General Overview

There is a nationwide concern regarding persistence at most academic institutions around the United States, which leads to the necessity of understanding factors that lead to student persistence for the benefit of the student and the academic institution (Kiser & Price, 2008). Investigating what variables indicate possible persistence or academic achievement of female college learners can assist colleges in discovering certain characteristics in current first-year students. It can also assist in providing more assistance to those who may be at risk of withdrawal during their first year.

Many studies show validity and reliability in two variables that can predict first-year success in postsecondary education: the two variables include student ability and prior academic performance (Harackiewicz, Barron, Tauer, & Elliot, 2002). However, there are many other variables that can be investigated such as the college environment, familial support, group values, and rapport with new role models. Harackiewicz et al. (2002) stated, “Students’ experiences in their introductory course may be a critical determinant of their motivation and performance in later courses in that discipline” (p. 564). This study could also assist in efforts toward maintaining enrollment during the first and second years of undergraduate studies and the enhancement of teaching strategy to fit the new generation of students: the Millennials.

The generation participating in this study is called the Millennials (Howe, 2005). The investigation requires a general overview of certain characteristics about the generation of interest in this study. The Millennials are discussed in an array of articles as having brought something new and exciting to the workplace, academia, and social arenas that is quite different from what other generations have displayed in the past. Millennials are seen as altruistic in their social interests and activities, faster and better at multi-tasking in all environments and high achieving despite the apparent discontent if work or play is not individualized directly toward satisfying their wants and needs (Howe, 2005). Howe (2005) stated, “These ‘babies on board’ have been regarded as special since birth and have been more obsessed over at every age than the Gen-Xers ever were” (p.19).

The Millennial generation has been nurtured to be quite egocentric and insensitive in their immediate environments. This generation is of focus in this study due to the age range from which the population is selected. Millennials are considered multitaskers in that they have grown up with technology that requires consistent attention to multiple items at one time. This is what makes the Millennials quite different from previous generations: their ability to multitask given the advances in technology. The changes in technology and increased multitasking by students may contribute to possible dominant learning styles for this generation (Kazu, 2009).

The advances in technology have led to different tools for learning apart from traditional methods of didactic strategies, such as use of social media and collaborative internet websites for learning. Modern students who have access to multimodal activities or interactions may process information quite differently from the preceding generations. There are many types of memory in processing information, which brings light to the idea of varied learning styles. In order to learn something, we need to be able to fully complete these steps: encode, store, and retrieve. How do

humans transfer information from encoding to long-term memory for retrieval? Humans encode several stimuli within our environment at any given time, but effortful processing and rehearsal need to occur in order to bring the process to long-term memory. What is meaningful to the student for recall later is correlated to ability for critical thinking; however, at this point a discussion of memory mechanisms will guide to the utility of learning and the different learning styles.

Scientific issues related to memory, theories of adaptation, implications of multitasking on learning, and practical uses of knowledge about Millennials have been discussed in short. The impact is either negative or positive depending on what is to be learned: skills or knowledge acquisition. If humans are to learn more than surface value information and get the depth and breadth of a topic or concept then it is not possible to critically think about any single given item if we are tuned into all irrelevant information. The socio-technological multitaskers of this generation will continue to require the skills of focused cognition and complex problem-solving.

Experiential learning theory emphasizes a process interdependently created by concrete experience of the individual and the consciousness or subjective experience of the individual internally (A. Kolb & Kolb, 2005). The influence of the Lewinian model of learning on experiential learning theory is quite profound, giving light to meaningful emphasis placed on the experience by the learner, which creates the reference point for a learner to return when faced with similar problem-solving activities (A. Kolb & Kolb, 2005). A. Kolb and Kolb (2005) expressed that learning styles are ever-changing and purported that a learner tends to favor particular ways in which she or he experience a learning situation.

Learning style can be discussed based on the characteristics of the current generation attending postsecondary institutions in the United States. An understanding of the current

generation may shed light on the findings in this study and point to which learning style, if any, is connected to persistence and academic achievement. The stated characteristics and recent studies conducted may determine a more pervasive learning style for the new generation of female learners.

Theoretical Framework

According to Kolb (1984), experiential learning is a cycle of experiencing, thinking, and reflecting resulting in a behavior. Kolb was influenced greatly by Jung, Lewin, and Dewey as these men expanded conceptions of learning beyond behavior or simple cognition by integrating the influence of experience. Kolb developed the experiential learning theory that described learning as an ongoing process for the learner. Kolb's theory indicates learning as a four-stage cycle including concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 1984). Differences in the learning styles of students affects motivation and attitude (Kazu, 2009). The basic learning styles purported by Kolb include Accommodator, Assimilator, Converger, and Diverger. These basic learning styles are set in dimensions of perception and processing creating learning style combinations.

Joy and Kolb (2009) encapsulated the process of learning experientially as follows:

The ELT model portrays two dialectically related modes of grasping experience—concrete experience (CE) and abstract conceptualization (AC)—and two dialectically related modes of transforming experience—reflective observation (RO) and active experimentation (AE). Experiential learning process is portrayed as an idealized learning cycle or spiral where the learner “touches all the bases”—experiencing, reflecting, thinking, and acting—in a recursive process that is responsive to the learning situation and what is being learned. Immediate or concrete experiences give rise to observations and reflections that

are assimilated and distilled into abstract concepts from which new implications for action are drawn. When these implications are actively tested new experiences are created again. (pp.70-71)

The use of Kolb's theory and learning style inventory are fitting for this study based on the research question posed. Because students' particular means of perceiving and processing stimuli yields dominant features and remains stable over time; it is hoped that this study will reveal which of these can be associated with persistence and academic achievement in educational settings. Similar insights from Dewey and Kolb propose the meaningful learning process requires the components of experience, reflect, think, and act (Kolb, 1984). Kolb (1984) stated, "Postponement of immediate action is essential for observation and judgment to intervene, and action is essential for achievement of purpose" (p. 22).

Purpose of the Study

The purpose of this research study was to enhance institutional knowledge and awareness regarding student individual learning styles and to promote first-year success within a Catholic, liberal arts, women's undergraduate program. One study suggested to educators the use of different learning style-aligned methodologies for teaching students to increase the overall range of strategies through which students may learn (Loo, 2004). Many teaching styles reflect a professor's learning style, and implementing new teaching methods may be a struggle because change requires learning new behaviors. The outcomes of this study were intended to promote clearer understanding of the learning style preferences presented by the studied population, and how those preferences aligned with persistence and academic achievement. In addition, the outcomes of this study were intended to provide a rationale for thoughtful adoption of learning style-aligned teaching methodologies.

Research Questions

The following research question guided this study:

What impact does learning style have on persistence and academic achievement?

Hypothesis

H₀: There is no significant difference in learning style, persistence, and academic achievement.

Definitions

Learning styles are defined by Kolb's Learning Style Inventory (A. Kolb & Kolb, 2005). There are four types of learning styles: Diverging, Assimilating, Converging, and Accommodating. These learning styles are referenced on continuums of perception and processing (A. Kolb & Kolb, 2005).

For the purposes of this study, academic achievement is defined by grade point average (GPA) clusters using a 4-point scale. A GPA of 3.0 or higher is defined as highly successful. A GPA between 2.0 and 2.9 is defined as moderately successful. A GPA below 2.0 is defined as not successful.

For the purposes of this study, persistence is defined as continued registration for the next academic semester.

Delimitations

The population sample, all women, was chosen as a convenience sample. The variables of adult student and high school achievement scores have been excluded in determining correlations of learning style to persistence and academic achievement. It is important to note that the college in this study holds no requirement for either students or faculty to be of the

Catholic faith to attend or to be employed by the college. It is also important to note that participants were not required to be Catholic in order to engage in this study.

Limitations

Demographic generalizability is a limitation to this study. Other limitations include extraneous variables that could affect this particular population such as location, individual subject characteristics, and impact of faculty teaching style. Among participants, course load combinations during the first year were not considered.

Summary

The purpose of this study was to enhance institutional knowledge regarding learning style preferences related to first-year success in a private, secular, liberal arts, women's undergraduate program. The results of this study were intended to show that specific learning styles can, to some degree, predict first-year student academic achievement and persistence. The outcomes of this study were also intended to provide a rationale for thoughtful adoption of learning style-aligned teaching methodologies given the generational characteristics of this generation.

A lengthy literature review revealed that there are no studies archived having used an all-female population or having utilized the variables specified in this study. However, there were studies conducted using learning styles in the case of specific majors including male and female participants at the undergraduate and graduate levels. The next chapter indicates a portion of the research discussed in this study.

CHAPTER 2

LITERATURE REVIEW

Today's Learner

Today, college learners present challenging issues to educators. The current generation is labeled many things including Millennials, New Boomers, and Generation Y, to name a few (Howe & Strauss, 2000). This study will discuss the current generation of learners as Millennials based on the insights offered by Howe and Strauss (2000). A review of the Millennial generation is necessary due to the population sample presented in this study.

Generally discovered systems of categorization have been discussed by many scholars; however, based on the extensive research studies reviewed, this study will use Howe and Strauss' (2000) categorization of generations. Howe and Strauss (2000) discussed some overlapping of birth years in scholarly categorization; however, the birth years listed by these authors can be distinguished in the following way. Howe and Strauss classified the generations as Boomers (those born between the years 1943-1960), Gen X (those born between the years 1961-1981), and Millennial (those born between the years 1982-2002). This discussion focuses on the Millennial generation, their agreed upon characteristics, and ways of learning.

According to Skiba and Barton (2006), the Millennial generation displays the following characteristics:

Fierce independence, emotional and intellectual openness, inclusion, free expression and strong views, innovation, preoccupation with maturity, investigations, immediacy, sensitivity to corporate interest, authentication and trust. (p. 3)

In addition, Hamilton (2008) discussed a major characteristic of the Millennial generation when referring to them as multitaskers. However, the purpose of this study was to focus on which learning styles for the new generation may possibly predict academic achievement or persistence. With the age of social networking at the center of the Millennial universe, Millennials value group discussion and reflection while feeling their opinions have been heard (Roehling, Kooi, Dykema, Quisenberry, & Vandlen, 2011). These characteristics can present a learning style that is more about thinking, reflecting, and action.

Tamkins (2009) suggested that people involved in multiple media tasks such as texting, instant messaging, and web surfing perform worse on tests in which they need to switch attention than people who rarely multitask with media. Ophir, Nass, and Wagner (2009) purported findings that indicate heavy media multitaskers have a more difficult time filtering out irrelevant information to the task at hand. Their research study showed that heavy media multitaskers are also bottom-up processors in cognition, which has detrimental performance effects on the primary task at hand. These researchers suggested looking at multitasking as a trait rather than a state and further that Millennials are considered masters of multitasking.

In contrast, Colom, Martinez-Molina, Shih and Santareu (2010) completed a brain activity study that indicated applied settings, such as air traffic controller, require higher working memory capacity; however, they asserted that intelligence has no predictive value for ability to multitask (p. 550). The different abilities of learners can be operatively defined with the use of

A. Kolb & Kolb's (2005) Learning Style Inventory, which will be discussed later. With the recent advancements in technology, this generation displays more time in activities that require working memory rather than practice of critical thinking skills.

Atherton (2010) provided a view that was directly related to the debate of multitasking and critical thinking skills. Atherton stated that "the usual argument is that it is important for the students to engage with the material, and the lecture, which is the principal method of delivery as opposed to consumption oriented teaching, [that] simply induces passivity and even surface learning" (p. 1). He brilliantly point's to the argument defining the concepts of skill acquisition methods for teaching and knowledge acquisition methods for teaching. When instructors are teaching students skills to fix cars, then they are teaching with a goal that the student will learn the systematic skills to repair cars, in which multitasking is advantageous. On the other hand, when instructors are guiding students in the discipline of philosophy, then they are facilitating personal and community growth for change that would not benefit from socio-technological multitasking. These are examples of Atherton's implications of what instructors may be doing wrong in the classroom when it comes to student learning.

Tamkins (2009) reported that heavy media multitaskers are distracted with irrelevant information that occupies space in the short-term memory and can prevent short-term to long-term processing for specific information desired. Common educational assessments of recall and recognition are exams composed of both multiple-choice and essay questions. Provided the student can recall the desired information, she or he should do well on an essay question. Recognition is used when completing a test such as a multiple-choice exam. Multiple-choice and essay exams can test a student's memory, that in which is evidence of learning. These are exam

formats of which educators are already aware, but the real question lies in how meaningful information can be learned and applied within different contexts for the multitasking generation.

First-Year Persistence and Academic Achievement

Persistence and academic achievement are a concern for most institutions across the United States, there are many variables that affect both persistence and academic achievement that require administrative and faculty attention. According to Kiser and Price (2008), “When institutions of higher education have a high attrition rate, it costs thousands of dollars in unrealized tuition, fees, and alumni contributions” (p. 422). In addition, the student that goes into the world without a degree can be harmful economically. The value in discovering predictive variables within an institution is essential as these can result in development of retention programs established specifically for the institution based on demographic information about the learner.

Most studies have indicated that persistence potential should be discovered in the first year of undergraduate study as nurturing this potential can lead to maintained enrollment (Pascarella & Tarenzini, 1980). Retention should remain a concern based on the statistics reported by the National Center for Educational Statistics. The National Center for Educational Statistics (2012) reported that for private, for-profit institutions in the United States the academic year 2009-2010 had a 52.3% retention rate. The initial report indicated 48,970 first-year students had enrolled at the beginning of academic year in the fall of 2009 but that this number had decreased to 25,626 in the fall semester of 2010. Private, for-profit institutions hold the lowest rate of retention when compared to public and private not-for-profit institutions that showed a 79.5% and 80.0% retention rate of first-year students, respectively.

There are many research studies that have investigated factors that affect persistence and academic achievement for first-year undergraduate students. According to Harackiewicz, Barron, Taurer & Elliot (2002), “two variables stand out as key predictors: students’ ability, typically measured in terms of SAT or ACT scores, and prior academic performance, typically assessed using high school GPA or high school graduation rank” (p. 562). There are other variables that have been shown to impact the persistence and success of female and male first-year undergraduate students. Kiser and Price (2008) reported “the likelihood of academic performance, and ultimately college persistence, is enhanced through an increase of a student’s academic self-confidence, achievement motivation, academic related skills, and goal and institutional commitment” (p. 424). Institutions have implemented programs such as University 101 or freshman seminars that normalize the transitional changes that the student experiences in her or his first year. Pascarella and Tarenzini (1980) demonstrated the faculty and student interaction variable was correlative to student persistence. These studies have assisted in the practical implementation of programs geared at meeting student needs and encouraging postsecondary success.

Despite the various studies geared at predictor variables leading to program implementation, the research seems to lack investigation into learning styles of first-year female students and how learning styles for women might predict academic achievement or persistence decisions. Previous research variables have been quite informative for development of retention programs; however, changing the investigation from external factors to internal factors may provide for a reflective examination that is required of postsecondary students. For example, discovering the learning style of a learner and determining a possible correlative value between learning style and success as it is defined in this study.

Often students enter college with little preparation for what is to come. Abstract reflection may be difficult for a first-year student in the midst of transition from dependence to independence. In reflecting upon students in this transition, Nickles (2003) offered that “often they are away from personal support structures for the first time and find taking responsibility for their successes as university students a daunting task”(p.109). As students transition to the first year of college, understanding their learning styles may be most advantageous to their academic career because they will be encountering different teaching styles and curriculum structures.

The unique transitions that learners experience when entering the atmosphere of higher education are directly related to their personal development as individuals. Piaget (1950) proposed stages of development from concrete to abstract based on the age of the learner. Piaget determined that the process of learning is an active interaction between accommodation and assimilation, which provides a framework for adapting ones schema to the experiences encountered; extending intelligence. According to Piaget, “we can say that behavior becomes more ‘intelligent’ as the pathways between the subjects and the objects on which it acts cease to be simple and become progressively more complex” (p. 11). Students who can identify how they gain knowledge about the world and apply the knowledge gained may be better prepared for communicating their learning needs to educators resulting in educational successes. Moving students closer to an internal examination of how they learn may assist in the transition during the first year and possibly increase retention.

According to Rayle, Kurpius, and Arrendondo (2006), “while extensive research has comprehensively examined the factors that influence the persistence and academic success of undergraduates in general, little research has shed light on factors that influence the academic persistence and success of women specifically” (p. 326). Rayle et al. (2006) completed a study

based only on first-year college women of Euro-American ethnicity and ethnic minorities. The researchers chose to assess GPA, continued enrollment, and self-reports regarding self-beliefs, university comfort, academic decisions, and social support. Learning style was not assessed or correlated to persistence or success; however, the authors found that social support was the strongest predictor. Rayle et al. stated that “women, regardless of race/ethnicity, who felt socially supported were more likely to be positive about staying in school” (p. 337). This study found that there were no significant differences in which variables caused each ethnic group to persevere; however, the authors did find that women of minorities had lower GPAs suggesting that they were less prepared for college entrance (Rayle et al., 2006). The authors further noted that discovering the factors that may inhibit an increasing female attrition rate is necessary.

There is a need for learning styles to be identified prior to a first-year entrance or during the first semester. According to Kazu (2009), “when individual learning styles are determined, both the kind of teaching environment they need to be in and the way to precisely determine the issues to be learned inside and outside of the class may be raised” (p. 85). Learning styles cannot be classified as one being superior to another because individuals hold different ways of perceiving the world. The holistic view that encompasses experiential learning theory requires an integrative consideration of an individual’s perception, cognition, experience, and behavior—the dialectic process. The Kolb Learning Style Inventory can identify the types of learning that are specific to each person and provide direction that will allow for appropriate accommodations to be made based on the individual’s learning style preference. Accommodating today’s learners is becoming increasingly important based on the characteristics of this generation of undergraduate students. However, accommodating the students can be difficult for the institution based on human and financial resource limitations.

David Kolb: Experiential Learning and the LSI

David Kolb developed an experiential learning theory that proposes learning that is experiential and unique to the individual learner. Kolb is aligned to Bruner, Lewin, and Dewey as indicated in his published work, *Experiential Learning* (1984). Kolb was not satisfied with other theories that were less flexible in describing the whole experience of the human learner, such as fundamental behavior theory and cognitive theory. Kolb assessed these learning theories as more traditionalistic in nature providing a framework that avoided discussion of difference in individual human characteristics.

Kolb (1984) discussed this fundamental difference as follows:

Experiential learning theory offers a fundamentally different view of the learning process from that of the behavioral theories of learning based on an empirical epistemology or the more implicit theories of learning that underlie traditional educational methods, methods that for the most part are based on a rational idealist epistemology. (p. 20)

Kolb was strongly influenced by Jung, Dewey, and Piaget, restoring the original ideas of the pioneers of experiential learning to a more contemporary view. Experiential learning theory does not only rely on the outcomes of learning but the process of learning. It proposes that an individual's ideas are not stagnate after learning a concept; however, that individual's concept learning can be changed with experience. In juxtaposition, the outcomes-based learning of behaviorists is comforting as this philosophy provides a predictable outcome. In contrast, experiential learning is ever-changing and is not rested in fixed ideas for the learner but recognizes that a learning process exists.

Learning through experience promotes changes to human thoughts and beliefs related to the pre-existing schema available from previous learning experiences. Experiential learning

encourages conflict within the learner in order to foster conceptual growth of the limited pre-existing schema (Kolb, 1984). The internal conflict that arises within the learner is the necessary element to indicate a possible change in conceptual framework or potential for meaningful learning (Kolb, 1984). In essence, change is uncomfortable, whether it is physical or emotional. The ability to find novel solutions to problems requires changes in our beliefs and thought processes; otherwise, people would remain stagnant and unable to discover new solutions in problem-solving.

In adopting the perspective that learning is experientially-based rather than results-based, Kolb (1984) discussed the Lewinian model, Deweyan ideas, and Piaget's model in discerning the learner's ability to adapt to the world. According to Kolb (1984), "experiential learning is not a molecular educational concept but rather is a molar concept describing the central process of human adaptation to the social and physical environment" (p. 31). Because learning occurs in all areas of life and not only in the classroom humans are bound to learn to apply creativity to adapting to the different areas in which they learn.

Experiential learning requires a *transactional* process between a person's internal state and the objective experience within the environment (Kolb, 1984). Kolb aligned himself with Dewey in many ways as seen in his theoretical assumptions. Kolb (1984) purported that the interaction between the person and her or his environment demands an experiential philosophy of learning. Kolb's assertion being these interactions cannot be separated in the learning process. Kolb indicated that "learning is the process whereby knowledge is created through the transformation of experience" (p. 38). Within this philosophy, Kolb developed a theory of learning by identifying different learning styles that can be assessed in each learner. According

to Joy and Kolb (2009), “experiential learning theory is used to describe the learning process and the Kolb Learning Style Inventory is used to assess differences in how individuals learn” (p. 1).

Kolb (1984) identified four unique learning styles that include a combination of learning dimensions. The constructs are interdependent creating a four stage learning cycle: concrete experience, reflective observation, abstract conceptualization, and active experimentation. The constructs are defined by characteristics as follows: (a) CE (concrete experience) includes the characteristics of feelings and emotions, (b) RO (reflective observation) involves reflecting on experiencing and gathering new evidence, (c) AC (abstract conceptualization) involves meaningful experiences and creating ideas for future activities, and (d) AE (active experimentation) involves action by testing theories (Kayes, 2005). These constructs are divided by two dialectically related ways of experiencing: perceiving information and processing information. The dimensions cannot be separated. For example, the person attempting to solve a problem or learn a concept can utilize one or more modes of learning; however, a person will develop a preference for using a set combination of the constructs and this is identified as a learning style. The continuous process of learning combines perceiving and processing. Knowledge is perceived by thinking or feeling and then processed by doing or watching (Dede, 2009).

In regard to experiential learning theory, Dede (2009) states,

Kolb’s theory of learning, when looked at through the viewpoint of the learner, explains the nature of the learning process and how a student learns. When looked at from the viewpoint of the teacher, the one who plans and organizes teaching activities, it can also be considered a theory of teaching. (p. 151)

The Learning Style Inventory indicates four learning styles: Diverging, Assimilating, Converging, and Accommodating. According to Kolb (1984), each learning style presents patterns that include dominant learning abilities as illuminated following. The Diverging learning style includes the abilities of the CE and RO. Learners with this learning style are best at generating new ideas such as brainstorming solutions to problems. Kolb indicated that students with this style have traits that are imaginative, emotional, and these students tend to be in the Arts. The Assimilating learning style includes AC and RO. Learners with this learning style are logical thinkers focused on abstract ideas and practical solutions. These students prefer traditional classroom setting including lectures, and these students tend to be in careers in science and information. The Converging learning style includes abilities related to AC and AE. Students with this learning style prefer experimentation and learning in laboratory style settings and are more interested in technical problem solving than dealing with social or interpersonal issues. The final learning style indicated by Kolb is the Accommodating style, which includes the dominant features of the CE and AE. The Accommodating style learner prefers to learn with hands-on experiences and she or he prefer to work in groups on assignments and to field test ideas. These students are interested in careers in marketing and sales.

Kolb's (1984) experiential learning theory purported that people use each of the four modes of learning styles, but tend to have preferences to using two of the four in practice. The appendix depicts the cycle of learning within the dimensions.

Kayes (2005) described the learning preference descriptors as follows:

Diverging (CE and RO) describes individuals who show a preference for learning through creating, generating new ideas, and imagining possibilities. Assimilating (RO and AC) describes individuals who like to learn by drawing on multiple sources of

information, logic, and step by step organizing of information. Converging (AC and AE) describes individuals who like to learn through solving practical problems, making decisions, and interacting with problems rather than necessarily with people. The Accommodating (AE and CE) describes individuals who like to learn through taking actions, risks, and leadership roles. (p. 250)

The Learning Style Inventory was created by David Kolb in order to validate his experiential learning theory. The learning style inventory assesses the preferred learning style of the person taking the exam and includes self-report assessment that also allows for self-scoring. There are three versions of the LSI, LSI-2, LSI-2A, and LSI-3. This study used the most current version, the LSI-3 revised in 1999. According to Kayes (2005), the LSI-3 consists of “12 sentence stems” (pp. 250-251) that are followed by four possible endings. The learner indicates the endings based on a rank order of preference using their perspective modes or learning style. This ranking style results in a 48-item survey in which the score on either dimension is calculated to determine the preference of the learner such as AE-RO.

The development of the learning style inventory provided a way to measure learning style preferences. Kolb developed his initial learning style inventory in 1976 with revisions made in 1985 and 1996. In the years following the initial learning style inventory’s implementation for research purposes, this instrument has been tested in reliability and validity measures. The psychometric properties through continued testing of its effectiveness have been shown to be supported by many practitioners in different fields of study. Based on the findings of reliability and validity, the learning style inventory was the instrument chosen for use in this study (A. Kolb & Kolb, 2005). Nevertheless, it is not unusual for an instrument to be criticized based on inconsistencies in reliability and validity scores. Atkinson (1991) discussed the culmination of

many studies in which most researchers have found “inadequate reliability for the instruments purpose” (p. 17). Despite the criticism, all instruments are in process and require revisions to improve their measuring effectiveness.

Summary

The three variables investigated in this study—learning style, persistence, and academic achievement—have shown a slight correlative value as demonstrated in other investigative studies on first-year undergraduate success. The absence of studies on a female population and learning styles indicated the necessity of this investigation in adding to the knowledge base. The next chapter describes the study in detail.

CHAPTER 3

METHODOLOGY

Experiential learning theory provides a theoretical foundation in identifying unique, individualistic learning styles that are viewed from a holistic perspective. David Kolb developed the learning style inventory based on his theory of experiential learning. Learning styles indicate a preferred method for learning; hence, preferred ways for creating knowledge from engagement in a transformative experience. This study aimed to discern whether a specific learning style could be predictive of success at the undergraduate level within the selected population. Results of this study were intended to enhance institutional knowledge and enhance awareness for a single, private, Catholic, liberal arts, women's undergraduate program. The results are only generalizable to similar institutions of non-secular affiliation.

Theoretical Framework

According to Kolb's (1984) theory, experiential learning is a cycle of experiencing, thinking, and reflecting resulting in a behavior. David Kolb developed experiential learning theory that describes learning as an ongoing process for the learner. Kolb was influenced greatly by Jung and Dewey, among others, as they were pioneers in human experience rather than myopically looking at learning as only behavioral or cognition. His theory elucidated learning as a four-stage cycle including concrete experience, reflective observation, abstract conceptualization, and active experimentation. Differences in the learning style of students affect

motivation and attitude (Kazu, 2009). The basic learning styles purported by Kolb include: Accommodator, Assimilator, Converger, and Diverger. These basic learning styles are set in dimensions of perception and processing creating learning style combinations including concrete experience, abstract conceptualization, active experimentation, and reflective observation.

Experiential learning encompasses a continuous process related to the internal state of a learner and the interaction of the learner with the environment. The internal state and the objective experience of the learner within the environment are variables that require a cumulative assessment of how the individual learns. Within this philosophy, Kolb (1984) developed a theory of learning by identifying different learning styles that can be assessed in each learner.

Method

This study was a quantitative investigation based on the objective research question posed. The purpose for choosing this research design was to statistically determine the relationship among the variables. The independent variable was the student learning style obtained by the LSI-3.1. The dependent variables included academic achievement, which was determined by GPA, and persistence, which was determined by student registration for the following academic semester. This framework assisted in determining if there were any relationships that could be attributed to specific learning styles.

Quantitative methods include administration of a learning style inventory to each participant at the beginning of the spring 2013 semester. Further variables were gathered such as cumulative GPA and student persistence based on enrollment for the following academic semester. The quantitative data obtained were analyzed using a univariate approach with a one-way ANOVA that calculated learning style predicting GPA. This analysis was intended to assist in determining whether a specific learning style could be attributed to certain levels of academic

achievement. In addition, chi-square was used for predicting learning style and persistence. In addition to the one-way ANOVA and chi-square, Independent *t*-tests were analyzed between each scale score of CE, RO, AC, and AE to compare the scores on each scale as it related to persistence.

Instrument

Kolb's Learning Style Inventory 3.1 (2005) was developed as a self-assessment tool for construct validation in support of Kolb's experiential learning theory (A. Kolb & Kolb, 1993). According to Kolb (2005), "construct validation is not focused on an outcome criterion, but on the theory or construct the test measures" (p. 8). The self-assessment tool consisted of 12 sentences that provided four sentence stems that corresponded to the four dominant learning styles presented by Kolb. The person taking the inventory chose the stem that best described how she learned. The results of the self-assessment displayed four scores that correlated to dominant learning style combinations showing the person's preference for abstract over concrete and preference for action over reflection. The learning style combinations were determined by the highest scores in each subcategory. For example, the Accommodating dominant learning style combined AC (abstract conceptualization) and CE (concrete experience) preferences determined by the LSI 3.1.

The norms created based on results from studies were established by participation of several academic populations including on-line users, research university freshmen, liberal arts college students, Art College, MBA, and adult distance e-learning (A. Kolb & Kolb, 2005). The internal consistency reliability was established by use of Cronbach's alpha coefficients. The results of these reliability studies were documented in the Learning Style Inventory technical manual (A. Kolb & Kolb, 2005). There have been two test-retest reliability studies completed for

the LSI 3.1. In these studies, the Kappa coefficients determined little change in student learning style when administered the LSI 3.1 three times in an 8-week period (A. Kolb & Kolb, 2005).

Research Question

The following research question guided this study:

What impact does learning style have on persistence and academic achievement?

Hypothesis

H₀: There is no significant difference in learning style, persistence, and academic achievement.

Sample

The population of this study consisted of female, traditional, first-year undergraduate students inclusive of ages 18-22. There were 72 incoming first-year, resident students whom were identified as the total population. Of those incoming students, data were collected from 25 voluntary participants. There was no requirement for participants to be Catholic. Moreover, the college does not require students to be Catholic to attend nor faculty to be Catholic to be employed.

The students engaged in an inventory using Kolb's Learning Style Inventory during the first week of the spring semester 2013. The instrument was given to the participants by the director of the college's learning resource center at the research site. The inventories were coded by the director of the learning resource center to maintain student confidentiality and to connect student GPA and persistence to each inventory.

The anonymity of each participant was maintained by use of numerical coding. For example, the inventories were coded as participant number 1 as 01 and so forth. The LSI scores were maintained in each set of data within the column that represents test scores for each coded

participant. This data collection method maintained confidentiality of the participant and ensured participant test scores, GPA, and persistence information were properly organized.

Data Collection

Kolb (1984) developed a learning style inventory that has had four revisions to this date. The LSI was created in order to validate his experiential learning theory. The LSI assesses the preferred learning style of the person taking the exam. It makes use of self-reported assessments of learning preferences and also allows for self-scoring. Of the three versions of the LSI, LSI-2, LSI-2A, LSI-3.1, and LSI-4, this study made use of the most current paper version, the LSI-3 revised in 1999. The LSI presented 12 sentence stem questions providing four possible endings (Kayes, 2005). The learner indicated sentence endings based on a ranking system, which resulted in a 48-item survey providing score combinations on learning mode dimensions. The dimension scores were calculated to determine dominant learning styles.

Prior to gathering the data, participants were asked to read and sign appropriate documentation to validate their voluntary participation in this study. The participants who chose to participate were informed of their right to withdraw from this study at any point. After completing the necessary paperwork, the participants engaged in taking the LSI-3 one time at the beginning of the spring academic semester. The learning style preferences were recorded for use in univariate analysis with GPA scores. The preferences were also used in determining if any specific learning style tended to persist or not. The instrument was given in the college's learning resource center to ensure a consistent environment for administration of the instrument.

Within the consent form for participation in this study, the participants were aware that I was gathering their enrollment status for the next academic semester as well as gathering their cumulative GPA for the spring semester. The participant consents were forwarded to personnel

in the Registrar's Office in order to obtain the necessary data. The registration and GPA data were obtained through the Registrar's office. I accessed the participant codes to identify the participant in order to access her academic registration status and current GPA only.

Data Analysis

As previously identified, the student learning style as determined by the LSI-3 was the independent variable. The two dependent variables were persistence and academic achievement as defined in this study. The data was analyzed using one-way ANOVA, chi-square and independent *t*-tests on learning style individual scales. The first tier of analysis was executed to look at a one-way ANOVA for one outcome, the dependent variable of learning style to GPA, as it related to each learning style. In the second tier of this analysis, descriptive analysis, a chi-square was performed to compare the expected count for persisting or not persisting to the actual count within each learning style category.

Due to the small *n*, an independent *t*-test was used on each scale score to assist in describing the mean in relationship to persisting or not persisting. Descriptive statistics were used for the determining what percentage of the sample of the population fell into each of the four learning style categories developed by Kolb (1984). It was hoped that the results of this analysis would shed light on whether one learning style is dominant over another in this population as it relates to the dependent variables investigated.

Summary

The overall purpose of this study was to examine the relationship between female students learning styles and academic achievement and persistence in first-year undergraduate studies. Discovering the learning style of incoming students may be advantageous to institutions in maintaining student enrollment and enhancing academic success for each student in this

population. Discerning student learning style may also create a need for faculty adaptation to support students by adaptive change in instructional strategies and environmental learning conditions.

Quantitative data obtained were analyzed using a univariate approach with a one-way ANOVA that calculated learning style predicting GPA in order to determine whether a specific learning style could be attributed to certain levels of academic achievement. In addition, chi-square was used for predicting learning style and persistence. In addition to the one-way ANOVA and chi-square, independent *t*-tests were analyzed between each scale score of CE, RO, AC, and AE to compare the scores on each scale as it related to persistence.

CHAPTER 4

ANALYSIS AND FINDINGS

The purpose of this study was to examine the impact of student learning style on grade point average and persistence in promoting first-year student success within a Catholic, liberal arts, women's undergraduate institution. It is important to note that this institution does not require students or faculty to be Catholic. An additional purpose of this study was to enhance institutional knowledge of student learning style for determining ways in which similar institutions can increase retention rates by revising teaching methods and evaluating curriculum. However, the findings in this study supported the null hypothesis that stated there is no significant difference in learning style, persistence, and academic achievement. Due to a small number of participants in the study, the results concluded there is no difference or effect of learning style on persistence or achievement within the sample used.

Overview of Procedures

This quantitative investigation attempted to determine if a particular learning style was indicative to student GPA or persistence by use of a one-way ANOVA and chi-square followed by individual scale means analysis. Analyses were performed at the $p = .05$ level of significance. The one-way ANOVA test was conducted to calculate the difference in learning style and grade point average. A multivariate analysis of learning style on the combination of dependent variables could not be conducted because of too few participants. An

additional analysis included four *t*-tests for each scale score of learning mode to registration status.

An e-vite, an electronic invitation, was sent to each first-year student as the recruiting method for this study. The invitation was sent two times by a college official with few students appearing for participation. I was given permission to attend each class with multiple first-year student numbers in order to recruit and increase participation in this study. Overall, the recruitment methods resulted in participation of only 25 of the 72 prospective participants.

The Kolb Learning Style Inventory 3.1 was used to assess the learning style of each student. The participants self-scored the inventory, and the self-scoring sheets were calculated and confirmed by me after receiving the coded inventories. After implementing the Kolb Learning Style Inventory 3.1, the grade point averages and registration status were obtained from the registrar's office at the private college. All information was coded matching the codes on the inventory in order to ensure correct dependent variable information was connected to the appropriate student learning style inventory. Upon completion of data collection and small sample size result, the following analyses were performed: one-way ANOVA, chi-square and *t*-tests for each mode of learning as determined by the Kolb Learning Style Inventory 3.1.

Sample

The sample included first-year, traditional students ranging in ages of 18-22 years old. The sample was taken from a Catholic, liberal arts, women's undergraduate institution. The sample was procured by recruitment efforts including two e-vites and visiting classrooms to encourage participation. Unfortunately, the sample size resulted in lower than expected outcome ($n = 25$) from the first-year class size of 72.

Descriptive Statistics

The Kolb Learning Style Inventory provides scale scores for four learning modes that are indicated to discern the dominant learning style of an individual. The learning modes are representative of the learning cycle in which most individuals use one mode over the other dependent upon the context of the learning process: grasping and experiencing. Within each mode there are dialectically related modes of grasping and experiencing within the transformation process of learning. The result of these combinations of dominant learning modes results in a specific learning style: Accommodating, Diverging, Assimilating, and Converging.

Each style presents a different combination of learning modes, which individuals use most in the learning process or experience. The Accommodating style abilities are concrete experience (CE) and active experimentation (AE). This style learner enjoys learning by hand's-on experiences and prefers to work in groups relying more on others for information than individually conceptualizing or problem-solving on their own. The Diverging style learner abilities are concrete experience (CE) and reflective observation (RO). The Diverging style prefers gathering information and generating idea while possessing primary characteristics of imagination and emotionality. The Assimilating style abilities are abstract conceptualization (AC) and reflective observation (RO), which indicates an ability to focus on a large amount of information and to organize it into a logical form. This style learner is more interested in abstract concepts, which include logical soundness of theory and practical value. The Converging style abilities include abstract conceptualization (AC) and active experimentation (AE), which indicate a strong ability for finding practical use of an idea and making decisions on the best solution to a presented problem. This style learner enjoys technical tasks such as experimenting in the laboratory.

The data in Table 1 summarizes the data as it relates to individual learning styles within this study. The Diverging learning style ($n = 12$) was most dominant in this sample, followed by the Accommodating style ($n = 6$) and then Assimilating ($n = 5$) style. However, the second least represented among the sample, the Assimilating style held the highest GPA (3.70), followed by the Accommodating style (3.00) and then trailed by the Diverging style (2.74). Of course, with such a small number in the sample, it is possible that the GPA is modified on the basis of lower representation in the calculations. As an interesting juxtaposition reveals, when expressed as a percentage, persistence was highest for the Assimilating style (100% of the students enrolled in the following semester), followed by the Accommodating style (67% of the students enrolled in the following semester), and then trailed by the Diverging style (50% of the students enrolled in the following semester), revealing that persistence was directly, positively correlated with GPA. One further note, the Converging style had the fewest students in the group, held the lowest GPA, and had no students persisting.

Table 1

Learning Style Inventory Results

Learning Style	<i>n</i>	Mean GPA	<u>Persistence (%)</u>	
			Yes	No
Accommodating	6	3.00	4 (67)	2 (33)
Diverging	12	2.74	6 (50)	6 (50)
Assimilating	5	3.40	5 (100)	0 (0)
Converging	2	2.68	0 (0)	2 (100)

ANOVA

In order to determine the appropriate use of statistical analyses for this set of data, the assumptions of homogeneity and normality were checked to verify the ANOVA could be applied in this study. In testing the assumption for homogeneity, Levene's test was completed for this data set grouping learning styles. The Levene's test was not significant, $F(2,22) = 1.06, p = .363$. The result indicated that the assumption of homogeneity is tenable. This is interpreted as the error variance among each learning style group is equal; therefore, the assumption of homogeneity has been met.

In verifying the assumption of normality for use of ANOVA, the Shapiro-Wilks test was used to show that the learning style variable was normally distributed in each group. As shown in Table 2, the normality test is not significant for any learning style group; therefore, the assumption of normality was met. In summary, the assumptions of homogeneity and normality were met and the statistical analysis was completed.

Table 2

Shapiro-Wilks Tests of Normality

Learning Style	Statistic	df	Sig.
Accommodating	.92	6	.544
Diverging	.87	12	.080
Assimilating/ Converging	.85	7	.13

Due to the small n , the variable grouping for learning style was transformed into the following: Group 1, Accommodating; Group 2, Diverging; and Group 3, Assimilating and Converging. The Assimilating and Converging learning styles were joined due to the small number of students reporting these learning styles in those groups, which violates the assumptions of normality and homogeneity for this model. For example, the results revealed only five students in Assimilating learning style and only two in the Converging learning style. To ensure inclusion of each Kolb learning style in the analysis, it was imperative to continue by grouping of the two smallest groups, which were also most similar in the process of grasping and transforming experience.

Theoretical justification in combining the Assimilating and Converging learning styles was determined by the characteristics within each of those particular styles as shown on the graphic representation of the Kolb learning style grid and the Kolb cycle of learning in the Appendix. The shared property in each learning style includes abstract conceptualization, by which each style uses logical thinking and reflecting to practical solutions to scientific dilemmas, which refers to the mode of grasping experience. Both learning styles are similar in the technical bases of problem solving by use of transactional processes between abstract conceptualization, reflective observation, and active experimentation. Assimilating and Converging learning styles share in abstract conceptualization, which is the learner's way of grasping experience, and both learning styles are dialectically related in the modes of transforming experience.

A one-way ANOVA of learning style yielded no significant difference between groups regarding grade point average, $F(2, 22) = .619, p = .548$, two-tailed, $w^2 = .053, p > .05$. The regression model predicting grade point average to learning style was not significant. I was unable to reject the null hypothesis. Within this sample of $n = 25$, the models used did not

produce significant results. According to the results of this analysis, learning style does not have any effect on GPA in this sample.

Chi-Square Analysis

Chi-square analysis was run to establish whether or not there was a relationship between learning style and persistence. Persistence was defined as whether the participant was registered for the following academic semester. There was no significant difference in learning style and whether the student persisted as demonstrated by being registered for the next academic semester, $\chi^2(2) = .99, p > .05$. Due to the results, odds ratio was not calculated.

***t*-Tests**

A series of *t*-tests were conducted to analyze mean persistence within each learning style mode. Each scale score results from questions answered on the Kolb Learning Style Inventory that yields a scale score/learning mode. The four learning style modes are concrete experience, reflective observation, abstract conceptualization, and active experimentation. The highest scores for each mode generate a particular learning style for that individual. Comparisons of registration status for each learning style mode revealed no significant difference whether the students in each learning style mode persisted or not.

There were four independent means *t*-test conducted to determine if learning style modes differ significantly on the dependent variable of persisting. The first *t*-test conducted included the concrete experience learning mode and persistence, $t(23) = .44, p > .05$. The second *t*-test reflective observation, $t(23) = .096, p > .05$. The third *t*-test conducted using abstract conceptualization, $t(23) = -.61, p > .05$. The final independent *t*-test for mean scores of active experimentation, $t(23) = .17, p > .05$.

Learning modes are ways in which a learner grasps and transforms experience. A. Kolb

& Kolb (2005) combined those particular modes to determine a learner's particular way of processing and applying information. Each learning styles has two dominant modes; however, within the two dominant modes they are more likely to favor one mode over another mode. The application of *t*-tests allowed for a more in-depth look at whether this sample exhibited a dominant learning mode that either persisted or did not persist. In this sample, no particular learning mode revealed significance that any of the four modes of learning would persist.

Summary

The choice of statistical tests used in this study were indicated due to few participants, $n = 25$. The models used indicated no significance or relationship between learning style and the dependent variable, GPA. This study also indicated that within this sample learning style modes do not impact persistence. In essence, these are not useful variables in predicting academic achievement or persistence in this sample population. However, descriptive statistics identified some tentative areas for further consideration.

CHAPTER 5

DISCUSSION, IMPLICATIONS AND RECOMMENDATIONS

This chapter discusses the study in terms of implications of the findings and recommendations for future research in the area of women's learning style and its effects on persistence and achievement. First, conclusions are imparted as it relates to the research question posed for this study. Second, implications are stated given the results and meaning of the data analyzed. Third, limitations are discussed that may have hampered a significant result showing relationships of the variables presented. Last, suggestions are explored for future research in the area of female learning style, achievement, and persistence.

The literature lacks investigation of the impact of women's learning style as related to persistence and achievement in female post-secondary education. This is important information for institutions in retention of female students and targeted revision of teaching methods. This study investigated one research question:

What impact does learning style have on persistence and academic achievement?

The initial proposal of this study asserted a multi-variant analysis of both dependent variables: persistence and GPA. However, the sample did not allow for a look at the combination of both dependent variables in relation to each particular learning style due to a small sample size. Necessary statistical adjustments were made within the model after data collection in order to

provide insight into the relationship or lack of relationship with this sample. The first-year enrollment consisted of 72 incoming, traditional students; however, the sample consisted of 25 first-year, traditional, female student participants. The following section asserts conclusions based on the data analyzed.

Findings of the Study

In addressing the research question posed, I completed a one-way ANOVA to determine whether learning style impacts female achievement. A multivariate analysis combining both persistence and achievement could not be conducted due to small sample size. However, an ANOVA was conducted using learning style paired with GPA indicating that there is no significant difference between learning styles and each style learner GPA, $F(2, 22) = .619, p = .548$, two-tailed, $w^2 = .053, p > .05$. In order to analyze learning style effect on persistence, the second dependent variable, a chi-square was used resulting in no significance, $\chi^2(2) = .99, p > .05$. In determining the expected outcomes and the outcomes by chance, the chi-square shows that learning style does not impact persistence in the sample within this study.

In addition to the stated analyses, four *t*-tests were conducted to take a more in-depth look at the learning modes that are paired to determine the dominant learning style within the Kolb Learning Style Inventory as it relates to the learners' persistence. The tests indicated no significance; therefore, learning style modes calculated for each participant did not confer indication of a relationship to learner persistence for the following semester. This additional finding leads one to consider factors other than learning style not addressed within this study that could have an impact on female persistence and achievement. High school GPA is still considered among the best predictor for success and retention at the postsecondary level (Crossland & Hickman, 2004). However, other factors could include those such as student

demographics, motivation, or self-efficacy. These variables among others have been found to be predictors of postsecondary female student success at the first-year level. Rayle et al. (2006) contended that “for all women, self-beliefs, social support, and university comfort were significant predictors of academic persistence decisions, together accounting for over half of the variance in persistence decisions” (p. 337).

In a longitudinal study conducted by Harackiewicz et al. (2002), achievement motivation, interest, and performance goals were found to be important predictors of student success. It was also indicated that there was a positive correlation to ability and prior academic performance as seen in many studies conducted on predictive measures of student success. This study included first-year, male and female participants, $n = 471$; 319 participants were female. In another study, SAT verbal scores were found to be a predictive variable over math SAT scores when examining predictors of student success, $n = 243$, with over 60% of the participants being female (Huie, Kitsantas, & Winsler, 2008). In terms of self-efficacy as a predictor for success, Huie et al. (2008) found that self-efficacy was a major determinant to success in the first-year of college; however, self-efficacy became less relevant in upper-level courses as it relates to GPA or success.

Beyond high school academic performance and self-efficacy, Crossland and Hickman (2004) found female self-reported level of humor as an indicator for better adjustment to the college environment, higher GPA, and higher retention of those female students. A study by Rayle et al. (2006) suggested that the sole predictor of female academic success is social support; in addition, these authors stated that “as expected, the more these females and their families value education, the higher their overall levels of self-esteem, the greater their levels of self-

efficacy, and the lower their levels of academic stress, the greater their positive academic persistence decisions” (p. 338).

An in-depth search of the literature surrounding predictors of female academic success and persistence in first-year postsecondary education did not provide a history of studies based in learning style as a sole predictor of achievement and persistence. However, some studies included learning style as part of their study in predicting success. Dunman (2010) completed a study using male and female participants, $n = 68$, investigating how brain-based learning and teaching methods affected student academic achievement as related to their specific learning styles.

According to Dunman (2010),

the issue whether there is significant correlation between achievement and learning styles is a controversial one; however, if we want our students to be successful, it is surely a good idea to use brain-compatible and integrated learning teaching designs that can convert learning into a basic need. (p. 2097)

As learning style is the only variable investigated in this study as a possible predictor for female academic achievement and persistence, consideration should be given to Kolb’s (1984) learning style theory that postulates the inclusion of the whole individual. The dimensions in the Learning Style Inventory are extensions of adult development by including the four aspects of individual development: experiencing, reflecting, thinking, and acting. An individual’s cycle of learning changes dependent on the context in which the need for transforming information into practical use becomes necessary. A. Kolb and Kolb (2005) stated that “development through these stages is characterized by increasing complexity and relativism in adapting to the world and by increased integration of the dialectic conflicts between AC and CE and AE and RO” (p.

4). In essence, the inventory used in this study was developed based on experiential learning theory, which encompasses the entire individual development process that directly affects a preferred learning style.

Despite the lack of significance found in this study, the descriptive statistics have telling information that may provide insight into teaching methods that are meeting the needs for some learning styles and not others. The descriptive statistics illustrate some interesting observations that include logical connections between GPA and persistence: the higher the GPA, the higher the persistence rate. Looking further at the descriptive statistics, the representative learning style group, Diverging, had the third highest GPA and the third highest persistence rate. This observation within the data collected may point to useful teaching styles and how teaching styles are meeting the needs of the learners. For example, the Diverging learning style has two dominant modes of learning, which include concrete experience and reflective observation. According to A. Kolb and Kolb (2005), the Diverging learning style views concrete situations from many different perspectives and they prefer brainstorming sessions. They are actively imaginative and emotional, majoring in the arts mostly. In the formal academic environment, they prefer to work in groups and receive personalized feedback. It may be possible that the faculty members at this institution, overall, prefer the more traditional methods of teaching that conflict with the Diverging style.

Few studies have used the Learning Style Inventory in comparing student learning style to level of academic success using male and female participants at dissimilar institutions. Gurpinar, Alimoglu, Mamakli, and Aktekin (2010) conducted a study comprising of 170 participants that investigated learning style predicting success at a medical college. The study concluded that there was no significant difference between learning style as it relates to

achievement. Gurpinar et al. reported that “the reason behind this might be the fact that each individual used a mixture of different learning styles under different conditions” (p. 195). The findings indicated in this study present professional preferences as related to each dominant learning style. For example, the area of medicine is generally chosen by people with the Converging style (A. Kolb & Kolb, 2005).

Faculty tend to design and teach coursework based on their personal learning style, which causes some conflict in teaching students who do not share the same learning style (Felder, 1993). Dunman (2010) asserts most professionals in the teaching profession possess the style of Assimilating. According to Yildirim (2010), “assimilating individuals are persons who best understand through dividing comprehensive information into logical and proper forms” (p. 14). This may explain the finding in this study that the highest GPA and persistence rates belong to Assimilating style students. When faculty and student possess similar learning styles, it is a logical assumption that the learner will be the best fit to that particular teaching style. Although it is unknown if the teaching faculty at this college is predominantly Assimilating style learners, if they are, the logic applied to explain this finding holds. However, the key for educators in meeting individual student learning style needs is to diversify the techniques with which students are being taught. Dede (2009) stated that “the teacher must plan beforehand the teaching strategy he will use at which point and thus prepare the teaching-learning environment that will ease the process of learning accordingly” (p. 161).

Limitations

It is imperative to note the limitations to this study. The results of this study cannot be generalized to all White, female, first-year college students. The sample was taken from a non-secular, Catholic, liberal arts, women’s undergraduate institution. Furthermore, the sample

consisted of mostly Caucasian women, which limits the generalizability to women of other ethnicities and races. This study did not consider extraneous variables that could be affecting this particular population such as location, subject characteristics, and the impact of faculty teaching style. Among participants, course load combinations and specific majors were not identified.

The results of this study are also limited by using only quantitative measures, which inhibits the participants individual responses to open-ended questions that would have been able to relieve some of the aforementioned limitations. A qualitative component would benefit this investigation and is recommended for a revised replication of this study in the future. Doing so may help to determine how students perceive their individual learning style and how that perception may affect persistence and achievement.

Implications

There are many possibilities in postulating why Assimilating style learners were highest in achieving and persisting at this college. This would be best investigated by qualitative inquiry such as questionnaires or interviews. A first postulation may be associated with the acknowledgement that Assimilating style learners tend to prefer more traditional teaching methods in order to organize the information for practical use. This may produce an accommodating effect for completion of homework assignments that closely meet faculty expectations. Another postulation considers the possibility that the Assimilating style learner can determine what to expect from faculty and can accommodate to each faculty expectation. This may also lead to this style learner persisting at higher rates based on their ability to predict or “follow the rules” according to each faculty member’s course design. The Assimilating style learner tends to find out what is expected and then proceed with the objective. This characteristic of this specific learning style may, indeed, result in higher persistence and academic

achievement. Extending this research into the qualitative arena would assist in answering these questions. One could also determine if there is a correlation between the variable of length of time the student has been in formal education and the variables of achievement and persistence to determine if that may provide a basis for explaining the Assimilating style learners' higher rates of persistence and academic achievement.

A further postulation in explaining the outcomes of this study may be associated with faculty teaching style. As indicated previously, the teaching profession is dominated by faculty of the Assimilating style (Dunman, 2010). This study shows, descriptively, that the Assimilating style learner group was associated with highest GPA and persistence rate. In taking a more in-depth look at the lowest performing group, Diverging style learners, they differ from Assimilating style learners in that they are more interested in people and working in groups. When discerning the two learning styles, the Assimilating style, conversely, prefer "readings, lectures, exploring analytical models, and having time to think things through" (A. Kolb & Kolb, 2005, p. 5). If, indeed, faculty at this college predominantly possesses the Assimilating style, possible changes in teaching methods could be applied to support the different learning styles in the classroom.

The Millennial generation of student provides educators with even more challenges in not only acquiring knowledge about individual learning styles, but also moving away from authoritarian, hierarchical and traditional thought in higher education (Roehling et al., 2011). To explore the differences in the specific learning style needs, in response to the logical insight presented in the findings that the faculty may prefer the Assimilating style (thinking and watching), the Assimilating style learner prefers projects that require thinking alone, reflecting on theory without focusing on practical use, and summarizing a large amount of information.

Again, in this investigation, the Assimilating style learner showed the highest GPA (3.40) and highest persistence rate (100%). Focused on the logical assumption that a closer match between faculty teaching style and student learning style would result in greater learning and retention, a discussion of the learning styles and use of diverse teaching methods is required.

The learning styles include Diverging, Assimilating, Converging, and Accommodating, which are determined by combinations of dialectical abilities in the process of experiencing and transforming during the learning process. These preferred learning styles designate a particular way a student best learns. The Diverging style learner prefers feeling and watching. The Diverging style learner utilizes concrete experience and reflective observation in the learning paradigm. According to A. Kolb and Kolb (2005), “in formal learning situations, people with the Diverging style prefer to work in groups, listening with an open mind to different points of view, and receiving personalized feedback” (p. 5). In this investigation, the Diverging style had the largest group, but yielded 50% persistence and exhibited the third highest GPA (2.74). Teaching strategies to incorporate for Diverging style learners include cooperative learning, increased peer interaction, collaborative work, modifications in seating, and increased flexibility for students to be mobile (Johnson, Lane, & Pitts, 2000) According to Johnson et al. (2000), Diverging style learners “resist direct instruction and prefer to solve problems and discover answers using their own methods and techniques” (p. 1). In comparison, the Assimilating style prefers readings, lectures, analytic model exploration and reflecting alone on the concepts presented (A. Kolb & Kolb, 2005).

The Converging style learner group exhibited the lowest GPA (2.68) and a 0% persistence rate. The Converging style learner prefers technical tasks such as laboratory assignments and finding practical application of solutions to problems presented. This group of

learners lean more toward thinking and doing. Teaching techniques for this group include the teacher acting as a coach during learning activities. The goals of the task must be clearly emphasized and the teacher must provide personal feedback to those with the Converging style. The Converging style excels in solving problems and making decisions given they have coaching and personalized praise from the teacher. According to Dede (2009), “teachers of students with this style need to be an expert or a consultative authority in order to be effective over them” (p.159).

Finally, the Accommodating style learner, in this investigation, showed the second highest persistence rate (67%) and the second highest GPA (3.00). The Accommodating style learner observes then becomes active in the learning process in order to attempt hands-on problem solving. This style emerges in the careers of marketing and sales that require dependency on others ideas when completing a project. However, they participate in group work by taking the leadership role that requires a democratic approach. The teacher can incorporate small group work in which this learner style takes the role of expert in the learning process. This collaborative technique is beneficial and rewarding for both teacher and student within the bounds of meeting the Accommodating style learner needs (Dede, 2009).

One of the largest challenges for educators in fostering needs of the learner is the temporal frame allowed during the semester. At times, the teacher may experience time pressures that impact delivery of course information, which can result in rote learning for students. However, meeting the needs of diverse learners can increase achievement and persistence (Dede, 2009). Knowing the learners before courses begin, such as discovering their dominant learning styles, can assist in preparation for course delivery and techniques that will accommodate the different styles of learning. Teachers’ specific learning styles may be challenged within this

effort, and the teacher may show some discomfort in changing teaching methods to which they have become accustomed based on their own specific learning styles. However, a teacher with any given learning style can use a variety of techniques such as inclusion of academic games, cooperative learning, brainstorming, debates, demonstration, direct instruction, individualized instruction time to meet specific needs, hybrid courses, performances, lectures, role-playing, report writing, individual and group presentations, controversy discussions, and personalized feedback. These specific teaching techniques can be altered to reach the four learning style categories.

An important notion to be taken from this study is that of faculty knowledge of their students' learning styles in order to assist the learners in reaching their goals and building critical thinking skills by use of multiple methods. The results or success of each student's academic encounter is a dual responsibility both for the student and the teacher. However, the most responsibility lies on the teacher to match teaching style to each learning style in order to provide a wide range of tasks, which exposes each learner to the different tasks within another learning style mode (Kazu, 2006). It is also important to incorporate a variety of techniques, not only to reach the specific style learner, but also to provide each student with attempts at grasping and transforming information in different ways that are not within their dominant learning style.

Kazu (2009) suggested,

the teachers should match teaching style and learning tasks to individual learners' preferred styles and provide a range of input styles and learning tasks so that the learners will sometimes get a task in their preferred style, sometime in other styles, so that they can improve. (p. 90)

By challenging the learner to use all modes of learning as discussed in Kolb's model, critical

thinking can be built into the already existing structure, goal of the course, department, and institution. The first premise to David Kolb's experiential learning theory is that learning is a process in which all learning styles can use other modes based on contextual requirement (Kolb, 1985). In this aspect, teachers can meet the needs of the learners, challenge themselves in modifying course planning, and meet the criteria of incorporation of critical thinking skills.

According to Felder (1993),

students whose learning style is compatible with the teaching style of a course instructor tend to retain information longer, apply it more effectively, and have more positive post-course attitudes toward the subject than do their counterparts who experience learning/teaching style mismatches (p. 286).

Felder's (1993) observations as stated above should be encouragement to faculty in attempting to meet the needs of the learner.

Faculties are presented with other unique challenges when returning their focus to the learner, especially, in the current generation of student. Additional factors in student learning preferences include the integration of technology into teaching methods of this generation. Howe and Strauss (2000) indicates in their research that Millennials are more group interactive, which can serve as a way to incorporate technology in learning modules and; therefore, reaching across all learning styles. Diversifying the methods used in the classroom can reach across the lines provided in the learning style grid by providing opportunity for a variety of techniques for experiencing and transforming information while using technology. For example, when the technique of role-playing paired with technology is used in the classroom, the current generation and all style learners can benefit in the following ways: (a) observation of others performing skills (Assimilating style), (b) direct feedback from the consultative teacher and expert learners

within the group (Accommodating style), (c) collaborative interaction that allows for personalized feedback (Diverging style) and (c) practice of skill set (Converging style). Within this example, technology can be incorporated by asking the observers to provide feedback about the task and peer performances on a projection screen from their computers.

The use of discussion boards and blogging while the planned activity is taking place can serve the current generation and across learning styles. Skiba and Barton (2006) suggests for the current generation, “since they don’t respond to lecture format, it is important to take advantage of their multi-tasking ability by posting course notes with relevant web links so that the students can explore relevant resources and become engaged with the content” (p. 4). The use of technology in the classroom is an important way to incorporate different methods that address the different learning styles and the current generations stated abilities for multi-tasking; engaging in the classroom activity and giving feedback through use of public instant messaging.

In a study conducted by Roehling et al. (2011), using a similar sample as this investigation, the authors provided tips for optimizing classroom conditions for the millennial generation. Roehling et al. 2011 suggested,

- 1) Work to develop a comfortable classroom atmosphere at the very beginning of the semester while norms for participation are being established.
- 2) Engage in exercises in which students get to know each other, increasing their level of comfort with their classmates.
- 3) Show respect for all opinions, even those that diverge from your own.
- 4) Set ground rules for civil discussions.
- 5) Moderate difficult discussions.
- 6) Show enthusiasm for the subject matter. (p. 6)

Use of the Learning Style Inventory in the orientation phase of postsecondary education would allow for faculty to prepare for course dynamics of the various learning styles, which can direct use of specific teaching methods needed in each unique group of students. The use of the Learning Style Inventory incorporates the entire individual as it originates from experiential learning theory, which would best fit the characteristics of this generation as well in determining what faculty can expect in planning for each course. Students present with different cognitive abilities that require an array of teaching techniques that should be identified prior to course planning (Cornett, 1983).

The Learning Style Inventory has undergone many unbiased reliability and validity examinations that make this inventory well fit for this institution. Kayes (2005) administered the Learning Style Inventory to a sample of 221 participants of which 107 were female. The results provided indicated overall evidence of internal reliability and validity of internal characteristics of the Learning Style Inventory. Furthermore, *t*-tests were used to test the sample demographics that included gender compared to scores on each scale mode. As no gender biases are found in the reliability and validity of internal characteristics, the Learning Style Inventory can be a useful tool at this college. According to Kayes (2005), “this study supports prior research which reported no significant differences in constructs based on gender” (p. 256). It is suggested that the institution implement this particular learning style inventory.

A shift away from teaching styles invites the subject of an additional useful application at this institution. Learning style is important in identifying student characteristics, application of living-learning communities could be useful at the first-year level. The conception of community learning in education began with the work of John Dewey as demonstrated by his profound work. Scholars have been greatly influenced by the coined term *progressive education*, which

includes learning within communities or community type settings that do not follow traditional regiments to curriculum delivery. Situated learning theory was introduced by Jean Lave to include communities of practice and this technique is being applied in many institutions in such ways as collaborative learning centers, subject matter clubs organized and lead by learners, and environmental application of subject matter facilitated by teachers (Lave, 1996). Lave purported that in the teaching specialization, teachers must “untangle the confusions that mistakenly desubjectify learners’ and teachers’ positions, stakes, reasons, and ways of participating, and then inquire anew about those relations” (p. 162).

The living-learning community can enhance student achievement and success through a social lens. Lenning and Ebbers (1999) discussed learning communities established for particular groups of students: “The primary focus of such learning communities was to facilitate collaborative learning among entering undergraduate students” (p. 30). Administratively, the primary purpose of the learning communities was to restructure the curriculum and make the courses more cohesive for students to make broader connections to how subjects relate to them and to their world experiences (Lenning & Ebbers, 1999). The learning communities provide learners opportunities for social and self-growth in adjusting to the postsecondary environment as they build relationships by activities that constitute close interaction between learners. Lave and Wenger (1991) stated, “members are brought together by joining together in common activities and by what they have learned through their mutual engagement in these activities” (p. 2). The students can be grouped in many ways such as by specific major and then learning styles within that major. The idea of acquiring knowledge when using living-learning communities is based on inclusion of the social component of human nature and asking what is the social nature involved in knowledge acquisition.

The praxis suggested by use of living-learning communities involves a learner's aim to participate in the learning process, which results in meaningful learning through socio-cultural indices (Lave & Wenger, 1991). In traditional settings, the individual holds the power or hierarchical position in knowing; however, in the living-learning community, all persons have a place within the group that extends learning to acquiring knowledge within the context and from group participation in the learning process. Seaman (2008) emphasized the most important role that living-learning communities possess when applied: "the main goal of communities of practice is to improve practice or collectively redefine practice" (p. 275) within the social context that can be applied to the whole person as a member within a group. This practice may be useful for implementation by developing a system for building living-learning communities that may empower students to interactively support the learning of all.

Zhao and Kuh (2004) stated,

Learning communities are intentionally structured to help students make two types of connections consistent with this theoretical orientation. The first is encouraging students to connect ideas from different disciplines, which is aided by being co-enrolled in two or more courses. The second is the linking of students through on-going social interaction afforded by being with the same students for an extended period of time. (p. 117)

Essentially, identifying learning preferences and heterogeneously grouping them creates the conditions for students to help each other negotiate the learning challenges that arise as an academic period proceeds. This is in addition to providing the other social supports necessary. However, this can only happen when directors of learning-living communities understand each specific learning style and can mentor students as well as support peer-to-peer mentoring in resolving these challenges. This calls for some specific education of learning-living

communities' directors.

Recommendations for Future Research

This study did not indicate a significant difference in learning style and GPA or learning style modes and persistence; however, descriptive statistics allow for interesting observations. The Assimilating style learner displayed a higher rate of persistence and the highest GPA, which may indicate that the preferred learning style of the faculty at this college is the Assimilating style. This study could be best replicated with revisions that include a larger sample, addition of a qualitative piece, possibly a questionnaire on how students view their particular learning style and its effects on persistence and achievement. Surveys, interviews, or questionnaires may assist in discovering what type of learner volunteered for participation in this study, which would provide more insight into the possible implications of Assimilating style learners' accommodating characteristic and years of practice within the formal education environment. It would also be beneficial to collect data on faculty learning style and what teaching methods they are currently using.

Recommendations for future research include investigation of teaching style at this institution to determine the dominant learning style of faculty. It is also recommended that college and university faculty engage in seminars based in identifying student learning style and how faculty may efficiently prepare for multi-modal activities to accommodate learners of the current generation. An additional observation of the data indicates that the Diverging and Converging style learners presented with the lowest GPAs and low or no persistence; however, more data are required to determine if this institution has faculty that prefer the Assimilating style in their teaching methods.

Summary

The predictors for academic success and persistence are various and depend on the population being studied. Despite having found no significance in this sample, there have been some telling observations in the descriptive statistics as it relates to faculty teaching style at the institution from which this sample was taken. As little research has been conducted on women's learning styles in postsecondary settings, it was imperative to add to the knowledge base.

Experiential learning theory posits and demonstrates a process of human adaptation and how the lifelong journey of learning is a cyclical. This cycle requires use of different modes such as abstract conceptualization, concrete experience, and reflection at different points of grasping experiences and transforming them to heighten human intellect or critical thinking skills.

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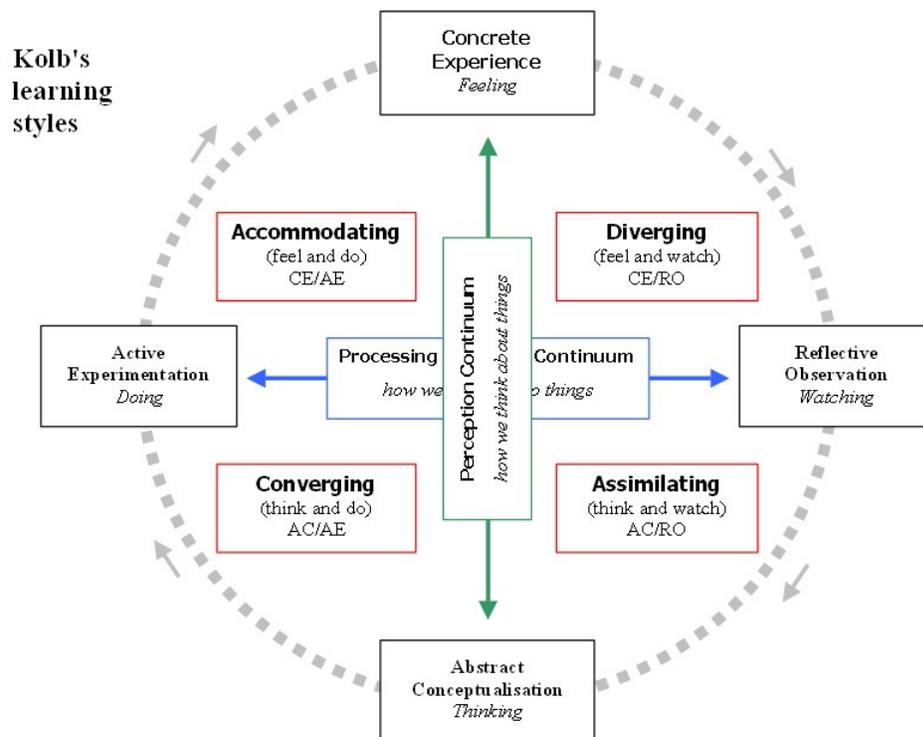
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APPENDIX



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