10-2-2017

The relationship between peer tutoring and learning styles at Rowan University

Marissa Jean Wood
Rowan University

**THE RELATIONSHIP BETWEEN PEER TUTORING AND LEARNING
STYLES AT ROWAN UNIVERSITY**

by

Marissa Jean Wood

A Thesis

Submitted to the
Department of Educational Services and Leadership
College of Education
In partial fulfillment of the requirement
For the degree of
Master of Arts in Higher Education
at
Rowan University
September 28, 2017

Thesis Chair: Burton R. Sisco, Ed.D.

Dedications

I would like to dedicate this manuscript to my late grandmother, Sylvia Cox (nee Ratcliff), and to my loving mother, Laura Wood.

Acknowledgments

I would like to express my appreciation and sincere thanks to Dr. Burton Sisco for his guidance, help, and continued patience throughout this research. The skills that I have learned and the knowledge that Dr. Sisco has imparted throughout this project will serve me well in future endeavors.

I would like to thank the Division of Strategic Enrollment Management and the Tutoring Services Department at Rowan University for allowing me to conduct research within the Tutoring Services Department.

Finally, I would like to thank the tutors who participated in my research. Without them, this thesis would not be possible.

Abstract

Marissa Jean Wood
THE RELATIONSHIP BETWEEN PEER TUTORING AND LEARNING STYLES AT
ROWAN UNIVERSITY
2016-2017
Burton R. Sisco, Ed.D.
Master of Arts in Higher Education

The purpose of this study was to determine the learning styles of peer tutors employed by the Tutoring Services department on the Glassboro campus of Rowan University during the spring 2017 semester. The study collected responses to two learning style instruments: the Learning Connections Inventory (LCI) Adult Education Form © and the VARK © instrument. Of particular interest was what were the most common learning styles among the tutors and was there a relationship between the reported styles and, length of time as a tutor, academic major, and class rank?

Although there is a plethora of research describing the relationship between tutoring and the student being tutored (i.e. the tutee), there is a gap in the literature pertaining to the relationship between tutoring and the tutor. Further, the literature regarding the relationships between being a tutor and tutoring does not adequately explore potential interactions between learning styles and being employed as peer tutor. The LCI © and VARK © instruments were administered to 45 peer tutors who were employed by the Tutoring Services Department of Rowan University during the spring 2017 academic semester. This study found that there were no relationships between the reported learning styles and, length of time as a tutor, academic major, and class rank.

v

Table of Contents

Table of Contents (Continued)

Table of Contents (Continued)

List of Figures

List of Tables

x

Chapter 1

Introduction

Learning is a process through which individuals absorb new information, create knowledge, and reconcile differences between new knowledge and previous knowledge (Kolb, 1974; Kolb & Kolb, 2005). The learning process for adults is different than the learning process for children (Knowles, 1972). Learning theories such as experiential learning and andragogy provide a shared vocabulary for researchers and educators to use as well as a starting point for further research into learning and metacognition.

Previous literature has described how learning styles may affect teaching styles and has shown that there may be correlations between job categories and learning styles (Kolb, 1974; Rings & Sheets, 1991; Sims, 1983). However, there is limited literature that clearly describes whether being employed as a peer tutor in a collegiate environment has any relationship with how tutors learn or the processes they use to gather and retain information.

Background of the Problem

The existing literature does not explicitly describe whether peer tutoring is related to learning styles and tends to focus on tutee interactions rather than the peer tutors themselves. Most researchers have focused on interactions between tutors and tutees or how tutoring might affect a tutee. Very little research exists about the tutors themselves despite the fact that tutors have a significant impact on the students they are tutoring (Rings & Sheets, 1991).

Statement of the Problem

There is a gap in existing literature regarding both peer tutoring and learning styles which is evidenced by the lack of existing research on how these two topics may intersect. Research exploring whether there is a relationship between being a peer tutor at a collegiate level and learning styles is important because such research will help to fill an existing gap in the literature and may also assist with the functioning of collegiate tutoring programs.

Purpose of the Study

The purpose of this study was to determine the learning styles of peer tutors employed by the Tutoring Services department on the Glassboro campus of Rowan University during the spring 2017 semester. More specifically, the study collected responses to two learning style instruments: the Learning Connections Inventory (LCI) Adult Education Form © and the VARK © instrument. Of particular interest was what are the most common learning styles among the tutors and is there a relationship between the reported styles and, length of time as a tutor, academic major, and class rank?

Assumptions and Limitations

This study is limited in scope. There were approximately 76 peer tutors employed by Tutoring Services at Rowan University during the spring 2017 semester. Due to the small population, this study should not be generalized to all collegiate peer tutors or peer tutoring programs. However, this study may be applicable to collegiate peer tutoring programs that are similar to Rowan University's Department of Tutoring Services.

Additionally, I was employed as a peer tutor by Tutoring Services at Rowan University for 3 years. Further, I was also employed by Tutoring Services as a Graduate

2

Coordinator until December 2016. Due to my background in tutoring, I am aware of how I personally have tutored and how my own tutoring style may have been affected by knowledge of the ways in which I learn. However, my own personal experiences will have no bearing on the execution of this study or the evaluation of the results since I am in no way acting as a participant and did not create the scoring criteria for the LCI © or VARK © instruments.

Operational Definitions

1. Appointment Based Tutoring: Appointment based tutoring refers to appointment-based, small group tutoring sessions of no more than four students per tutor.

2. Drop-in Session: Drop-in session refers to a tutoring session for which no appointment is needed.

3. Tutee: A Rowan University student who is receiving tutoring from a tutor who is employed by the Tutoring Services department of Rowan University during the spring 2017 semester.

4. Tutor: A tutor is a Rowan University student who is employed as a peer tutor during the spring 2017 semester by the Tutoring Services department within Strategic Enrollment Management at Rowan University, is at least 18 years of age and has earned at least a 3.0 grade point average using a 4.0 scale.

5. Tutoring: Tutoring refers to both appointment-based tutoring and drop-in sessions.

6. Tutoring Services: Tutoring services refers to the Tutoring Services Department under the auspices of the Division of Strategic Enrollment Management at Rowan University.

3

Research Questions

The following research questions guided the study:

1. What are the results of the LCI © VARK©?

2. What are the results of the VARK©?

3. Is there a relationship between the scores on the LCI© and the VARK© instruments and the variables of length of time as a tutor, academic major, and class rank?

Overview of the Study

Chapter II is a literature review that discusses the concepts of experiential learning and andragogy, the history of learning styles and related instrumentation, and research regarding peer tutoring in colleges and universities.

Chapter III describes the methodology of the data and the procedures that were used during data collection. Information regarding the context of the study, population and sample information, and the instrumentation used during the study can be found in this chapter. Also presented are data collection procedures and how the data were analyzed.

Chapter IV presents the outcomes of the study and contains a statistical analysis that is guided by the research questions that can be found in Chapter I. Chapter IV also provides data tables and with narrative comment which depict the findings of the study.

Chapter V contains a summary of the study, a discussion of the findings of the study contextualized by the research discussed in Chapter II, conclusions, and suggestions for further practice and research

4

Chapter II

Literature Review

Introduction to the Literature Review

Many studies exist regarding the effects of tutoring on students hereafter referred to as tutees, but considerably fewer studies have been done regarding what effects tutoring has on the tutor, specifically how being a peer tutor at the collegiate level may be related to learning styles. Tutees receive many benefits from tutoring such as increased cognitive skills, greater levels of knowledge retention, an increase in metacognitive functions, and the opportunity to be quickly corrected when an error is made (Topping, 1996). Topping (1996) attributes the aforementioned tutee benefits to a decreased educator-student ratio and a decrease in the tutee's level of social isolation. Cohen, Kulik, and Kulik (1982) also found that being tutored positively affects the tutee's understanding of the subject matter as well as his or her attitudes regarding subject matter; attitudes regarding subject matter generally improved after receiving tutoring. Neither Topping (1996) nor Cohen et al. (1982) discuss how learning styles could play a role in tutor-tutee interactions.

In order to better understand how tutors and learning styles may relate to one another, literature regarding certain learning theories, learning style instrumentation, metacognition and peer tutors who tutor at the collegiate level are reviewed and synthesized into this literature review. This literature review begins with an overview of the theoretical framework of the study followed by a description of learning style instrumentation and tutoring at the collegiate level. The literature review concludes with the need for further study and a summary of the literature review.

5

Theoretical Framework

      Experiential learning. Experiential learning is a learning theory by Kolb (1974) that describes learning as a continuous, holistic process grounded in the experiences of a learner. According to Kolb, the point of learning is to better understand the nature of knowledge and to create knowledge via transactions between people and between people and their respective environments (1974). Kolb and Kolb (2005) built upon the definition given in Kolb (1974) and further describe learning as a type of initiation into a new environment. Through the process of learning, individuals are able to create knowledge of their new environment, resolve any conflict between what has been learned previously and new knowledge they have attained, and reap the social rewards (e.g. acceptance, praise, positive feedback) of creating, sharing, and integrating what they have learned (Kolb, 1974; Kolb & Kolb, 2005).

      In order for individuals to maximize personal learning experiences, they must conceive of themselves as learners and be willing to learn more about the concept of learning itself (Kolb & Kolb, 2008). Once an individual is able to learn about learning and has been made aware of his or her learning style, proponents of experiential learning theory suggest that individuals should become employed in occupations that are complementary to their learning experiences (Kayes, 2002; Sims, 1983)

      Experiential learning theory eventually formed the basis of *Kolb's Learning Style Inventory* (LSI). The LSI conceptualizes learning as occurring in one or more of the following categories, "concrete experience," "reflective observation," "abstract conceptualization" and "active experimentation" (Kolb & Kolb, 2005, p. 198). After the categories are identified, a learner is then sorted into 1 of the 4 learning styles as

6

described in Kolb and Kolb depending upon which of the categories are scored as dominant (2005). These learning styles are labelled diverging, assimilating, converging, and accommodating (Kolb & Kolb, 2005). The LSI is supposed to be used as a tool for introspection and self-discovery (Kolb & Kolb, 2005). Kolb and Kolb (2005) caution that the LSI should not be used to "pigeonhole" (p. 198) learners and that learning styles must not be considered fixed states in order for the LSI to accurately measure learning styles.

Critiques of experiential learning theory. Both experiential learning theory and the LSI have been critiqued as being theoretically unsound, unreliable, invalid and unable to be empirically tested (Freedman & Stumpf, 1980; Kayes, 2002). Freedman and Stumpf (1980) state that the LSI is both unreliable and invalid with weak, statistically insignificant correlations to experiential learning theory and that the instrument itself is biased because it relies on self-reported answers.

Freedman and Stumpf (1980) also claim that the theoretical foundation of and empirical research on the LSI is contained within an unpublished document written by Kolb in the early 1970s. This claim is refuted by Kolb (1981) and is proven false when Kolb (1981) provides a citation for a published work titled "The Learning Style Inventory: Technical Manual" which was written by Kolb and published in 1976, 4 years prior to Freedman and Stumpf's published critique in 1980.

Kolb (1981) rebuts Freedman and Stumpf (1980) with a claim that Freedman and Stumpf view learning as having fixed attributes, which, according to Kolb (1981) is demonstrated by Freedman and Stumpf's test-post-test analysis. Viewing learning as having fixed attributes is antithetical to the nature of experiential learning theory and

7

necessitates the disregarding of the findings of Freedman and Stumpf (1980) according to Kolb (1981).

Stumpf and Freedman's (1981) reply to Kolb (1981) with a clarification of their previous critique discussed in Freedman and Stumpf (1980) add further evidence that the LSI is psychometrically unsound because it is susceptible to measurement error (Stumpf & Freedman, 1981). Stumpf and Freedman (1981) assert that results of the LSI can be affected by numerous variables including situational factors, a learner's personal characteristics, and/or scoring errors. Stumpf and Freedman (1981) state that the low test-retest scores for the LSI are not obviously meaningful variances, but could be results of an important measurement error in the instrument itself. Ultimately, Stumpf and Freedman (1981) conclude that the LSI instrument needs to be further researched before it can be used reliably in research.

In addition to Stumpf and Freedman (1981) and Freedman and Stumpf (1980), Miettinen (2002) also critiques experiential learning theory. While Stumpf and Freedman (1981) and Freedman and Stumpf (1980) focus on psychometric issues within the LSI, Miettinen (2002) focuses on experiential learning theory itself. Miettinen (2002) criticizes Kolb's experiential learning theory as inadequate and inconsistent with the theories and philosophies that experiential learning theory is based.

Miettinen (2002) argues that Kolb (1974) misused the works of John Dewey by citing only the portions of Dewey's work that lends credence to experiential learning theory while discarding the portions of Dewey's work that may conflict with experiential learning theory. Additionally, Miettinen (2002) discusses that the need for a learner to be completely objective, as described in Kolb (1974), is impossible because a learner will

8

not be able to separate him or herself from the cultural context in which he or she was raised. Therefore, it impossible to view any new situation completely free of bias (Miettinen, 2002).

Andragogy. Knowles developed andragogy because the learning theories at the time were based on pedagogy (i.e. the education of children) which has its origins in behavioral models that were used to analyze the behavior of lab animals (Knowles, 1972). There were no theories related to the education of adults that sufficiently explained and accounted for the complexity of adult learners and how greatly adult learners differ from learners who are children, so Knowles created andragogical theory within the context of human resource development in order to facilitate a deeper understanding of the adult learner (Knowles, 1972).

Knowles' (1972) andragogical theory focuses on the differences between the assumptions that are made during the education of children (i.e pedagogy) and the assumptions made during the education of adults (i.e andragogy). Knowles' andragogy is based on the notion of self-concept, the role of experiences as related to education, a readiness to learn, and a problem-centered learning orientation (Knowles, 1972).

Like Kolb (1981), Knowles (1972) describes experience as integral to the learning process of adults and intrinsic to the way in which adults learn. When teaching an adult learner, it is important to appeal to the experiences of the adult learner and help the learner understand how what is being taught is applicable to a learner's lived experiences (Knowles, 1972; Weingand, 1996).

Zmeyov (1998) adds that cooperation between the individual fulfilling the role of the teacher and the individual fulfilling the role of the student is quintessential to the

9

success of the student and requisite of any individual claiming to educate using an andragogical method. According to Zmeyov (1998), without this cooperation, education would not be focused on the experiences of the adult learner which would be in opposition with andragogical principles as described by Knowles (1972).

Zmeyov's assertion that teacher-student cooperation is necessary in order for education to be considered andragogical is supported by Knowles (1972) when he states that andragogical education must take place in a reciprocal environment and include discourse between the teacher and the student, not just lecturing. Also, Bass (2012) states that science education for adults is much more fruitful when the adult students are able to have input regarding what they will be taught and when they will be expected to create and retain their knowledge.

It is also vital for educators to realize and understand that adult learners are different than learners who are children, and that adult learners are not "big kids" (Hiemstra & Sisco, 1990, p. 21). Adult learners are complex and have varying life experiences that affect how they perceive and complete educational tasks (Hiemstra & Sisco, 1990). Hiemstra and Sisco (1990) lend credence to Bass' (2012) assertion that science education is more helpful for students when the students are able to have input by explaining the utility of an educational contract when working with adult learners. Since adult learners are often self-directed, a learning contract or other heuristic activities can be used to create a fulfilling learning environment for an adult learner and aid in a learner's metacognition (Hiemstra & Sisco, 1990; Knowles, 1972).

10

Metacognition

Vermunt (1996) defines metacognition as an analytical process by which an individual can make use of knowledge, differentiate between what knowledge is useful for a particular task, motivate oneself and others, and work independently. Both experiential learning theory and andragogy encourage metacognitive practice, as defined in Vermunt (1996), as essential elements of education and the sharing of and acquisition of knowledge (Knowles, 1972; Kolb 1974; Kolb & Kolb, 2008).

According to Kolb and Kolb (2008), if an individual believes that he or she cannot learn, then he or she will learn nothing and will not be internally motivated. Internal motivation is a necessary element of adult education (Knowles, 1972) and is developed through a metacognitive process (Vermunt, 1996). Therefore, it is vital to understand how metacognition intersects with learning and teaching, especially when peer tutors are involved in knowledge sharing as the tutors themselves may not have reflected upon their own learning processes (King, 1998).

According to Rings and Sheets (1991), most successful tutors have already developed a metacognitive process, but may be unaware of how to describe the process to others or encourage their tutees to describe or begin their own metacognitive processes. When these processes differ, a tutor may be mismatched with a tutee which could result in a negative tutoring experience for all parties involved and could discourage the tutee from pursuing further tutoring in the future (King, 1998). When the metacognitive processes of the tutor and the tutee are similar or, at the very least, complementary, the tutoring session may be positive for all participants and could result in an increased level of understanding of subject material and metacognition which, in turn, fosters more

11

productive tutoring relationships thus creating a positive cycle for the tutor and the tutee (King, 1998; Rings & Sheets, 1991).

Since increased levels of metacognition has been linked with positive tutoring outcomes (King, 1998; Rings & Sheets, 1991), and metacognition is intrinsically associated with experiential learning, learning styles, and andragogy (Knowles, 1972; Kolb & Kolb, 2008), it is desirable to ascertain whether there is any relationship between the act of being a peer tutor at a collegiate level and learning styles.

Learning Styles

The term learning styles is often used interchangeably with the terms cognitive styles, learning strategies, learning preferences and, in some cases, learning modes (Cassidy, 2004). For the purposes of this literature review, the term learning styles is used to refer to studies citing cognitive styles, learning preferences or learning strategies unless otherwise specified because the aforementioned terms are often used interchangeably and are occasionally synonymous with one another (Cassidy, 2004). When a term other than learning styles must be used, this variance will be clearly stated and the reason for the variance will be explained.

Learning styles can vary across cultures, genders and many other demographics (Joy & Kolb, 2009; Severiens & Dam, 1994). Joy and Kolb (2009) stated that cultural differences such as ethnicity and country of origin could have an effect on learning styles due to the different educational experiences that may have taken place. Since many learning style instruments were developed in North America, portions of Oceania, and parts of Europe (Cassidy, 2004), it is important to be cautious when applying said

12

instruments to students who, for whatever reason, may not align themselves with Western values.

Also, it is important to take into consideration that gender may play a large role in the development of learning styles because of gendered socialization (Severiens & Dam, 1994). Severiens and Dam (1994) found that men were more likely than women to be extrinsically motivated by goals and other rewards while women were more likely to be internally motivated, which is a major component of Knowles' (1972) theory of andragogy. The differences between men and women in Severiens and Dam (1994) varied by academic department which suggests that Kolb (1981) may have been correct when he asserted that the learning experiences that one has will affect personal learning styles.

Like many other individuals, tutors also have learning styles and may utilize their preferred style of learning when they are tutoring (Hawk & Shah, 2007). If most tutors ascribe to similar learning styles, there is the potential for a severe mismatch between the tutor and the tutee because tutors are likely to tutor in the same method in which they prefer to learn (King, 1998; Roscoe & Chi, 2007). For this reason, tutors should be evaluated to determine what their learning styles may be.

There are numerous instruments to measure learning styles such as the LSI, Honey and Mumford's *Learning Styles Questionnaire* (LSQ), *Vermunt's Learning Styles Inventory* (VLSI), and many others (Cassidy, 2004).

The LSQ is an instrument that is based on the LSI and grounded in experiential learning theory (Cassidy, 2004). Like the LSI, the LSQ has questionable psychometrics (Cassidy, 2004; Duff & Duffy, 2002; Freedman & Stumpf, 1980). Duff and Duffy (2002)

13

found that the LSQ is unreliable and potentially invalid because the instrument does not have sufficient internal consistency and does not measure accurately. These findings are similar to the findings of Freedman and Stumpf's (1980) analysis of the LSI, the instrument upon which the LSQ is based (Cassidy, 2004). Since the LSI and the LSQ have questionable reliability and validity, these instruments were not utilized in the study.

The VLSI is an instrument that was designed as a diagnostic tool within the context of higher education (Cassidy, 2004). The instrument was inspired by the LSI and the LSQ. However, unlike the LSI and the LSQ, the VLSI has not been deemed reliable or valid in any of the research covered in Cassidy (2004). This study did not utilize the VLSI because much of the literature regarding the instrument is at least 10 years old (Cassidy, 2004).

Instrumentation

VARK© Questionnaire. VARK© is an acronym for visual, aural, read/write, and kinesthetic which are the four modal preferences that can be determined by the VARK© instrument (Fleming & Mills, 1992). The instrument itself is comprised of multiple choice items which serve to determine whether the individual taking the instrument has a modal preference for visual learning, auditory learning, learning via reading and writing, kinesthetic learning or a combination of any of the modes (Fleming & Mills, 1992). If an individual scores equally on two or more modes, the individual is considered a multimodal learner according to the VARK© instrument (Fleming & Mills, 1992; Hawk & Shah, 2007).

Reliability and validity. Much of the literature surrounding VARK© has been authored by Neil Fleming, the creator of the VARK© instrument and the current

14

copyright holder for the instrument. For this reason, any literature from Fleming may be susceptible to bias. Fleming claimed that the VARK© instrument was statistically valid (Hawk & Shah, 2007). Leite, Svinicki, and Shi (2010) conducted a multimethod confirmatory factor analysis to determine whether the VARK© instrument was psychometrically sound and whether it could be considered valid and reliable.

Leite et al. (2010) preliminarily found that the VARK© instrument is valid and reliable, but there are errors in word choice that should be corrected in newer iterations of the instrument. The wording of some of the VARK items excludes certain groups of people (e.g. An item regarding Internet usage cannot be answered by someone who does not routinely use the Internet) (Leite et al., 2010).

Leite et al. (2010) conclude that the VARK© instrument may be helpful for students to learn more about their own modal preferences, but that the instrument should not be the sole instrument used when researching learning styles and that further research on the validity of the VARK © instrument is needed. Leiete et al. studied only the internal validity of VARK © and suggest that researchers should analyze other types of validity (2010). Fleming (2012) rebuts Leite et al. (2010), but does not provide statistical evidence for the rebuttal. Taking the findings and recommendations of Leite et al. (2010) into consideration, the *Learning Connections Inventory©* was also utilized in this study.

Learning Connections Inventory. The *Learning Connections Inventory ©* (LCI) is based on the Let Me Learn process, which is grounded in the Interactive Learning Model (Let Me Learn, n.d). The LCI contains 28 Likert-scale items and 3 open-ended questions. All responses are self-reported (Let Me Learn, n.d). The LCI measures mental processes then places individuals in one or more of the following categories: (a)

15

Sequential; (b) Precise; (c) Technical; or (d) Confluent (Johnston, 1994 as cited in Let Me Learn, n.d).

The Sequential pattern is characterized by clarity, organization and neatness, so an individual with the Sequential pattern may require clear, consistent direction and will often take the time to ensure that any item subject to external scrutiny (such as turning in coursework), will be organized, clear, and correct (Let Me Learn, n.d). The Precise learning pattern is characterized by attention to detail, engaging in dialog, and an emphasis on being correct, which means that an individual who primarily uses the Precise pattern will often take very detailed, or even verbatim, notes, focus on what is correct, and will ask questions frequently (Let Me Learn, n.d). Individuals with a Technical learning preference will often be drawn to problem solving, hands-on work such as building an item, and learning through experience (Let Me Learn, n.d). The last pattern is the Confluent pattern, which is typified by preferring unconventional approaches, using alternative methods to complete tasks, improvisation, and beginning a task prior to the completion of instruction (Let Me Learn, n.d). An individual who primarily uses the Confluent pattern is often a person who takes risks, who is innovative, and who relies on intuition more than any one specific knowledge base (Let Me Learn, n.d).

Each of the four patterns is comprised of cognition, conation, and affectation (Johnston, 1998). Cognitive processes provide a recollection of previous experiences and allow a learner to consider how what he or she is currently learning is connected to what he or she has already learned (Johnston, 1998). Conation takes place simultaneously with cognition and is defined in Johnston (1998) as the "performance control center" of the brain (p. 21). Conative behaviors include considering how and when new information

16

will be applied, whether a learner prefers working alone or in groups and whether a learner can actually perform the act of learning in a successful way (Johnston, 1998). Affectation is typified by the question "How successful was I the last time I did this?" (Johnston, 1998, p. 22). When a learner is successful, that success will positively affect a learner and contribute to further success in the future (Johnston, 1998). Each of the four patterns contains elements of cognition, conation, and affectation (Johnston, 1998). Each pattern can be utilized at a use first, use as needed, or avoid basis (Johnston, 2010).

Once the preferred patterns of a learner are established, the learner is sorted into one of four categories based on how often a learner utilizes the four patterns. The categories include the bridge learner, the dynamic learner, and the strong-willed learner (Johnston, 2010). A bridge learner utilizes all of the patterns at a use as needed level and is considered to be akin to a jack-of-all-trades (Johnston, 2010). A dynamic learner uses one or two patterns at the use first level and uses the remaining patterns at use as needed level or avoids the remaining patterns (Johnston, 2010). A strong-willed learner will use three out of the four patterns or all four patterns at use-first level (Johnston, 2010). Although there is existing research regarding the LCI and learning styles in general, there is very little research regarding the interaction of learning styles and peer tutoring.

Peer Tutors and Tutoring

A peer tutor is an individual who assists an individual of a similar age and grade level with tasks related to a particular course (e.g. assisting a student in Organic Chemistry I) or tasks related to general concepts such as study skills, organizational skills, or time management (Roscoe & Chi, 2007; 2008). At Rowan University, peer tutors employed by Tutoring Services provide tutoring for a wide variety of courses from

17

one or more of the various courses offered by Rowan University in a variety of subjects such as hard sciences (e.g biology, chemistry, physics etc.), social sciences such as sociology, communications, technology (e.g computer science), mathematics, English language, foreign languages, and history (Tutoring Services, n.d).

Tutors often engage in knowledge-building which is defined by Roscoe and Chi (2007) as a process through which tutors engage in a dialogue with tutees that involves asking and answering questions, as opposed to simply telling the tutee the answer or lecturing the tutee. Whether a tutor lectures or not may be related to the topic the tutor is teaching and the academic major of the tutor because individuals employed in certain fields or preparing to be employed in certain fields are likely to have a particular learning style that individuals in other fields do not use and because learning styles are likely to affect tutor's tutoring style (Kolb, 1974; Sims, 1983). Individuals in fields related to science and math, for example, are more likely to engage in and value reflective practice and recursive learning than individuals who are employed in middle management (Sims, 1983). Therefore, is possible that tutors who are preparing to be employed in particular fields may be predisposed to certain learning styles (Sims, 1983). However, Johnston (2008; 2010) states that no particular learning style is more or less beneficial in the professional world.

Summary of the Literature Review

Since tutors' learning styles might affect the way they tutor and the method in which tutors tutor can significantly impact the learning of other students, it is important to understand the relationship between tutoring and learning styles (Kolb, 1974; Rings & Sheets 1991; Sims, 1983). There is a gap in the literature regarding both tutoring and

18

learning styles in that the literature does not go into great detail about any potential relationship between peer tutoring in higher education and learning styles despite literature detailing relationships between other job categories and learning styles such as Sims (1983). There is no literature that clearly describes how being a peer tutor at the collegiate level relates with learning styles or whether peer tutors are likely to have a particular learning style.

Therefore, this study sought to determine the most common learning styles for the peer tutors at Rowan University, tutors' results on the LCI© and VARK© instruments, and whether there is a relationship between the scores on the LCI© and the VARK © instruments and the variables of length of time as a tutor, academic major, and class rank.

Chapter III

Methodology

Context of the Study

This study was carried out at Rowan University, a midsize, public university in the mid-Atlantic region of the United States of America with campuses in Glassboro, Camden City, and Stratford, New Jersey. Rowan University was originally known as Glassboro Normal School, which became Glassboro State College prior to receiving a large endowment from its current namesakes, Henry and Betty Rowan. Rowan University currently holds research institution status and is accredited by the Middle States Commission of Higher Education (MSCHE). The next evaluation by the Middle States Association will be during the 2018-2019 academic year (MSCHE, 2016). Rowan University's Tutoring Services Department is accredited by the College Reading and Learning Association (CRLA). The Tutoring Services Department is nestled within the Division of Strategic Enrollment Management at Rowan University.

Rowan University is comprised of 14 colleges which are the Rohrer College of Business, the School of Biomedical Science & Health Professions, the Graduate School of Biomedical Sciences, Communication & Creative Arts, Cooper Medical School of Rowan University, Education, Engineering, Global Learning & Partnerships, Humanities & Social Sciences, Performing Arts, School of Osteopathic Medicine, and Science & Mathematics (Fast Facts, 2015).

This study was conducted on the Glassboro campus. Glassboro, NJ is in the greater Philadelphia area and is located about 20 minutes southeast of Philadelphia, Pennsylvania (Fast Facts, 2015). Rowan University's total undergraduate population is

20

approximately 16,155 students with a majority of those students identifying as White or Caucasian (Fast Facts, 2015). The total undergraduate population is 13,169 students. The remaining 2,986 students are graduate and professional students (Fast Facts, 2015).

Population and Sample Information

The population of this study included students who were enrolled at Rowan University, were at least 18 years of age, and were employed by Tutoring Services. There were approximately 76 tutors employed by Tutoring Services as of spring 2017. This study was a total population study due to the small size of the intended population.

Instrumentation

Learning Connections Inventory ©. The LCI Adult Education Form © is comprised of 31 total items. The first 28 items are Likert scale items. The remaining 3 items are open-ended questions. All of the items are intended to gather information about how those who take the test prefer to learn new information, how they prefer to disseminate information to others, and how they prefer to be recognized for their accomplishments. The full Adult Education Form © can be found in Appendix A of this report. The LCI Adult Education Form © takes approximately 15 to 30 minutes to complete.

The sequential pattern is characterized by clarity, organizational skill, and a preference for being neat, so an individual who utilizes the sequential pattern may require clear, consistent direction and will often take the time to ensure that any item subject to external scrutiny (such as work requiring a professor's evaluation), will be organized, clear, and correct (Let Me Learn, n.d). The precise learning pattern is characterized by attention to detail, engaging in dialogue, and an emphasis on being correct, which means

21

that an individual who primarily uses the precise pattern will often take very detailed, or even verbatim, notes, focus on what is correct, and will ask questions frequently (Let Me Learn, n.d). Individuals with a technical learning preference will often be drawn towards problem solving, hands-on work such as building an item, and learning through experience (Let Me Learn, n.d). The last pattern is the confluent pattern, which is typified by preferring unconventional approaches, using alternative methods to complete tasks, improvisation, and beginning a task prior to the completion of instruction (Let Me Learn, n.d). An individual who primarily uses the confluent pattern is often a person who takes risks, who is innovative, and who relies on intuition more than any one specific knowledge base (Let Me Learn, n.d).

Once the preferred patterns of a learner are established, the learner is sorted into one of four categories based on how often a learner utilizes the four patterns. The categories include the bridge learner, the dynamic learner, and the strong-willed learner (Johnston, 2010). A bridge learner utilizes all of the patterns at a use as needed level and is sometimes not noticed until they are no longer present (Johnston, 1997; 2010). A dynamic learner uses one or two patterns at the use first level and uses the remaining patterns at use as needed level or avoids the remaining patterns (Johnston, 2010). A strong-willed learner will use at least patterns or all four patterns at use-first level (Johnston, 2010).

Figure 3.1 depicts the LCI© results of one subject who is a dynamic learner, and who utilizes precision and sequence learning at a use-first level while using technical an confluent learning at an as-needed level.

22
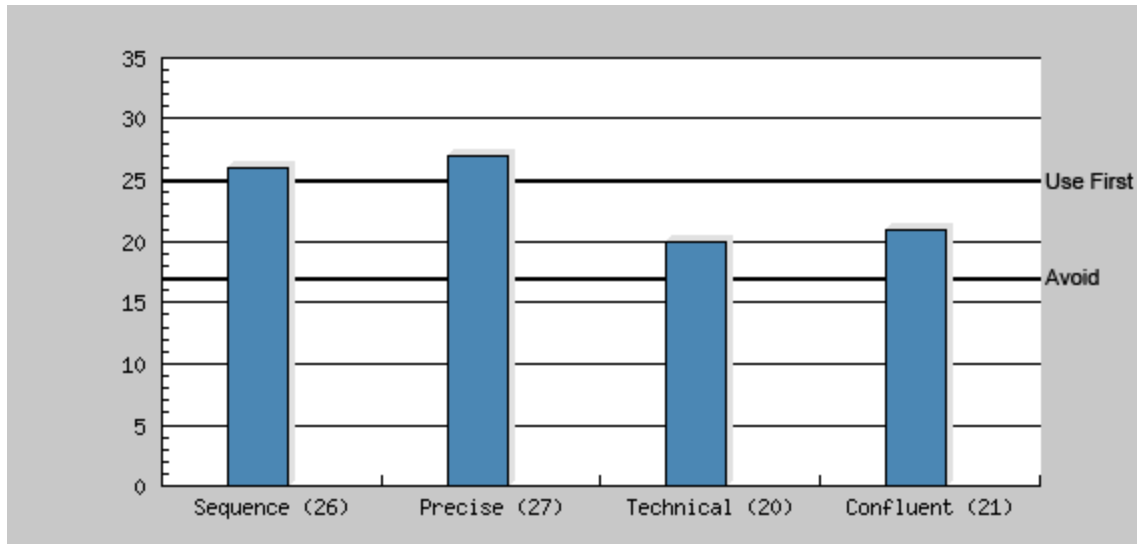
Figure 3.1. Example of a dynamic learner

VARK ©. This study uses version 7.8 of the VARK © instrument. VARK © is comprised of 16 multiple choice questions. A respondent may choose more than one answer for each question. The 16 questions on the VARK © instrument are designed to measure whether a respondent prefers visual learning, auditory learning, read/write learning, kinesthetic learning or a combination of two or more of the above-mentioned learning preferences. Visual learners prefer to receive information via graphical displays and symbols (e.g. a pie chart) (Fleming & Mills, 1992). Learners who prefer the read/write mode tend to learn best when information is presented in written format (e.g. a textbook) (Fleming & Mills, 1992). Aural learners learn best when information is given to them verbally and also benefit from discussing the information with other people (Fleming & Mills, 1992). Kinesthetic learners often rely on past experiences to analyze new information and will typically benefit from hands-on learning such as lab work or

23

field trips (Fleming & Mills, 1992). Finally, a learner who is multimodal will prefer two or more of the aforementioned modalities at an equal level.

The complete VARK © instrument can be found by accessing vark-learn.com. The instrument is not available in this document due to the preferences of the copyright holder. Although I have received permission to use the VARK © instrument in my research, Neil Fleming, the current copyright holder, has not given me permission to reproduce the instrument in this document. Due to Fleming's preference, one will need to access the instrument by visiting the official VARK © website, which is www.vark-learn.com.

Validity and Reliability

LCI©. The *LCI Adult Education Form* © is valid and reliable because the instrument has seen extensive use in higher education and is internally consistent (Johnston, 1998) The open-ended items within the LCI also function as an internal validity check for the multiple choice and Likert scale items by allowing me to verify whether the responses to open-ended items are consistent with the responses given to the multiple choice and Likert scale items (Johnston, 1997). Responses to the open-ended questions often echo the responses to the Likert scale items thereby making the LCI© "extremely reliable" (Johnston, 1997, p. 78). For example, Johnston (1997) states that an individual who "scores high on statements that represent sequence and then writes 'I need to see a sample of the work before I begin' or 'I like it when the teacher gives step-by-step directions,' the student has valid the score for sequence" (p.78).

The pilot test for the LCI© was conducted in thirteen different school districts in New Jersey and received responses from over 2000 students (Calleja, 2010). Following

24

the pilot study, the instrument was administered domestically in the United States as well as internationally (Calleja, 2010). After each administration of the instrument, the instrument was analyzed using factor analysis and any items that were psychometrically unsound were subsequently removed from the instrument (Calleja, 2010).

Further study regarding reliability utilizing a test-retest design confirmed both construct validity and instrument reliability (McLaughlin & Anglietta as cited in Calleja, 2010; Johnston & Capasso as cited in Calleja, 2010). Further, the test-retest reliability analysis confirmed the findings of the factor analysis that was completed after the pilot study (Calleja, 2010). Overall, the LCI© is psychometrically sound and is "conceptually driven by a conceptually sound representation of the human learning process…" (Calleja, 2010, p.7).

VARK©. The VARK © instrument was not the sole instrument utilized in this study because of concerns regarding the reliability and validity of the VARK © instrument raised by Leite et al. (2010). Leite et al. (2010) found that the VARK © instrument is not reliable enough to be used as the sole instrument for academic research. Leite et al. (2010) utilized multitrait–multimethod confirmatory factor analysis to evaluate the VARK©. Leite et al. (2010) found that there has been inconsistent wording and some ambiguous word choice within the current version of the instrument, but that the VARK © was satisfactorily reliable and valid with the caveat that the VARK© should not be the sole instrument used when researching learning styles. Leite et al. (2010) found that Cronbach's alpha would not accurately measure the reliability of the VARK© instrument because Cronbach's alpha does not accurately measure reliability of

25

an instrument when, like VARK©, the items used in the instrument are not parallel measures.

Fitkov-Norris and Yeghiazarian (2015) utilized Rasch analysis to evaluate the internal validity of the VARK© instrument. Fitkov-Norris and Yeghiazarian (2015) administered the VARK© to 107 graduate students pursuing master's degrees in business management and related fields then analyzed the results using the extended Rasch model. Fitkov-Norris and Yeghiazarian (2015) found that their data confirmed the internal validity of the VARK© instrument overall. However, Fitkov-Norris and Yeghiazarian (2015) found that one item related to the visual mode, one item related to the aural mode, one item related to the kinesthetic mode, and two items related to the read/write mode did not fit the Rasch model due to the potential for bias and item ambiguity which confirms the findings of Leite et al. (2010). Fitkov-Norris and Yeghiazarian (2015) found that the VARK © is internally valid and reliable overall, but caution that further research with a larger sample size is needed to examine the multilevel structure of the VARK© instrument.

Procedures

After receiving approval from the chair of my thesis committee, Dr. Burton Sisco, this study was submitted for review by the Institutional Review Board (IRB) at Rowan University. The IRB approved this study on March, 9, 2017. Permission to use the *Learning Connections Inventory Adult Education Form* ©, to utilize the VARK © instrument, and the IRB disposition form can be found in Appendix C of this document. Once all required permissions and approvals were received, the administration of the *LCI Adult Education Form* © and the VARK © instrument took place during the spring 2017

26

academic semester at Rowan University. Data were collected in a computer lab in James Hall on the Glassboro campus of Rowan University. Demographic information were collected during the administration of the LCI © and VARK© instruments.

The administration of the instruments used in the study took place at a computer lab in James Hall on Rowan University's Glassboro campus. All participants used computers that were equipped with the Windows operating system. Participants were not permitted to submit any portion of their responses remotely.

Data analysis. The results from the LCI © and the VARK © were scored according to their respective scoring instructions to determine the results of the LCI© and the VARK © instruments. Next, I analyzed the data using the Statistical Package for the Social Sciences (SPSS) to determine whether there were any statistically significant relationships between learning styles as determined by the LCI © and VARK © instruments, and the variables of length of time as a tutor, academic major, and class rank by utilizing frequency distributions and Kendall Tau-b. Frequency distributions were used to determine the most common learning styles for tutors.

Chapter IV

Findings

Profile of the Sample

Matriculated Rowan University students who were over the age of 18 and were employed by the Tutoring Services Department were the sample for this study. In order to participate, tutors were required to be over the age of 18. Provided that the tutors met the aforementioned requirements, tutors of all races, ethnicities, sexualities, genders and religious affiliations were permitted to take part in the study.

Table 4.1 displays the demographic information of the sample which includes number of years employed as a tutor, major program of study, year in school, and reasoning for becoming a tutor. Out of the 76 tutors employed by Tutoring Services, 45 tutors elected to participate for a response rate of 59%. Fifty-four percent of the subjects were employed by Tutoring Services for 1 year. Twenty-three percent of the subjects were employed by Tutoring Services for 2 years. The remaining 17% of subjects were employed by Tutoring Services for 3 years. None of the subjects were employed by Tutoring Services for more than 3 years.

Twenty-seven percent of the subjects were dual majors in education and a program within the science, technology, engineering, or math (STEM) fields. Liberal arts, communications, and STEM majors with no dual major each accounted for 14.6% of responses. Subjects who were dual majors in education and liberal arts made up 12.5% of the sample. Tutors who identified as education and communication dual majors constituted the remaining 10.4%.

28

Sophomores comprised 35.4% of the respondents. The percentage of juniors in the sample was 33.3%. The remaining 25% of the sample were seniors. There were no freshman subjects. Helping other students (18.8%) and wanting to become a teacher (18.8%) were the two most popular responses for subjects' first reason for becoming a tutor. The two most popular secondary reasons were making money (16.7%) and being recommended by a professor (16.7%).

Table 4.1

Tutor Demographics (N=45)

Subjects	*f*	%
Years Employed as a Tutor		
1	26	54.2
2	11	22.9
3	8	16.7
Academic Major		
Education & STEM	13	27.1
Liberal Arts	7	14.6
STEM	7	14.6
Education & Liberal Arts	7	14.6

Table 4.1 (continued)

Subjects	f	%
Education & Communication	6	12.5
Year in School	5	10.5
Sophomore	17	35.4
Junior	16	13.3
Senior	12	25
Reasons for being a Tutor (Choice One)		
Desire to be a Teacher	9	18.8
Desire to Help Other Students	9	18.8
Professor Recommendation	7	14.6
To Make Money	7	14.6
Friends are Tutors	5	10.4
Career Aspirations	4	8.3
Resume Building	3	6.3
Federal Work Study (FWS) is not Required	1	2.1
Reasons for being a Tutor (Choice Two)		
To Make Money	8	17.8
Professor Recommendation	8	17.8

30

Table 4.1 (continued)

Subjects	f	%
Career Aspirations	7	14.6
Resume Building	6	12.5
To Help Other Students	6	12.5
Desire to be a Teacher	5	10.4
FWS is not Required	4	8.3
Friends are Tutors	1	2.1

Analysis of the Data

    Research question 1. What are the results of the LCI ©?

    Tables 4.2, 4.3 and 4.4 depict the scores for the LCI © instrument. Figures 4.1 and 4.2 depict the data in Tables 4.2 and 4.3 respectively. LCI © results include learning preferences related to sequence, precision, confluence, and technical patterns, dynamic learning, strong-willed learning, and bridge learning.

    Sequence learning is the most preferred LCI © pattern with 62.5% of tutors using sequence learning at a use-first level. The least popular LCI © pattern is technical learning with only 35.6% of tutors using the technical pattern at a use-first level and with 28.9% of tutors avoiding use of the technical pattern.

    The most common learning style for the LCI© is the sequence learning pattern. The sequence learning pattern is used more frequently and avoided less often than the other patterns. Thirty tutors (62.5%) utilized the sequence pattern at a use-first level while five tutors (10.4%) avoided the sequence learning pattern.

31

Table 4.2

LCI © Learning Patterns Used at a Use-First Level (N=45)
(1=Yes, 2=No)

Pattern Preferences	*f*	%
Patterns Used at a Use-First Level		
Sequence		
Yes	30	62.5
No	15	31.3
Precision		
Yes	29	60.4
No	16	33.3
Confluence		
Yes	20	41.7
No	25	52.1
Technical		
Yes	16	33.3
No	29	60.4

Table 4.3

LCI © Learning Patterns that are Avoided (N=45)
(1=Yes, 2=No)

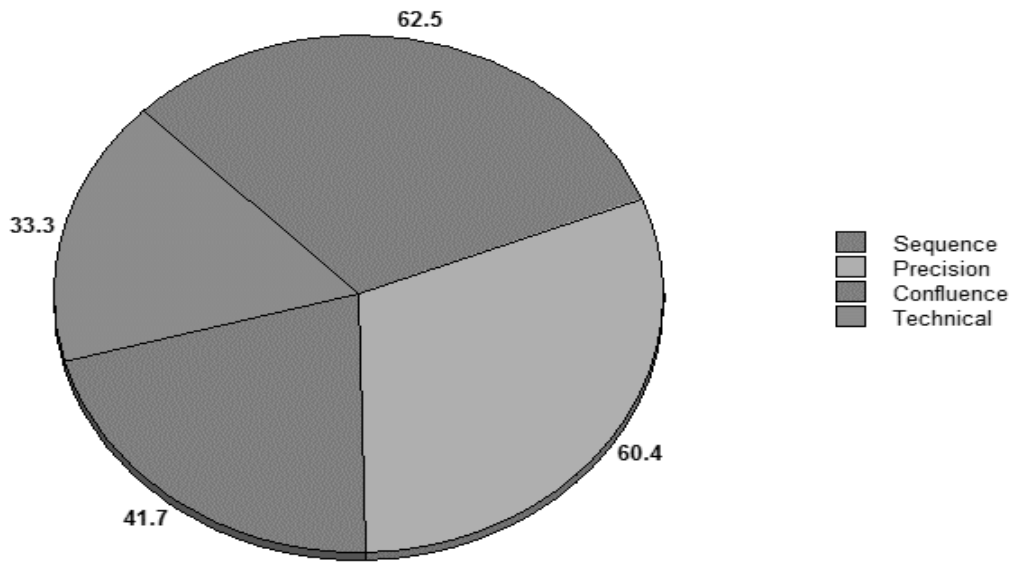| Pattern Preferences	f	%
Patterns that are Avoided		
Technical		
Yes	13	27.1
No	32	66.7
Confluence		
Yes	8	16.7
No	37	77.1
Sequence		
Yes	5	10.4
No	40	83.3
Precision		
Yes	1	2.1
No	44	91.7

33

Figure 4.1. Patterns used at a use-first level organized by percentage.
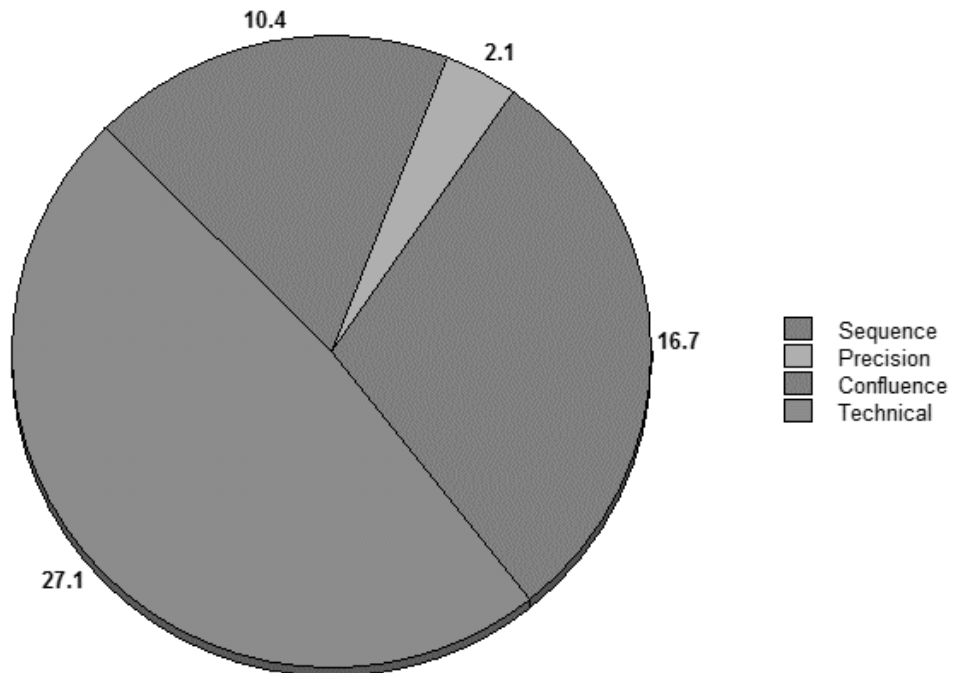

Figure 4.2. Patterns that are avoided organized by percentage.

34

Table 4.4

LCI © Learner Types
(1=Dynamic Learner, 2=Strong-Willed Learner, 3=Bridge Learner)

Learning Styles	*f*	*%*
Is the Tutor a Dynamic, Strong-Willed, or Bridge Learner		
Dynamic	27	56.3
Strong-Willed	16	33.3
Bridge	2	4.2

Research question 2. What are the results of the VARK©?

The most common VARK© learning preference is multimodal. Fifteen tutors

(31.3%) were multimodal learners. Aural learning, which is the second most common

preference, was preferred by 20.8% of the tutors.

Table 4.5 depicts results for the VARK © instrument. VARK © results include

preferences for visual, aural, reading/writing, kinesthetic, and multimodal learning

preferences. Most respondents (31.3%) have a multimodal learning preference and

constitute 31.3% of the sample. Aural learners are the most popular following the

multimodal preference and account for 20.8% of the sample. Tutors with a preference for

visual learning and a preference for the reading/writing pattern each comprise 13.3% of

the sample.

35

Table 4.5

VARK© Preferences
(1=Visual, 2=Aural, 3=Reading/Writing, 4=Kinesthetic, 5=Multimodal)

Preferences	*f*	%
VARK© Modality Frequency		
Multimodal	15	31.3
Aural	10	20.8
Kinesthetic	8	16.7
Reading/Writing	6	12.5
Visual	6	12.5

Research question 3. Is there a relationship between the scores on the LCI © and

the VARK © instruments and the variables of length of time as a tutor, academic major,

and class rank?

Correlation coefficients were calculated for the relationships between LCI ©

results, VARK © results, length of time as a tutor, academic major, and class rank using

Kendall's Tau-b non-parametric test. No relationships were found between the variables

of length of time as a tutor, academic major, and class rank.

Chapter V

Summary, Discussion, Conclusions, and Recommendations

Summary of the Study

This study sought to determine the most common learning styles for the peer tutors at Rowan University, tutors' results on the LCI© and VARK© instruments and whether there is a relationship between the scores on the LCI© and the VARK © instruments and the variables of length of time as a tutor, academic major, and class rank. The study utilized the VARK© instrument, the LCI Adult Education Form ©, and a brief survey regarding tutor demographic information. All instruments were administered during the spring 2017 academic semester in James Hall on Rowan University's Glassboro campus. The LCI© was administered electronically, and the VARK© and demographic survey were administered in paper form.

The subjects in the study were all employed by the Tutoring Services Department of Rowan University during the spring 2017 academic semester, were at least 18 years of age, and were matriculated Rowan University students. Forty-five tutors were subjects for this research.

Data were analyzed using SPSS software. Specific statistics used were frequency distributions and Spearman Nonparametric Correlation. As per the scoring criteria for the LCI ©, the open-ended questions on the LCI © scored by identifying trigger words associated with the sequential, precision, confluence, and technical learning patterns.

Discussion of the Findings

  Research question 1. What are the results of the LCI ©?

  Learning Connections Inventory. Most of the subjects preferred to use sequential learning at a use first level (62.5%). The precision pattern was the next most-preferred pattern with 60.4% of tutors preferring to utilize precision at a use-first level. The technical pattern was the pattern that was least likely to be used at a use first level with only 33.3% of subjects preferring to utilize the technical pattern at a use-first level. The technical pattern was also avoided more frequently than the other patterns with 27.1% of subjects avoiding the technical pattern. The precision pattern was avoided the least with only 2.1% of subjects avoiding the precision pattern.

  The most common learner type reported for the LCI© was the dynamic learner type (56.3%), followed by the strong-willed learner type (33.3%), and the bridge learner type (4.2%). Dynamic learners utilize one to two patterns at a use-first level and use the remaining patterns as-needed or avoid them (Johnston, 2010). A strong-willed learner uses three of the patterns at a use-first level and may avoid the remaining pattern or use the pattern at an as-needed level (Johnston, 2010). Bridge learners use all four of the patterns at an as-needed level (Johnston, 2010).

  The learning style data for the LCI © in this study match data from the general population as defined by Let Me Learn (n.d). This suggests that tutors do not deviate far from the norm for the LCI ©. According to Let Me Learn (n.d), approximately 70% of individuals are dynamic learners, 25% are strong-willed learners, and the remaining 5% are bridge learners.

38

Research question 2. What are the results of the VARK?

The most common modal preference for subjects on the VARK © questionnaire was multimodal with 31.3% of subjects being categorized as multimodal which means that they scored equally in one or more learning modes (Fleming & Mills, 1992; Hawk & Shah, 2007). A preference for aural learning accounted for 20.8% of the subjects. Kinesthetic learning was preferred by 16.7% of subjects. Reading/writing and visual learning each accounted for 12.5% of the subjects.

Fleming (2012) found that there is a "trend towards multimodality…" (p. 39) and states that responses to the VARK © instrument tend to skew towards multimodality. However, responses from subjects in this study tend to be more evenly distributed. Fleming (2012) found that multimodal learners accounted for 66% of the responses to the VARK©. Since a majority of the tutors (31.3%) of tutors were multimodal, the responses to the VARK© instrument in this study are within the ranges established in Fleming (2012).

According to Fleming (2012), age affects the skew with older adults being categorized as multimodal more often than younger adults. This study did not collect the ages of participants and therefore cannot speak to the relation age may have with VARK© results.

Research question 3. Is there a relationship between the scores on the LCI© and the VARK© instruments and the variables of length of time as a tutor, academic major, and class rank?

39

There were no correlations found in this study that suggest that scores on the LCI © and VARK © instruments were related to the variables of length of time as a tutor, academic major, or class rank.

Conclusions

Data analysis revealed that subjects did not fall within the normal range of responses for the LCI © instrument, particularly with the normative data given for dynamic learner and strong-willed learners. According to Johnston (2010), Dynamic learners typically make up 70% of the sample and strong-willed learners comprise 25% of the sample. Bridge learners make up the remaining 5% of the normative data described in Johnston (2010). In this study, 56.3% of the subjects were identified as dynamic learners. 33.3% of the subjects were identified as strong-willed learners. 4.2% of the subjects were identified as bridge learners.

Subjects were within the expected range for VARK © according to Fleming (2012) who states that the VARK © is skewed towards multimodality. However, responses for this study were more evenly distributed than the typical skew for the VARK © instrument. Fleming (2012) found that multimodal learners accounted for 66% of the responses to the VARK©. Since a majority of the tutors (31.3%) of tutors were multimodal, the responses to the VARK© instrument in this study are within the ranges established in Fleming (2012).

The data did not suggest any relationships between the results of LCI© and VARK © instruments and the variables of length of time as a tutor, academic major, and class rank.

40

This study cannot confirm Severiens and Dam (1994) who found that gender may impact learning preferences because information regarding the gender of the subjects was not collected during this study. Additionally, nothing can be concluded from this study regarding any potential relationship between the variables of age, sex, gender, ethnicity, or race with learning preferences because information regarding the variables of age, sex, gender, ethnicity, and race were not collected from the tutors during this study. Further research is needed to determine whether gender, age, sex, ethnicity, or race has any impact on learning styles.

Recommendations for Practice

Based upon the findings of this study, the following recommendations for practice are suggested:

1. Do not use learning styles to assign strict categories to tutors or tutees.

2. Inform tutors and tutees about the various methods an individual may use to learn so the tutors will gain a deeper understanding of learning and associated patterns.

3. Provide opportunities for tutors to become familiar with how they prefer to learn by facilitating access to the LCI © and other similar instruments.

4. Avoid the tendency to match the tutor and tutee based on learning preferences. Rather, stress versatility in building patterns and skills that can be adjusted for different tasks.

Recommendations for Further Research

Based upon my data analysis, the following suggestions are recommended:

1. Further study regarding tutors and the interaction of tutoring services and metacognition should take place to bridge the gap in the literature.

41

2. In future studies, a larger sample should be used as a sample of 45 individuals is not adequate to generalize to a larger population.

3. Future studies should utilize a mixed-method model to ascertain if tutors conceive of themselves as learners, which is critical to learning style development according to Kolb and Kolb (2008).

4. Further research should be conducted regarding the possible relationship between educators and learning preferences as determined by the LCI ©.

5. Future studies should collect more in depth demographic information such as race, ethnicity, gender, sex, and age.

References

Bass, C. (2012). Learning theories & their application to science instruction for adults. *The American Biology Teacher, 74*(6), 387-390. Retrieved from http://www.jstor.org/stable/10.1525/abt.2012.74.6.6

Calleja, V. (2010). The Let Me Learn Process ©: A robust theory with practical implications. *Vega Journal, 6*(3), 1-17. Retrieved from https://goo.gl/Vtsk4b

Cassidy, S. (2004). Learning styles: An overview of theories, models, and measures. *Educational Psychology*, *24*(4), 419-44.

Cohen, P. A., Kulik, J. A., & Kulik, C. -L. C. (1982). Educational outcomes of tutoring: A meta-analysis of findings. *American Educational Research Journal, 19*(2), 237-48.

Duff, A. & Duffy, T. (2002). Psychometric properties of Honey and Mumford's Learning Styles Questionnaire (LSQ). *Personality and Individual Differences, 33*(1)*,* 147-163.

Fast facts. (2015). Retrieved from http://www.rowan.edu/fastfacts/

Fitkov, E. D., & Yeghiazarian, Y. (2015). Validation of VARK learning modalities questionnaire using Rasch analysis. *Journal of Physics: Conference Series, 588,* 1-6. doi: 10.1088/1742-6596/588/1/012048

Fleming, N. (2012). *Teaching and Learning Styles VARK strategies* (2nd ed.). Self-published.

Fleming, N., & Mills, C. (1992). Not another inventory, rather a catalyst for reflection. *To Improve the Academy*, 137-55. *Digital Commons*. University of Nebraska.

Freedman, R., & Stumpf, S. (1980). Learning style theory: Less than meets the eye. *The Academy of Management Review, 5*(3), 445-447. Retrieved from www.jstor.org/stable/257119

Hawk, T. F, & Shah, A. J. (2007). Using learning style instruments to enhance student learning*. Decision Sciences Journal of Innovative Education, 5*, 1–19. doi: 10.1111/j.1540-4609.2007.00125

Hiemstra, R., & Sisco, B. (1990). *Individualizing instruction: Making learning personal, empowering, and successful*. San Francisco, CA: Jossey-Bass.

Johnston, C. A. (1997). Using the learning combination inventory. *Educational Leadership, 55*(4), 78-82. Retrieved from www.ascd.org/publications/educational-leadership/dec97/vol55/num04/Using-the-Learning-Combination-Inventory.aspx

43

Johnston, C. A. (1998). *Let me learn*. Thousand Oaks, CA: Corwin Press.

Johnston, C. A. (2010). Finding your way: *Navigating life by understanding your learning self*. Glassboro, NJ: Let Me Learn.

Joy, S., & Kolb, D. A. (2009). Are there cultural differences in learning style? *International Journal of Intercultural Relations*, *33*(1), 69-85. Doi:10.1016/j.ijintrel.2008.11.002

Kayes, D. (2002). Experiential learning and its critics: Preserving the role of experience in management learning and education. *Academy of Management Learning & Education, 1*(2), 137-149. Retrieved from http://www.jstor.org/stable/40214146

King, A. (1998). Transactive peer tutoring: Distributing cognition and metacognition. *Educational Psychology Review, 10*(1), 57-74. Retrieved from http://www.jstor.org/stable/23359437

Knowles, M. (1972). Innovations in teaching styles and approaches based upon adult learning. *Journal of Education for Social Work, 8*(2), 32-39. Retrieved from http://www.jstor.org/stable/23038299

Kolb, A., & Kolb, D. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of Management Learning & Education, 4*(2), 193-212. Retrieved from http://www.jstor.org.ezproxy.rowan.edu/stable/40214287

Kolb, A. Y., & Kolb, D.A. (2008). The learning way: Meta-cognitive aspects of experiential learning. *Simulation & Gaming, 40*(3), 297-327.

Kolb, D. (1974). Experiential learning: *Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice-Hall.

Kolb, D. (1981). Experiential learning theory and the learning style inventory: A reply to Freedman and Stumpf. *The Academy of Management Review, 6*(2), 289-296. Retrieved from http://www.jstor.org/stable/257885

Leite, W. L., Svinicki, M, & Shi, Y. (2010). Attempted validation of the scores of the VARK: Learning styles inventory with multitrait-multimethod confirmatory factor analysis models. *Educational and Psychological Measurement, 70*(2), 323-39.

Let Me Learn. Pattern explanation - Let Me Learn. *Let Me Learn*. N.p., n.d.

MSCHE. (2016). Statement of accreditation status. *Middle States Commission of Higher Eduction.* Retrieved from http://www.msche.org/Documents/SAS/384/Statement%20of%20Accreditation%20Status.htm

Miettinen, R. (2002). About the legacy of experiential learning. *Thresholds in Education*, 11-18. Retrieved from www.researchgate.net/profile/Reijo_Miettinenpublication/ 252079009_About_the_Legacy_of_Experiential_Learning/links/54b7ab2a0cf2e68eb2 803af7.pdf

Rings, S., & Sheets, R. (1991). Student development and metacognition: Foundations for tutor training. *Journal of Developmental Education, 15*(1), 30-32. Retrieved from http://www.jstor.org/stable/42785273

Roscoe, R., & Chi, M. (2007). Understanding tutor learning: Knowledge-building and knowledge-telling in peer tutors' explanations and questions. *Review of Educational Research, 77*(4), 534-574. Retrieved from http://www.jstor.org/stable/4624910

Roscoe, R., & Chi, M. (2008). Tutor learning: The role of explaining and responding to questions. *Instructional Science, 36*(4), 321-350. Retrieved from http://www.jstor.org/stable/23372885

Severiens, S., & Dam, G. (1994). Gender differences in learning styles: A narrative review and quantitative meta-analysis. *Higher Education, 27*(4), 487-501. Retrieved from http://www.jstor.org/stable/3448301

Sims, R. (1983). Kolb's experiential learning theory: A framework for assessing person-job interaction. *The Academy of Management Review, 8*(3), 501-508. Retrieved from http://www.jstor.org/stable/257838

Stumpf, S., & Freedman, R. (1981). The Learning Style Inventory: Still less than meets the eye. *The Academy of Management Review, 6*(2), 297-299. Retrieved from http://www.jstor.org/stable/257886

Topping, K. J. (1996). The effectiveness of peer tutoring in further and higher education: A typology and review of the literature. *Higher Education, 32*(3), 321-345. Retrieved from http://www.fau.edu/CLASS/CRLA/Level_Three/The_effectiveness_ of_peer_tutoring_in_further_and_higher_education-a_typology_and_review_

Tutoring Services. *Tutoring Services*. Rowan University, n.d.

Vermunt, J. (1996). Metacognitive, cognitive and affective aspects of learning styles and strategies: A phenomenographic analysis. *Higher Education, 31*(1), 25-50. Retrieved from http://www.jstor.org/stable/3447707

Weingand, D. (1996). Continuing education: A reminder about andragogy. *Journal of Education for Library and Information Science, 37*(1), 79-80. doi:1. Retrieved from http://www.jstor.org/stable/40324288 doi:1

45

Zmeyov, S. (1998). Andragogy: Origins, developments and trends. *International Review of* Education / Internationale Zeitschrift Für Erziehungswissenschaft / Revue Internationale *De L'Education, 44*(1), 103-108. Retrieved from http://www.jstor.org/stable/3445079

46

Tutor Demographic Form and LCI ©

1. How many years have you been a tutor?

2. What is your major program of study?

3. Are you a freshman, sophomore, junior, or senior?

4. Why did you choose to become a tutor? (Please circle your top two responses in ranked order.)

    a. To make money

    b. You do not have Federal Work Study (FWS) and can work as a tutor

    c. You want to be a teacher

d. Resume building

e. To help other students

f. Professor recommendation

g. Career aspirations

h. Friends are tutors

i. Other (Please explain)

5. What are the benefits of being a tutor?

48

LCI Learning Connections Inventory

Making Connections/Developing Insights/Enhancing Relations

Learning Connections Inventory

Education Form II

Christine A. Johnston
Gary R. Dainton

Learning Connections Resources, LLC

Making Connections/Developing Insights/Enhancing Relations

The journey of learning never leaves us. We are in a constant search to understand our relationships, our experiences, and ourselves. The LCI is a tool dedicated to assist you by providing a voice, a language, and an appreciation of your personal learning connections.

For additional information or support contact:

Learning Connections Resources, LLC
PO Box 8861
Turnersville, NJ 08012-8861
USA
(856) 307-7878
www.LCRinfo.com

Education Resources:
Education Form I (Years K-4): ISBN#0-9754826-0-2
Education Form II (Years 5-12+): ISBN#0-9754826-1-0
Education Adult Form (Adults engaged in education): ISBN#0-9754826-2-9

Family Resources:
Kids Form I (Years 6-10): ISBN#0-9754826-4-5
Kids Form II (Years 11-18): ISBN#0-9754826-5-3
Adult Form (Years 18+): ISBN#0-9754826-6-1

Professional Resources:
Professional Form (For working adults): ISBN#0-9754826-3-7

For more information about using the LCI in education environments please visit:
Let Me Learn, Inc
2 Tiverstock Dr.
Pittsgrove, NJ 08318
(856) 358-0039
www.letmelearn.org

Name:_____   _____

There are three parts to the Learning Connections Inventory.
- Part I begins on page three. In this part, you are asked to respond to 28 different statements by selecting your answers from the five choices.
- Part II begins on page seven. In this portion you are asked for a written response to three questions.
- Feel free to begin with either Part I or Part II.
- After completing Parts I and II, complete Part III on page eight.

Part I
This is a way to find out about how you accomplish learning tasks. There are 28 statements each followed by five phrases which read: *"never ever," "almost never," "sometimes," "almost always," and "always."*

Directions
Here is what you are to do. **1)** Read each sentence carefully. **2)** Decide how well it connects with how you learn. **3)** Circle the phrase that matches what you decided. Be sure that you circle only one phrase for each statement. **4)** Complete the three short answer questions to the best of your ability. Write as much or as little as you feel until you feel you have answered the question.

Let's Practice!

Sample Statements

A. I like to listen carefully when the teacher is giving directions.

| never ever | | sometimes | almost always | always |

B. I like to stand in the front of the class and act out skits or plays.

| never ever | | sometimes | almost always | always |

Words of Encouragement: Take the time you need and consider your responses carefully. While there are no right or wrong answers, there are answers that are more accurate to who you are than others. Selecting answers from each category provides a more accurate picture of your specific learning processes.

Choosing answers is not always easy. Often, if you decide on your answer, you will select "Sometimes" as a compromise. Rather than doing this, we encourage you to change the wording in a sentence or add to the wording so that you can select a response from the continuum that specifically describes you. Feel free to write any changes in the booklet. Most importantly, have fun, relax, and enjoy learning more about yourself!

1. I like assignments where I get to use mechanical/technical equipment.

never ever   some-times   almost always   always

2. I need to have a complete understanding of the teachers expectations before I feel comfortable doing an assignment.

never ever   some-times   almost always   always

3. I become frustrated when I have to wait for the teacher to finish giving directions.

never ever   some-times   almost always   always

4. I find that reading information is my favorite way to learn a subject.

never ever   some-times   almost always   always

5. I become frustrated if directions are changed while I am working on the assignment.

never ever   some-times   almost always   always

6. I prefer to build things by myself without anyone's guidance.

never ever   some-times   almost always   always

7. I keep detailed notes so that I have the right answers for tests.

never ever   some-times   almost always   always

3

8. I don't like to do my work in the way the teacher says, especially when I have a better idea I would like to try.

never ever | | some-times | almost always | always

9. I enjoy researching and writing factual reports.

never ever | | some-times | almost always | always

10. I clean up my work area and put things back where they belong without being told to do so.

never ever | | some-times | almost always | always

11. I enjoy the challenge of fixing or building something.

never ever | | some-times | almost always | always

12. I react quickly to assignments and questions without thinking through my answers.

never ever | | some-times | almost always | always

13. I am told by others that I am very organized.

never ever | | some-times | almost always | always

14. I ask more questions than most people because I just enjoy knowing things.

never ever | | some-times | almost always | always

15. I like to figure out how things work.

never ever | hardly ever | some-times | almost always | always

16. I like to make up my own way of doing things.

never ever | hardly ever | some-times | almost always | always

17. I would rather build a project than read or write about a subject.

never ever | hardly ever | some-times | almost always | always

18. I need to make lists and develop a plan before I start an assignment.

never ever | hardly ever | some-times | almost always | always

19. I memorize lots of facts, details, and dates when I study.

never ever | hardly ever | some-times | almost always | always

20. I generate lots of unique and creative ideas.

never ever | hardly ever | some-times | almost always | always

21. I feel better when I have time to double check my answers.

never ever | hardly ever | some-times | almost always | always

54

22. I like to take things apart to see how they work.

never ever | sometimes | almost always | always

23. I like to come up with a totally different ideas instead of doing things like everyone else.

never ever | sometimes | almost always | always

24. I like doing research to find the correct answer.

never ever | sometimes | almost always | always

25. I prefer to take a paper and pencil test to show what I know.

never ever | sometimes | almost always | always

26. I like the feeling of operating mechanical tools in my hand.

never ever | sometimes | almost always | always

27. I keep a neat notebook, desk, or work area.

never ever | sometimes | almost always | always

28. I am willing to risk offering new ideas even in the face of discouragement.

never ever | sometimes | almost always | always

Part II

Answer each of the following questions using the space provided. Write as much as you need until you feel comfortable that you have answered the question.

1. What makes school assignments difficult for you?

_____

_____

_____

_____

_____

2. If you could choose, what would you do to show your teacher what you have learned?

_____

_____

_____

_____

_____

3. What hobby or sport do you do well? How would you teach someone else to do it?

_____

_____

_____

_____

56

SCORING SHEET

Name: __ _____ _____ _____ _____ __

Score the responses for Questions 1-28 using a 1 for "never ever," 2 for "almost never," 3 for "sometimes," 4 for "almost always," and 5 for "always." Next, transfer the score of each response to the center of the corresponding circle below. Add up the inserted numbers and record the total in the space at the end of each line. Transfer your total for each pattern to the bar graph at the bottom of the page.

PATTERNS	2	5	10	13	18	21	27	TOTAL
Sequential Processing	○	○	○	○	○	○	○	_____

	4	7	9	14	19	24	25	
Precise Processing	○	○	○	○	○	○	○	_____

	1	6	11	15	17	22	26	
Technical Processing	○	○	○	○	○	○	○	_____

	3	8	12	16	20	23	28	
Confluent Processing	○	○	○	○	○	○	○	_____

Your Learning Connections

Graph the totals from each of the lines above on the appropriate bars below.

PATTERNS	I avoid this pattern.	I use this as needed.	I use this pattern first.
	7 12 17	21 25	30 35
Sequential Processing			
Precise Processing			
Technical Processing			
Confluent Processing			
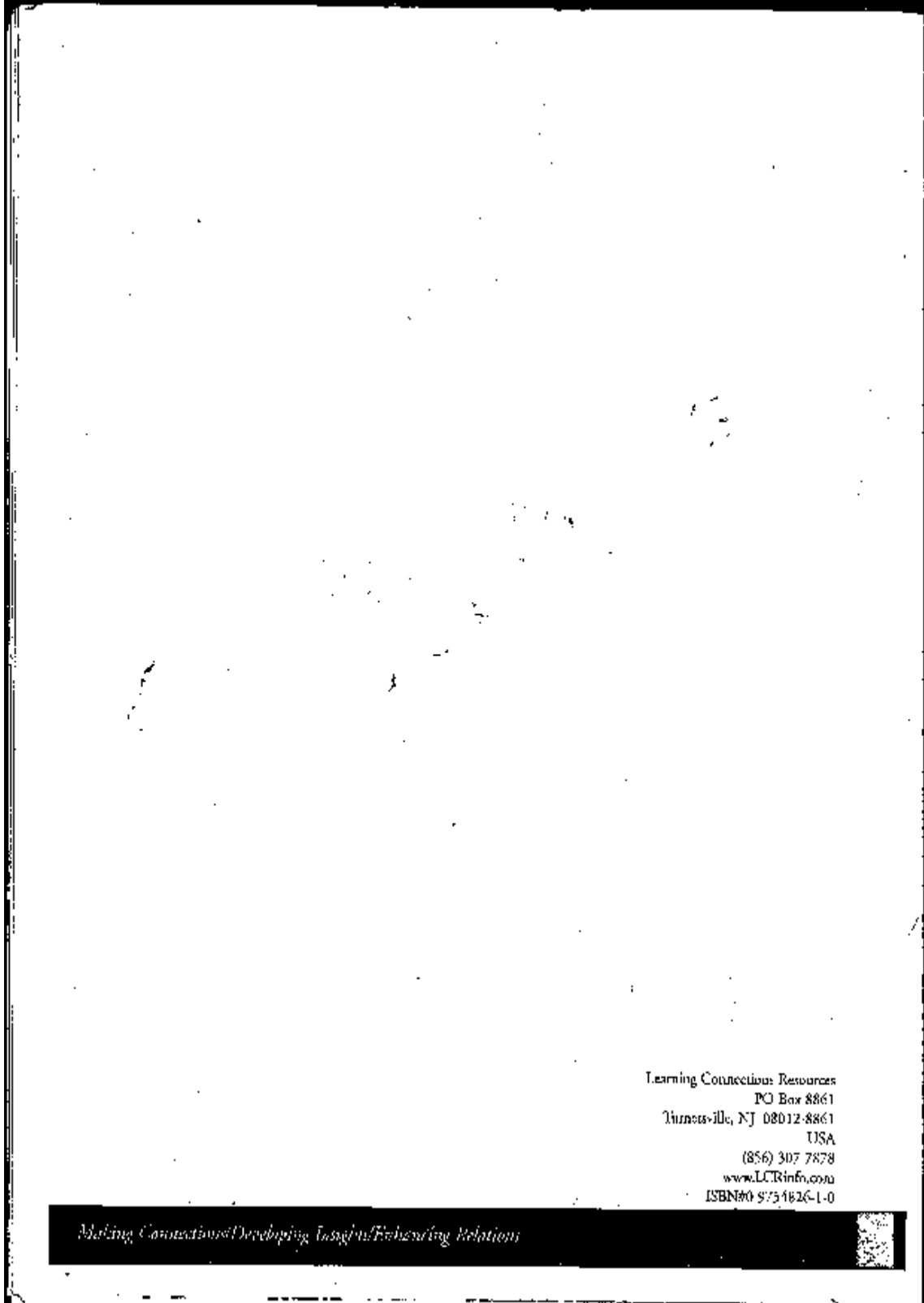
8

©Learning Connections Resources, LLC 2003

57

Making Connections/Developing Long-n/Enhancing Relation

Appendix B

VARK ©

The VARK© instrument cannot be reproduced here due to the preference of the copyright holder, Neil Fleming. The VARK© instrument can be found at www.varklearn.com.

59

Appendix C

IRB Disposition Form and Permissions to Use the LCI© and VARK© Instruments

Google Apps @Rowan

Wood, Marissa <woodm87@students.rowan.edu>

Rowan University eIRB: Study Approved
1 message

eIRB@rowan.edu <eIRB@rowan.edu>
Reply-To: eIRB@rowan.edu
To: Woodm87@students.rowan.edu

Fri, Mar 10, 2017 at 11:13 AM

Rowan University

** This is an auto-generated email. Please do not reply to this email message.
The originating e-mail account is not monitored.
If you have questions, please contact your local IRB office **

DHHS Federal Wide Assurance Identifier:
FWA00007111
IRB Chair Person: Harriet Hartman
IRB Director: Sreekant Murthy
Effective Date: 3/9/2017

eIRB Notice of Approval

STUDY PROFILE

Study ID: Pro2017001582
Title: The Relationship between Peer Tutoring and Learning Styles at Rowan University

Principal Investigator:	Burton Sisco	**Study Coordinator:**	
Co-Investigator(s):	Marissa Wood	**Other Study Staff:**	There are no items to display
Sponsor:	Department Funded	**Approval Cycle:**	Twelve Months
Risk Determination:	Minimal Risk	**Device Determination:**	Not Applicable

Review Type:	Expedited	**Expedited Category:**	7	**Exempt Category:**	There are no items to display
Subjects:	90	**Specimens:**	0	**Records:**	

CURRENT SUBMISSION STATUS

Submission Type:	Research Protocol/Study	**Submission Status:**	Approved
Approval Date:	3/9/2017	**Expiration Date:**	3/8/2018
Pregnancy		**Pediatric**	**Prisoner**

M Gmail

Marissa Wood <woodmar93@gmail.com>

Using VARK with permission

Neil Fleming <neil.fleming@vark-learn.com>   Tue, Apr 12, 2016 at 4:28 PM
To: Marissa Wood <woodmar93@gmail.com>

Dear Marissa

PERMISSION:
If you are a student or a teacher in a high school, college or university you are welcome to use the VARK™ questionnaire by linking to our website, or to use paper copies. We ask that you provide this acknowledgement:

© Copyright Version 7.8 (2014) held by VARK Learn Limited, Christchurch, New Zealand.

THERE ARE SOME RESTRICTIONS
You may not place VARK copyright materials online or on an electronic survey instrument, or any website, intranet or password protected site. This applies to those using VARK for research, and all publications, free resources and resources made for sale, or for which fees are charged.

We can analyse your data into VARK categories using both the VARK Research algorithm and the VARK Standard algorithm for a small fee (approx. $US10).

VIDEO PRESENTATIONS
There are two inexpensive video presentations that help explain many of the finer points of VARK. The first is *An Introduction to VARK* and the second is *VARK FOR TEACHERS* who want to assess their own teaching methods and use VARK to modify their strategies. There is more detail on our website at this page:

http://vark-learn.com/products/webinars

USING VARK TO HELP STUDENTS
VARK was designed for students so they could be given the resources to help their studies. Find out your preferences for learning and use the strategies that agree with your VARK preferences. Don't use the strategies that belong with your weakest preferences. Order a *VARK PROFILE* and get some pages of detailed study strategies to help your learning.

USING VARK FOR RESEARCH
If you plan to use VARK for your research email us and we may be able to offer some advice and we can analyse your data for a small fee. We can also easily and cheaply gather your data for you using an online system.

USING VARK TO HELP TEACHERS
Why not find out the learning preferences of your students. It is not expensive to get the VARK scores for a class, or all your classes ($US85). When you know more about how your students prefer to learn you may want to add new strategies to your teaching so that you reach more students. Our data capture does not need any installation on your IT system. You get to manage the site and to download your results at any time.

WHAT ABOUT FOR-PROFIT and NOT-FOR-PROFIT BUSINESSES? They are required to pay fees if they want to use VARK. That is how the free service for teachers and students (above) is paid for.

Best wishes for your learning.

Neil
Neil D Fleming
Designer of the VARK Questionnaire
Director: VARK LEARN Limited
50 Idris Road, Christchurch 8052
New Zealand
www.vark-learn.com
phone: (64) 3 3517798

Google Apps @Rowan

Wood, Marissa <woodm87@students.rowan.edu>

Research Permission/Quantity Discount
7 messages

Wood, Marissa <woodm87@students.rowan.edu>   Fri, Apr 15, 2016 at 9:55 AM
To: info@lcrinfo.com

To whom it concerns,

My name is Marissa Wood. I am a graduate student studying higher education administration at Rowan University in Glassboro, NJ. With your permission, I would like to administer paper versions of the Adult Form of the Learning Connections Inventory two times to approximately 80 individuals for my thesis using a pre-test post-test design. My proposed thesis topic is to determine whether there is a relationship between personal affect, communication styles and learning preferences with being employed as a peer tutor.

If permission is granted, am I able to receive a discount on the paper versions of the instruments?

Thank you,

Marissa Wood
Graduate Coordinator
Rowan University Tutoring Services

Proctor; Reader/Scribe
Rowan University Testing Services

M.A. Candidate Higher Education Administration
Rowan University
Woodm87@students.rowan.edu

LCR Customer Support <contact@lcrinfo.com>   Fri, Apr 15, 2016 at 10:25 AM
To: "Wood, Marissa" <woodm87@students.rowan.edu>
Cc: LCR Info <info@lcrinfo.com>

Hi Marissa,
We can get you all set with LCI access. Unless you insist, I think it would be easier for you to administer the web-based version of the LCI instead of the hard copy. This way you won't have to validate the LCI results and all of your data will be in one database that you can access via our web-based Data Management System and you won't have to manually enter data into a database. Here is what we propose:
-We will give you an LCI access code that will be good for 200 LCI users
-We will give you access to our LCI Data Management System
-Total cost is $50 to cover the programming and as part of a student research discount
-You supply a copy of your completed Thesis so we can add it to our library

Let me know if that meets your needs. BTW, just curious but who nudged you in our direction? Thanks much,

Gary Dainton
Learning Connections Resources, LLC
[Quoted text hidden]
--
Please contact us for additional assistance,
Learning Connections Resources Customer Support

Wood, Marissa <woodm87@students.rowan.edu>   Fri, Apr 15, 2016 at 10:34 AM
To: LCR Customer Support <contact@lcrinfo.com>

Hi Gary,

62