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Learning Connections Inventory: making major decisions among undeclared students

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Holloway, Raven Alexis, "Learning Connections Inventory: making major decisions among undeclared students" (2017). *Theses and Dissertations*. 2468.
https://rdw.rowan.edu/etd/2468

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LEARNING CONNECTIONS INVENTORY: MAKING MAJOR DECISIONS AMONG UNDECLARED STUDENTS

by

Raven Alexis Holloway

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
July 25, 2017

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

Dedications

First and foremost, I want to give my praises and thanks to God for pushing me and never giving up. Typing these words are surreal because there was a time where I thought it would never happen.

I would like to thank my village: my parents, Mr. & Mrs. Marc Holloway, my brother, Mr. Marc E. Holloway, and all my family and friends who have served as motivation and support since I began this journey 8 years ago.

Acknowledgment

Dr. Sisco, you never gave up on any of us. Thank you for always knowing I could do this. You are beyond amazing and because of you there are dozens of excellent scholars and practitioners in the field.

Abstract

Raven Alexis Holloway
LEARNING CONNECTIONS INVENTORY: MAKING MAJOR DECISIONS AMONG
UNDECLARED STUDENTS
2016-2017
Burton R. Sisco, Ed.D.
Master of Arts in Higher Education

The purpose of this study was to investigate the potential relationship between the

Learning Connections Inventory (LCI) and the career and academic exploration process

of undeclared students at Rowan University, Glassboro, New Jersey. I examined if the

LCI has predictive value in assisting undeclared students in the career exploration process

as well as the attitudes of selected Rowan University professors and administrators

towards the use of the LCI in the career and academic exploration process. The study

investigated the statistical relationship of learning styles, as defined by the LCI, had on

academic major selection. Data on the LCI scores and academic majors of 5,072 students

who completed the LCI since the fall 2007 semester were collected through an

anonymous Microsoft Excel file. Data on the attitudes were collected by means of

interviews with six Rowan University professors and administrators with direct

experience using the LCI with students. Factors examined included learning styles of the

selected students, the relationship between learning style and academic college, strengths

and limitations of the LCI in the classroom, and the effectiveness of using the LCI in the

career and academic exploration process of undeclared students. Using both quantitative

and qualitative research, I was able to conclude that the LCI can be used as a

supplementary tool in the career and academic exploration process for undeclared

students.

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Chapter I

Introduction

Choosing an academic major and a possible career path is a major decision that all college students face. Not having the proper guidance or tools can severely delay or hinder this process. Scholars have studied the development of college students during the beginning of their academic careers. These formative years have proven to be very influential in student's retention and matriculation rates.

Colleges and universities recognize and understand the importance of providing undergraduate students with resources in their academic and career exploration. Along with recent studies, there have been several tools and strategies utilized to provide the best services for students. With some of these strategies being implemented for several years, the question that arises is how effective have these tools and strategies been. There has been extensive research on learning styles and decision making styles, and how this applies to the academic major decision making process as well as the career exploration process. The problem within the research is determining if certain learning styles are more pronounced among undeclared majors and if learning style inventories can be predictors of career choice and/or academic choice. More research is needed to better understand the impact of these initiatives on college campuses.

Purpose of the Study

The purpose of this study was to investigate the potential relationship between the Learning Connections Inventory (LCI) and the career and academic exploration process of undeclared students. I examined if the LCI has predictive value in assisting undeclared students in the career exploration process. The attitudes of selected Rowan University

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professors and administrators towards the use of the LCI in the career and academic exploration process were also explored.

Significance of the Study

The significance of this study was to examine the use of the Learning Connections Inventory as a tool to assist students in their major declaration and career exploration process at Rowan University. This study sought to determine if this inventory can be relevant in decreasing the time it takes for undeclared students to declare a major on college campuses.

Assumptions and Limitations

When conducting this study, I identified several assumptions and limitations. When administering the data collection tools, I assumed that all participants were honest in the answers submitted. I also assumed that there are existing strategies and tools being used on Rowan University's campus to address the needs of undeclared undergraduate students. A major limitation identified is that all students enrolled at Rowan University did not take the LCI since the inventory was first implemented. There was also the potential for researcher bias. I have worked in the Exploratory Studies program, which has a particular interest in the use of the LCI with undeclared students, and this could further increase researcher bias.

Operational Definitions

1. Academic Advising: The intentional process of synthesizing a student's educational experiences with their educational/career aspirations and abilities.

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2. Career Exploration: The development of career preferences and skills, and the process of identifying and exploring career options that could coincide with a student's academics.

3. Declared Student: Matriculated, full-time, undergraduate students enrolled at Rowan University who had declared their academic major. These students attended Rowan University in Glassboro, NJ from fall 2007 until spring 2011. This group included students who began their first academic semester with a declared major and those who declared their major throughout their academic career.

4. Learning Style: Conditions under which learners learn better.

5. Learning Style Inventory: Tests developed to identify particular learning styles that coincide with a particular theory.

6. Learning Connections Inventory: Instrument designed to identify, accurately and consistently an individual's hardwired learning patterns. This inventory is a two-part, 28- question, self-reporting tool, that also includes three open-ended questions.

7. Undergraduate Student: Matriculated, full-time, undergraduate students enrolled at Rowan University from 1996 until the end of the fall 2010 academic semester. These students attend Rowan University in Glassboro, NJ. This word is also used interchangeably with the word undergrad.

8. Undeclared Student: Matriculated, full-time, undergraduate students enrolled at Rowan University who has not chosen an academic major. These students

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attended Rowan University in Glassboro, NJ from 1996 until the end of the fall 2010 academic semester.

Research Questions

The study sought to answer the following questions:

1. What are the learning styles as measured by the LCI of selected Rowan University students with declared majors?

2. What is the frequency of students who scored 'avoid' or 'first use' for each learning style within each college?

3. Is there a significant relationship between the learning styles of selected undergraduate students and their academic college?

4. What are the strength and limitations of using the LCI in the classroom?

5. Can the LCI be an effective tool in guiding undeclared students in the career and academic exploration process?

Overview of the Study

Chapter II provides a scholarly overview of selected literature related to this study. Examined are many articles, reports, and university websites pertaining to career exploration amongst college students, learning style inventories, student development theory, as well as several previous studies performed on this topic. Studies and scholarly articles addressing student involvement and retention rates were also examined for the purpose of this study.

Chapter III describes the methodology and procedures of the study. In this chapter is the description of context and location of the study, description of the population selected, description of the data collection instruments, description of the

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procedures used to collect the information, and a brief description of how the data were analyzed.

Chapter IV presents the findings and results of the research questions posed in Chapter I. The profile of the subjects as well as a presentation on the results are discussed, using tables, and narrative explanation of the findings.

Chapter V summarizes and discusses the major findings of the study. It also provides conclusions and recommendations for practice and further research on the topic.

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Chapter II

Review of the Literature

Academic Major Declaration Process & Decision Making Styles

Choosing a college major is a pivotal and life-altering decision all undergraduate students face. With all of the consequences involved with making such a major decision, it can be inferred that undeclared students would commit a longer period of time and resources to the decision making process. In fact, as Beggs, Bantham, and Taylor (2008) have discussed, many students do not commit the amount of time or resources that they should. Some students site trivial reasons, such as a dislike for a certain subject, for when deciding on a major, potentially resulting in regret of their choice or delay in degree completion. The authors suggest four categories of influence in major choice for students: (a) sources of information and influence, (b) job characteristics, (c) fit and interest in subject, and (d) characteristics of the major/degree.

Parents are noted as having a strong influence in the major decision making process. This influence can take on different roles, for example, a student may be interested in their parent's career. Influence can take on another, potential negative form, such as parental pressure to choose a major or career path they feel is best for their child (Beggs et al., 2008). Other significant influences in a student's life could be their peer group and other family members. Despite these sources of influence and guidance, the strongest indicator and influence for students was reported to be their own interest in a particular career field or academic subject. Other areas explored and reported to having influence in a student's decision making include marketing materials, such as university catalogs and brochures, potential earnings, quality of life, prestige, and opportunities in a

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particular career field. Overall aptitude and fit for the subject area are major influences for deciding on the choice of a major for a student. Finally, the authors discussed the characteristics of the major/degree as factors in choosing a major. These characteristics include reputation of the faulty and department, level of difficulty to earn the degree, and the ability to maintain a competitive grade point average.

Making Major Decisions

Making a decision, especially a major one, is something that every person does differently. For example, one person can be very hands-on in making a decision, while another person may want to avoid the subject or the situation all together. Understanding an individual's decision making style can be helpful for those who are assisting in the decision making process. Galotti et al. (2005) define decision making styles as, "Decision-making styles constitute a subset of broader cognitive styles, defined generally as the way people deploy their intellectual abilities, or the manner in which they approach cognitive tasks" (p. 630).

The authors discuss five distinct decision making styles in their research. The first style, rational, is characterized by a thorough search for and logical evaluation of alternatives. The second style, intuitive, is a reliance on hunches and feelings. The third, dependent, is characterized by a search for advice and direction from others. The fourth style discussed, avoidant, is characterized by attempts to avoid decision-making. Finally, the fifth style, spontaneous, is characterized by a sense of immediacy and a desire to complete the process quickly (Galotti et al., 2005).

Gati, Landman, Davidovitch, Asulin-Peretz, and Reuma (2010) address the need for a different approach to decision making than what has been previously provided.

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They discuss how in recent times there has been interest in the importance of individual differences in decision making. There are hundreds of measures in place focusing on decision making in general, but the authors state that there are very few dealing with career choice. Over time, there have been multiple career decision-making styles, which have allowed researchers to identify primary and secondary decision making styles for clients. A student may demonstrate characteristics of a dominant decision-making style, but also show characteristics of a secondary style as well.

An alternative multidimensional approach was proposed by the authors to characterize career decision-making. A key difference is that they refer to career decision-making profiles instead of career decision-making styles. The authors cited two main reasons for using the term profile instead of style. The first was to indicate and address that there were often more than one trait an individual has in making decisions. The other reason cited was that career decision making styles focus on personality characteristics while, the new proposed profile would focus on both personality and situational influences (Gati et al., 2010).

The authors used a multidimensional approach with 11 dimensions derived from previous research on decision making styles. This model is based on seven assumptions: (a) individuals differ in their approach to of making career decisions and in their characteristic profile of career decision-making; (b) individuals' career decision-making process can be better described by a multidimensional profile rather than by a single dominant characteristic; (c) each dimension describes a continuum between two extreme poles, along which the individual can be characterized; (d) although the dimensions are not independent, each has a unique contribution; (e) like personality-related measures

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(and unlike career decision-making difficulties) the dimensions cannot be combined to produce a single total score; (f) depending on the dimension, one pole is often more adaptive for decision-making than the other; and (g) whereas some dimensions are mainly personality-related and more consistent across situations, others are more situational and may depend on the specific decision-task the individual is facing or the stage of the decision-making process the individual is at. Understanding how a person makes a decision and how his/her particular decision making style is effected by major influences is very helpful. The stress of deciding a major or a career choice can be alleviated if particular attention is paid to how the student makes decision.

Theories of Career Development

Career exploration is a significant process leading to the development of career interests, as well the selection of an occupation or career. This is an essential component of most major theories of career development literature (Geiken, 2009). Career exploration is not a quick answer to making a career decision, but an involved process requiring effort to gather information, and skill in reflecting and integrating that information. Career development theories vary in their coverage of the career development process versus career decision-making content. Theories will emphasize differences in the individuals in regards to their occupation, or individual development related to their careers (Niles & Harris-Bowlsbey, 2009). There are multiple theories covering different areas such as individual development and a person's relationship with his/her environment.

Donald Super first introduced his Life Span, Life Space theory in 1990. Rather than emphasizing the discussion around getting a new job or adjusting to a current job,

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this theory focuses on the process of becoming ready to work or ready to make job transitions. Super's theory encompasses the whole life span. Major concepts include career maturity (adaptability), career stages, life roles, and role salience. Super's theory is not a unified theory; it is a segmented theory that describes three aspects of career development: (a) life span, (b) life space, and (c) self concept (Niles & Harris-Bowlsbey, 2009). The theory ends with an intervention model, the Career Development Assessment and Counseling (C-DAC), which translates the three theory segments into practice.

In the first aspect, life span, Super theorized a person's career as a series of developmental encounters and tasks, and the person handles them in the manner that reflects the type of person he/she would like to be (2009). Super identified stages of career development in conjunction with human development: growth (childhood), exploration (adolescence), establishment (early adulthood), maintenance (middle adulthood), and disengagement (late adulthood). In the second aspect of this theory, life space, Super addresses the degree of importance individuals place on work, which often is attached to self-worth and success. Super notes that individuals assume multiple roles throughout their life, including parent, child, spouse/partner, etc; which coincide with an individual's role in his or her career. If life roles can cause conflict in other areas of a person's life, so can finding balance conflict with an individual's career goals and growth. The final stage, self-concepts, is described as a picture of the person in a particular role, situation, or position, while performing particular tasks/functions, or playing a role in different relationships (2009). Super uses other models to depict the various personal and situational factors that shape the life roles that individuals fill, and they contain both objective and subjective elements. Objectively, we develop by

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comparing ourselves to others, whereas subjectively we develop understanding through focusing on our individuality. Super emphasizes that career exploration continues throughout one's life, and depending on where the person is in career exploration, there are different approaches to assisting the individual.

Swanson and Gore (2000) describe the Trait Factor Theory, which is a match between traits within the individual and occupational factors. Krumboltz's Social Learning Theory of Career Counseling describes the factors influencing individuals' career decisions. This theory identifies four factors that influence career decision making: (a) genetic Endowment and special abilities, (b) environmental conditions and events, (c) instrumental and associative learning experiences, and (d) task approach skills (as cited in Niles & Harris-Bowlsbey, 2009).

The Career Exploration Process

The development of career preferences and skills is heavily influenced by an individual's learning experiences (Geiken, 2009). Learning experiences influence the ability to do a specific task, and the belief about the probable result of one's behavior. These learning experiences also serve as motivational influences on future career behaviors/decisions. An aspect of these learning experiences is the self exploration experience. Students who reported having a more extensive career exploration process tend to be more satisfied with their career decisions. As mentioned earlier, career exploration has both external and internal components. The source is also very important. Students who utilized professional sources were more satisfied than those who depended on more informal sources such as parent, friends, and other family members.

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Some of the strongest predictors that these factors were heavily influential were an increased knowledge and level of preparedness on the career path (Geiken, 2009).

Geiken (2009) addresses career exploration and utilization of career services on college campuses in regards to the career exploration process. Students who have done extensive career exploration report to be more satisfied with their career choice than those who have not. This is especially important for those students who are undeclared or have not decided on a major. Studies have shown that a variety of cognitive factors are predictive of career exploration. Students who engage in career exploration can do so both internally and externally. External exploration, occupational exploration, includes searching for occupational information such as work tasks, employment outlook, educational preparation, or wages/salary. Internal exploration, self-oriented exploration, includes exploration of values, skills, interests, aptitudes, and personality. Geiken further reports that career exploration can be expanded by the source, or where the information was obtained. The source and where the information is obtained is very important in career exploration. This can be self-exploration gained through expert sources, family and friends, occupational information through expert sources, as well as employment experiences.

Geiken also refers to some challenges that come up with career exploration. One main challenge is a student who is not flexible in the career decision making and is resistant to looking at or considering other options. Students who have an idea of what they want to do career wise are more likely to find information that supports their career choice. They became less certain about their career choices when they are were presented with conflicting information.

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Undeclared students stand to benefit the most from career exploration. The inability to decide on a career is often associated with career exploration; those who are less certain about a career are also those who do not have as much information, and who report low involvement, and engagement in career exploration (Orndorff & Herr, 1996). Undecided students tend to be less involved in career exploration than those who have already declared a major. Geiken cites three broad categories that may prevent an individual from making a career decision, or make a less than optimal decision if one is made. These categories are low readiness, lack of information, and inconsistent information. Low readiness refers to problems that may occur prior to engagement in a particular process; in this case career decision making. This includes lack of motivation to engage in the career decision-making process, indecisiveness concerning all types of decisions, and dysfunctional beliefs about the decision-making process. Lack of information refers to difficulties during the career decision making process where individuals lack sufficient information, or they have difficulties processing and applying the information they have access to. The issue of inconsistent information is where the individual has unreliable or consistent information. This can also be an issue when the information the individual does have about making a career decision is incompatible with pre-existing information; if the student is not getting consistent information that supports each other, this will cause conflict and further confusion for the individual. Other factors influencing readiness of students include dysfunctional beliefs, the idea that choosing and entering into a particular career will solve personal problems and the 'dream job.' Information deficits are also cited; lacking occupational information or information about

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the stages of the career development process. Internal conflicts regarding personal choices are also cited as a hindrance to readiness.

Services for Career Exploration

Campus-based career services exist, in large part, to assist students with self-exploration and to provide access to occupational resources. Students who have declared a major and who are on their path to career exploration aid in higher retention rates for colleges and universities. Universities focus on retention rates by providing the appropriate resources for students and accommodating their needs (Scharen, 2010).

Rowan University provides career and academic advising help for all students. The Rowan University Career and Academic Planning (CAP) Center's mission is

> …to engage students in the development and implementation of meaningful
>
> educational and career goals consistent with their personal values, interests, and
>
> abilities. (as cited on CAP Center website, 2009)

Undecided students are a group who especially benefit from the services offered by the center. CAP Center staff counsel students and alumni on an individual basis on topics such as skills identification, values clarification, career exploration, writing resumes and cover letters, informational interview and job search techniques, and selection of a major. They also counsel undeclared students on selecting a major and courses to meet their academic and career goals. The center also coordinates internships and employment programs for students, and offers mock interviewing and resumes critiques for students that are job hunting.

Undeclared students are a population that works extensively with the CAP Center. These students, with 60 credits or less, are in the Exploratory Studies program, which is

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an academic program within the College of Liberal Arts and Sciences. Students in this program receive academic and professional advising, in efforts to assist them in declaring a major as soon as possible (CAP Center, 2009). The CAP Center also provides hundreds of publications to students referencing different career paths based on their interests. In conjunction with these publications, the CAP Center provides self-assessment tools to current students and alumni to assist in the career exploration process. Online resources are also provided to students so they can complete a thorough career exploration.

Students who seek career counseling are typically the least likely to be undecided in their careers (Geiken, 2009). Those who did not were decided on their careers but were less knowledgeable about themselves and occupations. Students who have more self and occupational knowledge engaged in more career exploration activities, whereas students who have less clear career interests may be less likely to think about and engage in career information-seeking behavior. Geiken noted that large numbers of college students on campus report needing or desiring assistance with a variety of career related concerns, and that assistance in declaring a major or choosing a career were one of the top services needed by students. Counselor-guided career exploration has been found to be more effective than computer or self-guided exploration in resolving career indecision.

Student Development Theories

Identity development. Theory of Identity Development is a psychosocial theory that views development as a series of tasks or stages dealing with thinking, feeling, believing, and relating to others. Chickering's theory is based on seven vectors of development. These vectors are more spiral in a student's life than linear, meaning that

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unlike human physical development, where one area must be completed before the next can begin, identity development constantly goes back and forth and a student can be in more than one vector at a time (Chickering & Reiser, 1993). The seven vectors identified were (a) developing competence, (b) managing emotions, (c) moving through autonomy and toward interdependence, (d) developing mature interpersonal relationships, (e) establishing identity, (f) developing purpose, and (g) developing integrity. Developing competence includes intellectual and interpersonal competence, developing physical, and manual skills. When managing emotions, students develop the ability to recognize and accept emotions, as well as to appropriately control and express them. The third vector of the developmental theory, moving through autonomy toward interdependence, students have an increased emotional independence, self-direction, problem solving, and recognize connectedness and interdependence. Developing mature interpersonal relationships is the fourth vector. In this vector, intercultural and interpersonal tolerance is developed. Relationship experience contributes significantly to the sense of self. Individuals learn to accept people for who they are (Chickering & Reiser, 1993). The fifth vector is establishing identity, and in this vector, acknowledgement of differences in identity based on gender, ethnicity, and sexual orientation are developed. Developing purpose is the sixth vector, where the development of clear vocational goals, making meaningful commitments to interests and activities, intentionally making and staying with decisions occurs. The seventh vector of Chickering's theory is "developing integrity." Integrity for one's beliefs, values, and purposes must be established. Also, thinking about others beliefs and points of view and the willingness to preserve self-

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respect while monitoring behavior is important in college students' development (Chickering & Reiser).

Student involvement. In 1984, Alexander Astin developed his theory of student involvement. When describing involvement, Astin refers to the "amount of physical and psychological energy that the student devotes to the academic experience" (Astin, 1999, p. 518). According to Astin, an example of a highly involved student would be one who spends a considerable amount of time studying, are engaged and active members of student organizations on campus, and have developed a relationship with professors. These students not only recognize the importance of being invested in the college experience on an academic and social level, but they are actively participating and creating opportunities for growth. Conversely, a student who is described as uninvolved is one who is the opposite: neglectful of their studies, spend little time on campus, is not involved in campus activities, and does not have much contact with professors. Astin concludes that the more involved a student is, the higher the student's success is while at college; the more a student puts into something, the more he or she gets out of it. Astin expands on his involvement theory to include, what he describes as five basic postulates: (a) involvement refers to the investment of physical and psychological energy in various objects. These objects can be as general as the student's experience at college or as specific as their career exploration process; (b) regardless of the object, a student's involvement occurs along a continuum. Each student will differ in the amount of energy they may invest in a particular object; (c) involvement can take on qualitative and quantitative forms. Using the example of a student in the career and/or academic exploration process, the amount of time a student searches and researches different

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academic and professional options would be measured quantitatively, whereas assessing

if the student understands and comprehends personal career and academic applications

would be measured qualitatively; (d) the amount of learning and personal development a

student will experience in an educational program is directly proportional to the quality

and quantity of student involvement in that particular program; and e) the effectiveness of

any educational policy or practice is directly related to the capacity of that policy or

practice to increase student involvement (Astin, 1999).

Involvement is an integral aspect of a student's academic and professional

exploration process. An involved student has an investment in personal academic and

professional growth, therefore will seek out the necessary information and tools to assist

in this process.

Learning Theories and Inventories

David Kolb's experiential learning theory is a holistic perspective that combines

experience, perception, cognition, and behavior (Kolb, 1984). Kolb believed that

learning was created through experience. His experiential learning model is cyclical,

which consists of four stages: Concrete Experience (CE), Reflective Observation (RO),

Abstract Conceptualization (AC), and Active Experimentation (AE). An individual may

begin at any stage of learning, but must follow each one in sequence (Figure 2.1).

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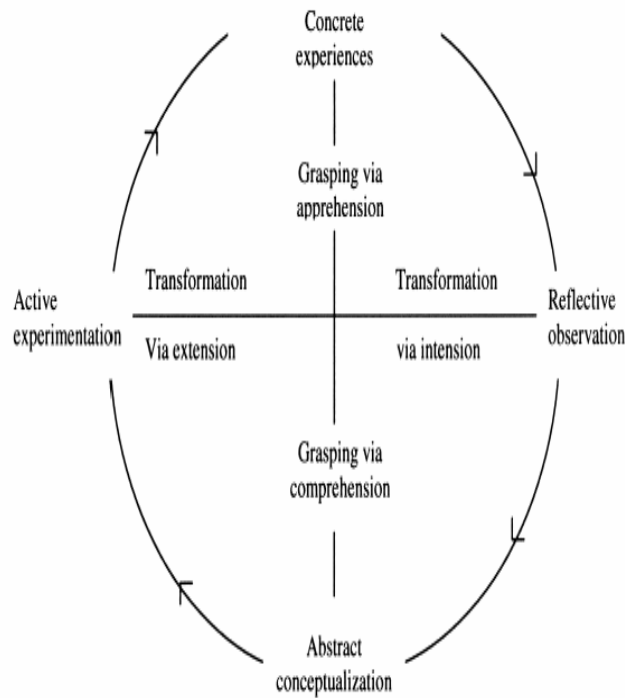
Figure 2.1. Kolb's (1984) Structural Dimensions Underlying the Process of Experiential Learning and the Resulting Basic Knowledge Forms (p. 42).

This four-stage learning cycle shows how experience is translated through reflection into concepts, which in turn are used as guides for active experimentation and the choice of new experiences (Kolb). Concrete experience (CE), is where the learner actively experiences an activity. Reflective observation (RO) is when the learner consciously reflects back on that experience. Abstract conceptualization (AC), is where the learner attempts to conceptualize a theory or model of what is observed. Active experimentation (AE), is where the learner is trying to plan how to test a model or theory or plan for a forthcoming experience (Kolb). Kolb identified four learning styles which correspond to these stages. The styles highlight ideal conditions under which learners

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gather, process, and implement information best. The styles are: Assimilators, Convergers, Accomodators, and Divergers. Assimilators learn better when presented with sound logical theories to consider. Convergers learn better when provided with practical applications of concepts and theories. Accommodators, learn better when provided with "hands-on" experiences. Divergers, learn better when allowed to observe and collect a wide range of information (1984).

Christine Johnston, former professor at Rowan University, developed the "Let Me Learn" process to focus on the abilities of the learner, exploring the path of learning that is best for them (Johnson, 1998). Johnston insists that "Let Me Learn" is not a curriculum, grouping, or assessment, but rather a tool that allows educators to create a listening environment where they can hear the needs of the learners, understand them, and deliver the best teaching methods for them to be successful. Johnston developed "Let Me Learn" from previous ideas flushed out in the Interactive Learning Model (ILM), which refers to the simultaneous interactions of three mental processes, identified as cognition (how we process information), conation (how we perform learning tasks), and affectation (how we develop a sense of self when engaged in learning tasks that do not always come naturally), which operate concurrently within each of the four operational patterns that make up each learner's brain-mind interface (Johnston, 1994). Johnston (1994) believes that the brain is configured into a trilogy of learning utilizing the three mental processes. Cognition is the most familiar learning process for most people. This process is the action of knowing, how we as learners attain information. Johnston (1997) notes that indicators of this include a learner's life experiences coupled with different intelligences. Conation guides performance, and also includes a learner's

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level of autonomy while learning. This mental process determines the learner's individual ability to self-navigate learning. Johnston notes that learners do not use cognitive functions and conative functions equally. Along with the interactions between cognition and conation is affectation, the emotional factor of learning. This sense of an emotional aspect of learning ties in with self-esteem and self-confidence in the classroom (Johnston, 1997). These three processes work together to develop and produce this trilogy of learning. A student's ability to understand and self-direct in learning can lead to higher confidence levels in the classroom. These processes are also effective when looking at the academic and professional exploration process.

Johnston refers to this concept as the Tripartite Theory of Human Mind (1994). Through her research, Johnston has explored how these three primary functions of human learning and processing effect how a person learns. She has utilized much of her findings in her development and use of the Learning Connections Inventory (LCI)

Learning Connections Inventory

The Learning Connections Inventory (LCI), formally known as the Learning Combinations Inventory, refers to the instrument designed to identify, accurately and consistently, an individual's hardwired learning patterns. The inventory is a two-part, 28-question, self-reporting tool that also includes three open-ended questions (Johnston, 1998). Responses to the 28 items are tallied, forming a score representing the degree to which an individual uses each of four Learning Patterns. These four learning patterns are Sequence, Precision, Technical Reasoning, and Confluence, which are the interaction of the cognitive, conative, and affective mental processes (Figure 2.2). The Sequential pattern is described as following a plan. This aspect of learning includes following step-

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by-step directions; completing assignments from beginning to end, without any interruptions. Johnston identifies the sequential patterns as the "making connections" part of learning (Johnston, 1998). The Precision pattern is enables one to seek and process detailed information carefully and accurately. When using this learning pattern, the learner typically takes detailed notes, asks questions to find out more information, and reads and writes in a highly specific matter. This pattern is known as the "discovery" pattern, wanting to know things with certainty (Johnston, 1998). The next pattern is the Technical Reasoning Pattern, According to Johnston, this is the practical, relevance-seeking part of learning. It is the "see what makes it work" part of our learning. In this learning pattern, individuals learn autonomously and hands on. The final learning pattern is the Confluent Pattern, our creative side of learning. Learning patterns in the confluent spectrum avoid conventional or traditional ways to complete a task. This type of learning is associated with risk taking, such as starting a task without directions, trying again after failure, or improvisation (Johnston, 1998).
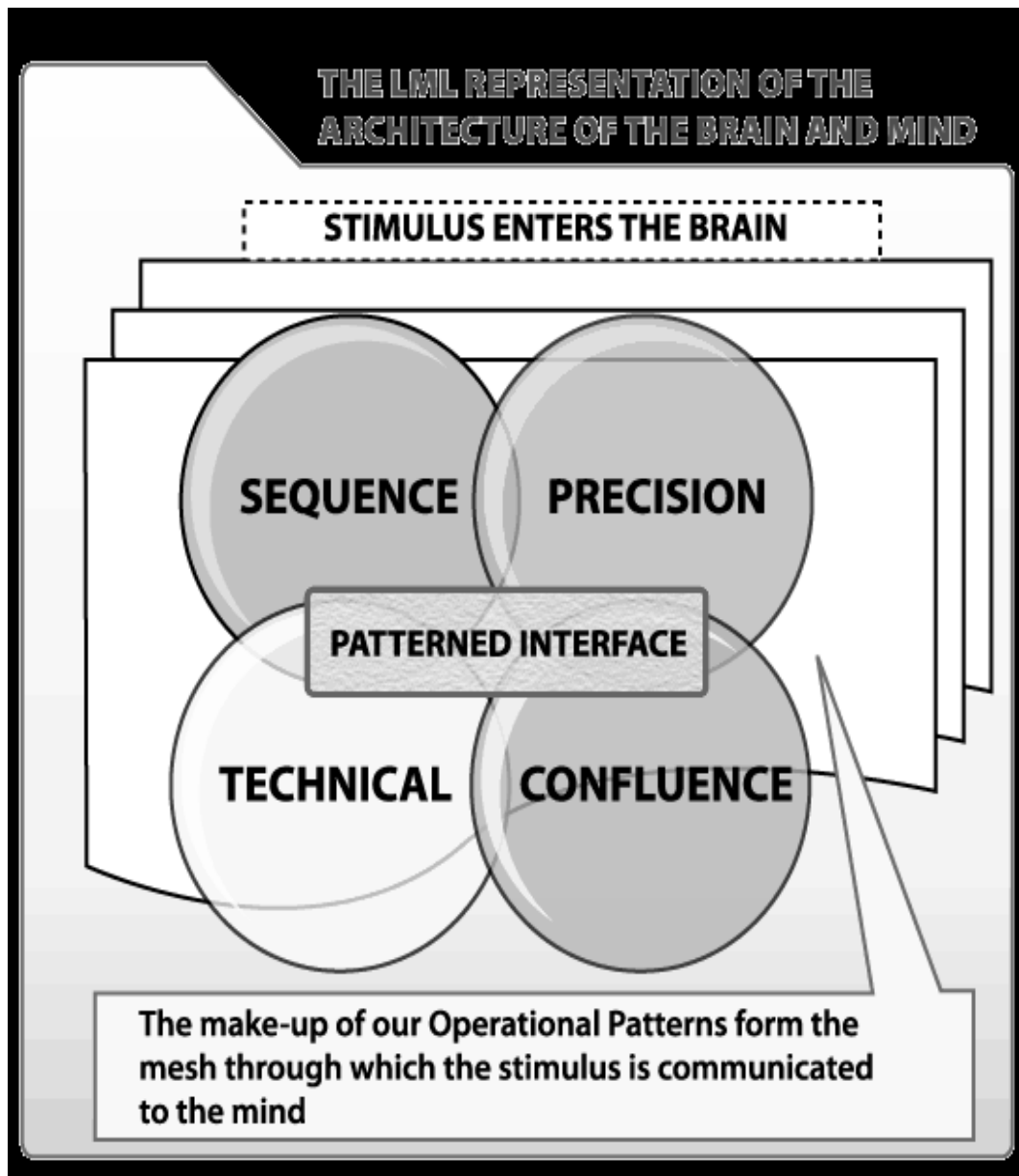
Figure 2.2. Johnston, C. (2006). The Let Me Learn Process® from www.letmelearn.org

The results of the LCI are first reported in a scoring pattern labeled after each learning pattern. The scores within each scale are divided into ranges: 7-16 = the learner avoids this pattern, 17-25= the learner uses this pattern as needed, 26-35= the learner uses this pattern first. Johnston also explains that by looking at and analyzing the "first use" as well as the "as needed" and "avoid" patterns help explain the learner as a whole. While there is no single professional profile that predicts success, patterns of professionals closely match the demands of their professional vocation (Johnston, 1998).

The LCI has had many uses in the field of education. The inventory has been utilized in the K-12 system, as well as in higher education. While the original purpose of the LCI was to identify how a student learns, and to be a tool that both students and teachers can utilize together to maximize learning, there has been use of the LCI to be used as an indication of academic success (Lane, 2003). The LCI has been utilized as a tool to be a predictor of academic success, coupled with other criteria such as grade point average, test scores, and the like.

Rowan University began the Learning Connections Inventory Initiative in the fall 2006 academic semester. In this initiative, all incoming freshmen who are participating in New Student Orientation, completed the LCI with their placement testing, and all transfer students were encouraged to complete the inventory as well. By 2010, the majority of undergraduate students at Rowan University would know their learning patterns and how to decode and strategize for greater success in and out of the classroom (Rowan University, 2012). Faculty, staff, and parents were also encouraged to take the inventory in order to better assist students in their academic career. Many faculty and instructors at

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Rowan use the terminology of the LCI to communicate strategies and procedures for academic success and to overcome academic challenges (Rowan University, 2012).

Prior to 2006, the LCI has been used at Rowan University for different aspects of academic planning. Newell, Dahm, Harvey, and Newell (2004) examined the use of the LCI to form work teams among engineering majors in Junior/Senior Clinics class at Rowan University. The purpose of these teams was to help students become metacognitive learners. In order to become metacognitive learners, Newell et al. state, students "must understand their strengths and weaknesses in learning and control how they will approach a problem" (p. 316). When students become metacognitive learners, it allows students and instructors a way for further learning personally and in team settings.

Similar to Newell et al., there have been additional studies conducted to examine the use of the LCI in the formation of working teams in an academic setting. Peter Kressler, professor of economics at Rowan University, contacted Christine Johnston about enhancing the learning experiences for his students enrolled in his courses. Kressler (2002) explored the effects of heterogeneously grouping teams of American Economic History students based upon their learning processes. After seeing much success in this design, Kressler (2003) continued to study the nature of the communication and understanding of learners when coupled within teams with similar learning styles in undergraduate macro-economic classes. Kressler (2003) discovered outcomes that included students having the ability to "develop a lexicon of learning and to use their learning processes with intention" (p. 4). Kressler believes that the understanding of the learning processes and styles is the key to success for a student's overall academic success.

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When reflecting on the needs of students who are undeclared or are still in career exploration, there is need for strong interventions. The LCI has potential for being a solid resource for advisors and career counselors to use with students. With the ability to give students a common language to express their learning styles and contributions, the LCI is a potentially strong tool to use. However, there is a need for more research on the use of the LCI in these areas.

Summary of the Literature Review

Choosing an academic major as well as a career are important aspects driving a student's college career. There are multiple influences in making these decisions, including parents, marketing materials, as well as the perceived benefits of the course of action. There have been multiple theories developed to identify how individuals go through the career exploration process, and what types of decisions and thoughts they may have. Having the correct resources and tools available are also critical components in a student's success. These resources include having engaged, involved, and competent staff and tools for students to use. If a college or university has a strong commitment to helping a student declare a major and begin the career exploration process, these students will have higher rates of success. Identifying how a student learns has been an area of study that can give insight or perspective on how to assist the undeclared student. Addressing how students learn, along with their interests, can prove to be very important in assisting undeclared students identify what their academic areas of choice are both successfully and relatively quickly.

The Learning Connections Inventory is an inventory that attempts to capture a student's interactive processes of cognition, conation, and affection (Johnston, 1994).

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Designed with both the Likert-scale and open-ended questions, the inventory's goal is to identify the learner's preferred as well as avoided learning styles. These identifications can prove to be vital for both the learning and the teacher, seeking to maximize the learning experience.

Research has shown that decision-making styles and learning styles can be major influences in the academic and career exploration process for students. There have been different inventories and tools developed to help students indentify their own styles of learning. The Learning Connections Inventory has recently emerged as a tool to take the learning style forum a step further and delve deeper into the intricate and intimate processes the learner uses and avoids to create themselves as a learner. There has been research and use of the LCI to assist in academic success, but there is little research done in the use of LCI as a predictor in the career and academic exploration process.

Little is known about the learning profiles of undeclared students, versus those who enter into college with a major declared. More research is needed to examine the impact the LCI has on the career and academic exploration process of undergraduate college students.

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<center>**Chapter III**</center>

<center>**Methodology**</center>

Context of the Study

The study was conducted at Rowan University's main campus, in Glassboro, NJ during the spring 2011 semester. The university is a public institution in the state of New Jersey, with its main campus located in Glassboro. Rowan University also had a smaller satellite campus in Camden, NJ. At the time of this study, Rowan University had a total student population of approximately 11,392 students (Rowan University, 2011). Specifically, there were 9,784 undergraduate students, 1,126 graduate students, 190 doctoral students, and 292 students in certificate programs.

Rowan University was founded in 1923 as Glassboro Normal school, a school to prepare elementary school teachers. By the 1970s, there had been several name changes and the institution was then known as Glassboro State College. Glassboro State College offered a variety of educational programs, but still specialized in teacher education. Glassboro State College became Rowan College in 1992 after Henry Rowan and his wife, Betty, donated $100 million dollars to the school; this was largest single gift made to a public college or university (Rowan University, 2008). Rowan College became Rowan University in 1997, when it won approval for university status from the New Jersey Commission on Higher Education.

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Beginning in the fall 2007 semester, The LCI Initiative came to Rowan University's campus, requesting that all freshmen complete the LCI. Transfer students are encouraged to complete the LCI as well. By 2010 the majority of undergraduate students at Rowan University were expected to know their learning patterns and how to decode and strategize for greater success in and out of the classroom.

Population and Sample Selection

The target population for this study included 5,072 undergraduate Rowan University students that have completed the Learning Connections Inventory (LCI) since fall 2007. This group of students involved students who were currently enrolled and those who are no longer enrolled in the University. The second group of subjects included six Rowan University professors and administrators who have had direct experience using the LCI with students. The convenience sample was selected undergraduate students who completed the LCI since the fall 2007 semester until April 2011. This sample also included the six Rowan University professors and administrators who have had direct experience using the LCI with students.

Instrumentation

This study used a combination of quantitative and qualitative research to explore the use of the Learning Connections Inventory in the career and academic exploration process of undeclared undergraduate students at Rowan University. The primary focus of the research was to better understand the career and academic exploration of undeclared students and to assess how strong of a role the LCI played in this process. The instruments used were the Learning Connections Inventory (Johnston, 1998) (Appendix A) and six one-session interviews with selected Rowan University professors and

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administrators (Appendix B). Christine Johnston's (1998) *Let Me Learn* is an advanced learning system that provides learners with an opportunity to describe and articulate who they are as a learner. Students are able to express what their needs are as a learner and what they can contribute in the classroom. This process also guides teachers in developing the learning environment necessary for students to employ their learning strategies. Johnston (2006) describes the LCI as a 28 Likert item self-reporting instrument that allows learners "to report the degree to which they simultaneously use each of four learning processes" (p. 2). Within the 28 Likert item questions, three questions allow for free form answers which enhance the dynamics of the *Learning Connections Inventory*.

There were six individual interviews conducted with Rowan University professors and administrators. All participants were selected based upon their previous work with the LCI both in and outside of the classroom. Each interview was recorded for future data analysis. Interview lasted between 30-45 minutes long and consisted of seven open-ended questions (Appendix B) crafted to explore their experiences with the LCI, perceived strengths and limitations, as well as their views on the use of the inventory in the career and academic exploration process. To determine content validity, I had a faculty member at Rowan University in The Educational Services and Leadership Department examine and give feedback about the instrument.

The data collection instruments and an Institutional Review Board (IRB) application were submitted for review before the data collection process began. The IRB approved and exempted the application on April 27, 2011 (Appendix C).

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Data Gathering Procedures

Written and verbal permission was given by Dr. Diane Dorland (Appendix D), former Dean and professor of the College of Engineering at Rowan University, to access an anonymous data file compiled of all undergraduate students who had taken the LCI since 1996. Dr. Dorland stripped the file of all identifying information (Student ID numbers, First & Last Names). The original file contained 11,177 students, but for the purposes of this study, only students who had taken the LCI since the fall 2007 semester were included. The information utilized in the data set included all matriculated undergraduate students who completed the LCI. The six professors/administrators were contacted by email and interview times were arranged. Each participant was asked seven non-leading questions surrounding their use of the LCI as well as their attitudes regarding the inventory's effectiveness. Exclusion criteria include any student who had taken the LCI prior to the fall 2007 semester or had not completed the LCI; as well as professors/administrators who had no experience or knowledge of the LCI.

Data Analysis

The independent variables in this study included the academic majors of the students who completed the LCI since the fall 2007 semester. These independent variables were collected in the anonymous data file provided by Dr. Dianne Dorland. This file contained the LCI scores for 11,117 students who completed the LCI since 1996. Other information included in this file included gender, academic major, SAT scores, GPA, and enrollment status. For the purpose of this study, only the following information was utilized: LCI scores, academic college (all majors were categorized into their respective college according to Rowan University), enrollment status, and LCI

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scores). Enrollment prior to the fall 2007 semester as well as non-matriculation while enrolled at Rowan University was used to narrow the file to the final number, 5072 students, to be analyzed. The data were analyzed using the Statistical Package for the Social Sciences (SPSS). This software analyzed data according to frequencies, percentages, means, and standard deviations' of the data provided in the data file. Pearson product moment correlations were calculated to determine if there were any significant relationships between the four learning styles and the colleges of the individual students.

The dependent variables included learning patterns of undeclared students as well as declared students, as well as the opinions expressed in the interviews conducted with the selected Rowan University professors/administrators. These dependent variables were collected in both the anonymous data file as well as recorded interviews. Audiotapes were individually transcribed and from the transcriptions of these interviews, themes indicated what the attitudes and beliefs of each professor and administrator had for using the LCI in the career and academic exploration process of undergraduate students. Analysis consisted of open coding, where all transcribed interviews were listened to and analyzed line-by-line to generate initial categories. Open coding was achieved by looking closely at the categories that arose from the data. Data from the dependent variables in the interview were coded and transcribed by the researcher using *Rules and Procedures for Logical Anaylsis of Written Data (*Sisco, 1981*).* (See Appendix E).

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Chapter IV

Findings

Profile of the Sample

  The subjects of this study were drawn from two groups of individuals. The first group was comprised of 5,072 undergraduate students that completed the Learning Connections Inventory (LCI) since the fall 2007 semester. Of these students, 2,639 (52.03%) were female and 2,433 (47.97%) were male. This group of students involves 3,932 students (77.52%) who were currently enrolled and 1,140 (22.48%) students who were no longer enrolled at Rowan University in Glassboro, NJ. The second group of subjects includes six Rowan University professors and administrators who have had experience using the LCI with undergraduate students in their work. These subjects included 3 (50%) who served dual roles as professors and administrators, 2 (33.33%) who served solely as professors, and 1 (16.67%) who served solely as an administrator at Rowan University in Glassboro, NJ.

Group I: Undergraduate Students

  Table 4.1 describes selected demographic information of the undergraduate students who took the LCI since the fall 2007 semester. The original file contained 11,177 students who completed the LCI since 1996. Using the exclusion criteria of being first enrolled prior to the fall 2007 semester as well as not being matriculated, 5,072 students were selected for this study. Of them 2,639 (52.03%) were female and 2,433 (47.97%) were male.

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Table 4.1

Gender Breakdown of Students (N=5072)

Variable	*f*	*%*
Gender		
Female	2,433	47.97
Male	2,639	52.03

Table 4.2 describes the enrollment demographics of all of the subjects while they were enrolled at Rowan University. During their tenure at Rowan University, all of the students were enrolled in one of the six colleges of the university. These colleges include the Rohrer College of Business, College of Communication, College of Education, College of Engineering, College of Fine and Performing Arts, and the College of Liberal Arts and Sciences. Students who had not declared a major in a specific college were in the Exploratory Studies Program, located within the College of Liberal Arts and Sciences. For the purposes of this study, students within the Exploratory Studies Program were separated into their own category to compare with students with a declared major in a college. Enrollment in specific colleges and programs were as follows: Rohrer College of Business 11.42%, College of Communication 10.55%, College of Education 14.94%, College of Engineering 9.13%, Exploratory Studies 6.03%, College of Liberal Arts and Sciences 42.51%, and the College of Fine and Performing Arts 5.43%. The enrollment statistics in regards to gender were as follows: Rohrer College of Business 31.61% female, 68.34% male; College of Communication 56.82% female, 43.18% male; College of Education 76.78% female, 23.22% male; College of Engineering 17.06% female, 82.94% male; Exploratory Studies 44.12% female, 55.88% male; College of Liberal Arts and Sciences 54.96% female, 45.04% male; and College of Fine and Performing Arts

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62.18% female, 37.82% male. As of April 2011, 3,932 (77.52%) students were enrolled

and 1,140 (22.48%) were not.

Table 4.2

College Enrollment Demographics (N=5072)

Variable	*f*	*%*
College Enrollment (Total)		
Business	579	11.42
Communication	535	10.55
Education	758	14.94
Engineering	463	9.13
Exploratory Studies	306	6.03
Liberal Studies	2156	42.51
Performing Arts	275	5.43
College Enrollment (Gender)		
Business	F= 183, M= 396	F= 31.61, M= 68.34
Communication	F= 304, M= 231	F= 56.82, M= 43.18
Education	F= 582, M= 176	F= 76.78, M= 23.22
Engineering	F= 79, M= 384	F= 17.06, M= 82.94
Exploratory Studies	F= 135, M= 171	F= 44.12, M= 55.88
Liberal Studies	F= 1185, M= 971	F= 54.96, M= 45.04
Performing Arts	F= 171, M= 104	F= 62.18, M= 37.82
Enrollment Status		
Enrolled	2639	52.03
Not Enrolled	1140	47.97

Analysis of the Data

   Research question 1. What are the learning styles as measured by the LCI of

selected Rowan University students with declared majors?

   Table 4.3 contains the data on the learning styles for selected Rowan University

undergraduate students who completed the *Learning Connections Inventory* since the fall

2007 semester at Rowan University.

Table 4.3

Learning Styles of Selected Undergraduate Students (N= 5,072)

Learning Style	M	Mode	SD
Confluence	21.74	22.00	3.651
Precision	22.35	22.00	3.985
Technical Reasoning	23.04	23.00	5.485
Sequence	26.19	26.00	4.147

   The Confluence category of the *Learning Connection Inventory* (Table 4.4)

scored a mean of 21.74, with a standard deviation of 3.651. The most frequent score was

21, accounting for 12% of all of the scores. The lowest score in the Confluence range

was 7, and the highest score was 35.

Table 4.4

Learning Connections Inventory Confluence (N=5,072)

Score	f	%
7	2	.0
8	2	.0
9	2	.0
10	3	.1
11	7	.1
12	10	.2
13	24	.5
14	54	1.1
15	103	2.0
16	130	2.6
17	211	4.2
18	363	7.2
19	459	9.0
20	510	10.1
21	610	12.0
22	566	11.2
23	509	10.0
24	391	7.7
25	328	6.5
26	285	5.6
27	185	3.6
28	124	2.4
29	93	1.8
30	43	.8
31	35	.7
32	11	.2
33	8	.2
34	3	.1
35	1	.0

The Precision category of the *Learning Connection Inventory* (Table 4.5) scored a mean of 22.35, with a standard deviation of 3.985. The most frequent score was 22, accounting for 10.3% of all of the scores. The lowest score in the Precision range was 8, and the highest score was 35.

Table 4.5

Learning Connections Inventory Precision (N=5,072)

Score	f	%
8	1	.0
9	3	.1
10	6	.1
11	7	.1
12	19	.4
13	31	.6
14	53	1.0
15	88	1.7
16	127	2.5
17	172	3.4
18	299	5.9
19	396	7.8
20	455	9.0
21	510	10.1
22	523	10.3
23	461	9.1
24	442	8.7
25	399	7.9
26	317	6.3
27	254	5.0
28	179	3.5
29	124	2.4
30	92	1.8
31	58	1.1
32	30	.6
33	10	.2
34	9	.2
35	7	.1

The Technical Reasoning category of the *Learning Connection Inventory* (Table

4.6) scored a mean of 23.04, with a standard deviation of 5.485. The most frequent score

was 25, accounting for 7.1% of all of the scores. The lowest score in the Technical

Reasoning range was 7, and the highest score was 35.

Table 4.6

Learning Connections Inventory Technical Reasoning (N=5,072)

Score	f	%
7	8	.2
8	12	.2
9	11	.2
10	30	.6
11	43	.8
12	58	1.1
13	56	1.1
14	119	2.3
15	118	2.3
16	160	3.2
17	184	3.6
18	249	4.9
19	286	5.6
20	331	6.5
21	318	6.3
22	354	7.0
23	321	6.3
24	338	6.7
25	360	7.1
26	314	6.2
27	295	5.8
28	248	4.9
29	208	4.1
30	162	3.2
31	162	3.2
32	109	2.1
33	122	2.4
34	63	1.2

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The Sequential category of the *Learning Connection Inventory* (Table 4.7) scored a mean of 26.19, with a standard deviation of 4.147. The most frequent score was 26, accounting for 10.1% of all of the scores. The lowest score in the Sequence range was 8, and the highest score was 35.

Table 4.7

Learning Connections Inventory Sequential (N=5,072)

Score	f	%
8	1	.0
10	2	.0
11	4	.1
12	8	.2
13	8	.2
14	11	.2
15	18	.4
16	23	.5
17	57	1.1
18	78	1.5
19	111	2.2
20	167	3.3
21	203	4.0
22	247	4.9
23	311	6.1
24	343	6.8
25	465	9.2
26	512	10.1
27	473	9.3
28	461	9.1
29	423	8.3
30	371	7.3
31	314	6.2
32	210	4.1
33	134	2.6
34	92	1.8
35	25	.5

Research question 2. What is the frequency of students who scored 'avoid' or 'first use' for each learning style within each college?

In the Confluence category (Table 4.8), the spread of avoid (score of 7-16) and first use (score of 26-35) scores were as follows: Rohrer College of Business 6.22% avoid, 13.64% first use; College of Communication 3.18% avoid, 17.76% first use; College of Education 10.95% avoid, 6.99% first use; College of Engineering 2.16% avoid, 21.17% first use; College of Liberal Arts and Sciences 7.42% avoid, 15.49% first use; College of Fine and Performing Arts 2.18% avoid, 24.73% first use; and for Exploratory Studies students 8.17% avoid, 18.95% first use.

Table 4.8

Learning Connections Inventory Confluence Scores by College

Variable	*f*	*%*
Business	*n=579*	
Avoid	36	6.22
First Use	79	13.64
Communication	*n=535*	
Avoid	17	3.18
First Use	95	17.76
Education	*n=758*	
Avoid	83	10.95
First Use	53	6.99

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Table 4.8 (continued)

Variable	*f*	*%*
Engineering	*n=463*	
Avoid	10	2.16
First Use	98	21.17
Liberal Arts	*n=2156*	
Avoid	160	7.42
First Use	334	15.49
Performing Arts	*n=275*	
Avoid	6	2.18
First Use	68	24.73
Exploratory Studies	*n=306*	
Avoid	25	8.17
First Use	58	18.95

In the Precision category (Table 4.9), the spread of avoid (score of 7-16) and first use (score of 26-35) scores were as follows: Rohrer College of Business 7.43% avoid,17.62% first use; College of Communication 7.48% avoid, 22.62% first use; College of Education 5.41% avoid, 19.92% first use; College of Engineering 8.64% avoid, 11.45% first use; College of Liberal Arts and Sciences 5.61% avoid, 26.11% first use; College of Fine and Performing Arts 11.64% avoid, 13.45% first use; and for Exploratory Studies students 6.54% avoid, 17.32% first use.

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Table 4.9

Learning Connections Inventory Precision Scores by College

Variable	*f*	*%*
Business	*n=579*	
Avoid	43	7.43
First Use	102	17.62
Communication	*n=535*	
Avoid	40	7.48
First Use	121	22.62
Education	*n=758*	
Avoid	41	5.41
First Use	151	19.92
Engineering	*n=463*	
Avoid	40	8.64
First Use	53	11.45
Liberal Arts	*n=2156*	
Avoid	121	5.61
First Use	563	26.11
Performing Arts	*n=275*	
Avoid	32	11.64
First Use	37	13.45
Exploratory Studies	*n=306*	
Avoid	20	6.54
First Use	53	17.32

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In the Technical Reasoning category (Table 4.10), the spread of avoid (score of 7-16) and first use (score of 26-35) scores were as follows: Rohrer College of Business 8.64% avoid, 36.27% first use; College of Communication 14.77% avoid, 22.80% first use; College of Education 19.00% avoid, 17.68% first use; College of Engineering 0.22% avoid, 77.89% first use; College of Liberal Arts and Sciences 13.73% avoid, 20.22% first use; College of Fine and Performing Arts 8.36% avoid, 21.45% first use; and for Exploratory Studies students 7.19% avoid, 35.62% first use.

Table 4.10

Learning Connections Inventory Technical Reasoning Scores by College

Variable	*f*	*%*
Business	*n=579*	
Avoid	50	8.64
First Use	210	36.27
Communication	*n=535*	
Avoid	79	14.77
First Use	122	22.80
Education	*n=758*	
Avoid	144	19.00
First Use	134	17.68

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Table 4.10 (continued)

Variable	*f*	*%*
Engineering	*n=463*	
Avoid	1	0.22
First Use	356	77.89
Liberal Arts	*n=2156*	
Avoid	296	13.73
First Use	436	20.22
Performing Arts	*n=275*	
Avoid	23	8.36
First Use	59	21.45
Exploratory Studies	*n=306*	
Avoid	22	7.19
First Use	109	35.62

In the Sequence category (Table 4.11), the spread of avoid (score of 7-16) and first use (score of 26-35) scores were as follows: Rohrer College of Business 1.90% avoid, 56.99% first use; College of Communication 1.31% avoid, 60.19% first use; College of Education 0.79% avoid, 71.37% first use; College of Engineering 1.73% avoid, 44.28% first use; College of Liberal Arts and Sciences 1.58% avoid, 60.39% first use; College of Fine and Performing Arts 1.09% avoid, 55.64% first use; and for Exploratory Studies students 1.96% avoid, 52.94% first use.

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Table 4.11

Learning Connections Inventory Sequence Scores by College

Variable	*f*	*%*
Business	*n=579*	
Avoid	11	1.90
First Use	330	56.99
Communication	*n=535*	
Avoid	7	1.31
First Use	322	60.19
Education	*n=758*	
Avoid	6	0.79
First Use	541	71.37
Engineering	*n=463*	
Avoid	8	1.73
First Use	205	44.28
Liberal Arts	*N=2156*	
Avoid	34	1.58
First Use	1302	60.39
Performing Arts	*n=275*	
Avoid	3	1.09
First Use	153	55.64
Exploratory Studies	*n=306*	
Avoid	6	1.96
First Use	162	52.94

Research question 3. Is there a significant relationship between the learning styles of selected undergraduate students and their academic college?

A Pearson product moment was calculated for the relationship between academic college and the different categories of the *Learning Connections Inventory* (see Tables 4.12-4.14). There was a weak significant, positive correlation regarding academic college and the Confluence category (*r=.037, p=.008) at a p<.01* level (Table 4.12) as well as the Precision category (*r= .053, p = .000) at a p< .01 level* (Table 4.13). There was also a weak significant, negative correlation regarding academic college and the Sequence category on the Learning Connections Inventory (*r= -.032, p= .088) at a p < .05* level (Table 4.14).

Table 4.12

Correlation between Academic College and the Learning Connections Inventory
Confluence
(N = 5,072)

Variable	*r*	*P*
Academic College and the *Learning Connections Inventory Confluence*	*.037**	.008*

**Correlation is significant at the 0.01 level (2-tailed).

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Table 4.13

Correlation between Academic College and the Learning Connections Inventory Precision
(N = 5,072)

Variable	*r*	*P*
Academic College and the *Learning Connections Inventory Precision*	*.053***	*.000*

**Correlation is significant at the 0.01 level (2-tailed).

Table 4.14

Correlation between Academic College and the Learning Connections Inventory Sequence
(N = 5,072)

Variable	*r*	*p*
Academic College and the *Learning Connections Inventory **Sequence***	*-.032***	*.088*

**Correlation is significant at the 0.05 level (2-tailed).

Qualitative Analysis

Content analysis was used to explore and answer the last two research questions of this study. The strengths and limitations of the LCI in the classroom as well as the possible effectiveness of the LCI to be used as a career and academic exploration tool were explored during this process. In order to answer Research Questions 4 and 5, additional data were needed in order to explore more in depth the potential impact the LCI can have in the career and academic exploration process for undeclared students. In conjunction with examining the data file containing LCI scores of the 5,072 student subjects, additional data were collected from Rowan University professors and

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administrators who had direct knowledge and experience using the LCI with students. Each subject agreed to participate in an interview to share their opinions and experiences and give further insight.

There were a total of six interviews conducted with each participant ranging from six minutes to approximately one half hour. Each participant was asked seven questions regarding their experience using the LCI, uses of the LCI in the classroom, strengths and limitations of the instrument, as well as uses of the LCI in a student's learning and career exploration process. Subjects were also asked to provide other uses they felt the LCI could be utilized not covered in the other six questions.

Group II: Professors and Administrators

Table 4.15 describes the selected demographic information of the six professors and administrators who participated in the interview portion of this study. There were three (50%) female and three (50%) male participants. These subjects included two (33.33%) who served solely as professors, one (16.67%) who served solely as an administrator, and three (50%) who served dual roles as professors and administrators at Rowan University in Glassboro, NJ.

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Table 4.15

Professors and Administrators Gender and University Roles (N=6)

Variable	*f*	*%*
Gender		
Female	3	50.00
Male	3	50.00
University Role		
Professor	2	33.33
Administrator	1	16.67
Dual	3	50.00

Analysis of the Interviews

The goal of the interviews with the professors and administrators was to gain

more insight into their opinion about the uses of the Learning Connections Inventory in

the classroom with students, specifically undeclared students. The participants for the

interviews shared a range of ideas and opinions regarding the LCI. All of the participants

had a variety of experiences working with the LCI. Table 4.16 presents the content

analysis of the common experiences with the LCI. Four of the participants explained that

their involvement with the Learning Connections Inventory began over 10 years ago

when Christine Johnston, developer of the LCI, first introduced the inventory to Rowan

University. These participants referred to participation in formalized trainings and

becoming an LCI consultant. All six discussed using of the LCI in their professional

work. This included use in the classroom as a part of their curriculum, to implementing

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within their offices practices to use as a first step in the career exploration process. Two professors/administrators talked about their experiences using the LCI as a tool to assist in forming teams/collaborations with their students. One professor stated, "We found that team-forming, and helping students strategize on how to improve their learning was a valuable add on piece to their education."

Table 4.16

Content Analysis Exploring Professors/Administrators Experience with the LCI (N=6)

Theme	*f*	Rank
Professional Work	6	1
LCI consultant training	4	2
Team forming/collaborative work with students	2	3
Total	12	

The uses of the LCI in the classroom were also explored in the interviews. There were a variety of uses of the LCI expressed during this portion of the interview. All six participants discussed the role the LCI plays in helping students understand themselves as learners. One participant stated, "It helps them, particularly freshmen, understand what skills, other than what they have now, needed to develop in order to be successful students." Five discussed the role the LCI has to help both teachers and students develop a language to be able to set clear expectations in the classroom. They each discussed the importance this language has to express their needs as well as understand the needs of

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others they are working with. One professor stated, "One of the things I point out to them (students) is that by understanding their learning patterns and the learning patterns of their team members, they are better able to describe what they need from the team, and what the team can expect from them." As a supplement to the conversation about language, four participants discussed the use of the LCI to help improve team dynamics. One participant also talked about how the LCI helped them to understand themselves as a teacher.

Table 4.17

Content Analysis Exploring uses of the LCI in the Classroom (N=6)

Theme	*f*	Rank
Helping students understand themselves as a learner	6	1
Help develop a language to set clear expectations as a teacher/student	5	2
Developing team dynamics	4	2
Helping professors understand themselves as teachers	1	3
Total	16	

Research question 4. What are the strength and limitations of using the LCI in the classroom?

Table 4.18 provides an analysis of what the professors and administrators felt were the strengths of the Learning Connections Inventory in the classroom. In regards to the strengths of the LCI in the classroom, there were several themes that arose. Four

participants discussed how the LCI has been able to help both students and teachers understand how they learn and perform in the classroom. One professor explained, "I understand much better who I am as an instructor. So that makes it easier for me how I present material, it helps me understand why I ask for information back in a particular fashion." Additionally, three participants discussed how the LCI has been very useful in helping students to develop academic strategies in the classroom based on the information they have learned about their learning. Expanding on this concept, one professor stated, "I think the biggest strength of the LCI in the classroom is the ability of students to actually analyze what they need and strategize how to get it." Finally, three participants discussed how the LCI can assist both teachers and students develop expectations of themselves and of others. One professor stated, "You are assisting the student in identifying how their strengths and weaknesses as a learner are going to line up with the class's expectations of them as a learner and giving them the opportunities to compensate where they need to."

Table 4.18

Content Analysis of the Strengths of the LCI in the Classroom (N=6)

Theme	f	Rank
Understand self as a learner and a teacher	4	1
Develop academic strategies	3	2
Develop expectations of self and others	3	2
Total	10	

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Table 4.19 describes the perceived limitations of the LCI in the classroom with students. Four participants discussed the lack of a "next step" for students. Concern was expressed because respondents felt that after the students take the LCI and receive their learning styles, there is "not enough follow through or follow up to help them use the information." Two discussed the regular use of the LCI within the university was also discussed as a limitation. This limitation was discussed by one professor: "Another limitation of the use of the LCI, we at Rowan have been struggling for years on how to embed this. We have lots of individual faculty who use this; we would have a lot bigger impact if we could make it more formal, institutionalize it." Two mentioned as a limitation as the 'misuse' of the LCI. When referring to the 'misuse,' they are referring to when those who utilize the inventory inappropriately use the results. Two examples cited were those who take the LCI use the results as an excuse for perceived incompetency's in their learning, as well as when administrators of the inventory attempt to label and place students in a particular category based on their results.

Table 4.19

Content Analysis of the Limitations of the LCI in the Classroom (N=6)

Theme	f	Rank
Lack of "next step" for students after taking LCI	4	1
Lack of regular use in the university	2	2
Misuse	2	2
Used as an excuse		
Make students fit into a category		
Total	8	

Research question 5. Can the LCI be an effective tool in guiding undeclared students in the career and academic exploration process?

In order to answer this research question, the discussion of the uses of the LCI in the career and academic exploration of students was explored with each of the interview participants. Table 4.20 reflects the major theme that arose when talking about the LCI in this process. All six discussed that the LCI together is very useful when students are able to pair their learning styles and aptitudes identified by the LCI with careers and academic majors that require them. The participants discussed "figuring out what someone wants and figuring out what's going to be your (the student) path and how you are going to meet your goals." One professor stated that when using the LCI in the career and academic exploration process, "You should start with what someone is interested in, but then use this (LCI) reflection on what kind of learner are you, and what kinds of things you want to do, what type of work do you want to do, and pair it with that interest." Another professor commented, "I could see if I were talking to students about what they wanted to do for a career. Having them take the LCI and having them discuss what these learning patterns and preferences mean. I think that could be a good guide for moving towards or away from particular careers."

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Table 4.20

Content Analysis of the uses of the LCI in the Career and Academic Exploration Process (N=6)

Theme	*f*	Rank
Matching learning styles/aptitudes with certain careers/majors	6	1
Total	6	

Chapter V

Summary, Discussion, Conclusions, and Recommendations

Summary of the Study

This study included a combination of quantitative and qualitative data analysis to answer five research questions investigating the potential impact and relationship between the Learning Connections Inventory (LCI) and the career and academic exploration process of undeclared students. The attitudes of selected Rowan University professors and administrators towards the use of the LCI in the career and academic exploration process were also explored. The subjects of this study included all students who completed the LCI since the fall 2007 semester as well as selected Rowan University professors and administrators who had direct experience using the LCI with students. Factors examined included learning styles of the selected students, relationship between learning style and academic college, strengths and limitations of the LCI in the classroom, and the effectiveness of using the LCI in the career and academic exploration process of undeclared students.

A data file containing the LCI scores, academic major, and other demographic information of 11,177 students who have completed the LCI since 1996 was initially analyzed. The exclusion criteria of initial enrollment prior to the fall 2007 semester as well as non-matriculation were used to narrow this data file to 5,072 students.

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Descriptive statistics were used to analyze the data from the data file. The learning styles of the selected students and the relationship between learning style and academic college were investigated using Statistical Package for the Social Sciences (SPSS) computer software.   SPSS was used to calculate descriptive statistics including frequencies, means, percentages, and standard deviations and Pearson product-moment correlations. Content analysis was used to analyze qualitative data gathered from interviews regarding the opinions of selected Rowan University professors and administrators towards the strengths and limitations of the LCI in the classroom, and the effectiveness of using the LCI in the career and academic exploration process of undeclared students.

Discussion of the Findings

Research question 1. What are the learning styles as measured by the LCI of selected Rowan University students with declared majors?

After reviewing the data collected in the original file, a clearer picture of the learning profiles of the students who completed the LCI could be seen. A total of 5,072 students' LCI scores were analyzed using descriptive statistics in regards to each of the learning styles. Selected students at Rowan University produced the following mean scores: (a) Confluence- 21.74, (b) Precision- 22.35, (c) Technical- 23.04, and (d) Sequence – 26.19. Three of the four learning categories (Confluence, Precision, and Technical) fall into the as needed classification, whereas Sequence fell into the first use classification.

As stated by Johnson (1998), the Sequential learning style is referred to following a plan; items are laid out and the learner will follow them step by step until completion.

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Academic classes have structured syllabi, including the expectations of the professor and the academic college; an inference can be made that this constant structure allows for students to rely on this learning style more. Once students understand the tasks and expectations of the class, they are able pull from other learning styles as they need them; this is reflected in the data. These learning styles will allow for the student to seek and process detailed information carefully and accurately (Precision), become more creative with their learning (Confluence), as well as utilizing hands on experiences to enhance the process (Technical Reasoning).

Research question 2. What is the frequency of students who scored 'avoid' or 'first use' for each learning style within each college?

The examination of the frequency of 'avoid' and 'first use' scores for each LCI category within the academic majors was examined. These were examined to determine if there was a trend in these scores within each major. If there was a trend found, this could perhaps lend itself in utilizing an undeclared student's raw LCI score in the academic and career exploration process. I was looking for a percentage over 50% for each to see if this trend was possible.

Within the Confluence category, the spread of avoid (score of 7-16) and first use (score of 26-35) scores were as follows: Rohrer College of Business 6.22% avoid, 13.64% first use; College of Communication 3.18% avoid, 17.76% first use; College of Education 10.95% avoid, 6.99% first use; College of Engineering 2.16% avoid, 21.17% first use; College of Liberal Arts and Sciences 7.42% avoid, 15.49% first use; College of Fine and Performing Arts 2.18% avoid, 24.73% first use; and for Exploratory Studies students 8.17% avoid, 18.95% first use.

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In the Precision category the spread of scores were as follows: Rohrer College of Business 7.43% avoid,7.62% first use; College of Communication 7.48% avoid, 22.62% first use; College of Education 5.41% avoid, 19.92% first use; College of Engineering 8.64% avoid, 11.45% first use; College of Liberal Arts and Sciences 5.61% avoid, 26.11% first use; College of Fine and Performing Arts 11.64% avoid, 13.45% first use; and for Exploratory Studies students 6.54% avoid, 17.32% first use.

In the Technical category: Rohrer College of Business 8.64% avoid, 36.27% first use; College of Communication 14.77% avoid, 22.80% first use; College of Education 19.00% avoid, 17.68% first use; College of Engineering 0.22% avoid, 77.89% first use; College of Liberal Arts and Sciences 13.73% avoid, 20.22% first use; College of Fine and Performing Arts 8.36% avoid, 21.45% first use; and for Exploratory Studies students 7.19% avoid, 35.62% first use.

In the Sequence category, scores were as follows: Rohrer College of Business 1.90% avoid, 56.99% first use; College of Communication 1.31% avoid, 60.19% first use; College of Education 0.79% avoid, 71.37% first use; College of Engineering 1.73% avoid, 44.28% first use; College of Liberal Arts and Sciences 1.58% avoid, 60.39% first use; College of Fine and Performing Arts 1.09% avoid, 55.64% first use; and for Exploratory Studies students 1.96% avoid, 52.94% first use.

After examining the data, in the Technical Reasoning category, students in the College of Engineering had the most dramatic skew of these scores. Only one Engineering student (.22%) scored in the avoid pattern, whereas 356 students (78.89%) of students scored as using this learning pattern first. The very hands-one and often autonomous nature of Engineering supports these scores with Johnston's (1998) analysis

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of the Technical thinker: practical and relevance seeking. Johnston reports this is the "see what makes it work" part of learning. In this learning pattern, individuals learn autonomously and hands on.

The next learning pattern that showed a dramatic skew was in the Sequence category. Students in all of the academic colleges except one showed the majority of their students utilized this learning pattern first: Rohrer College of Business 56.99%; College of Communication 60.19%; College of Education 71.37%; College of Liberal Arts and Sciences 60.39%; College of Fine and Performing Arts 55.64% ; and Exploratory Studies students 52.94%. Though the College of Engineering did not have a majority of students in who utilized this learning style first, they had a sizeable amount that did (44.28%).

Johnston (1998) reports that the Sequential pattern is described as a student following a particular plan. This aspect of learning includes following step-by-step directions; completing assignments from beginning to end, without any interruptions. Johnston identifies the sequential patterns as the "making connections" part of learning.

While there were large amounts of students who did score in the first use category for different learning patterns, there was not enough of a pattern to support the idea that there is a trend in either first use or avoid learning styles within each academic college.

Research question 3. Is there a significant relationship between the learning styles of selected undergraduate students and their academic college?

There was one weak positive correlation and one moderate correlation regarding academic college (Rohrer College of Business, College of Communication, College of Education, College of Engineering, College of Fine and Performing Arts, and the College of Liberal Arts and Sciences) and different categories in the LCI: the Confluence

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category (*r=.037, p=.008)* at a *p<.01* level, as well as the Precision category (*r= .053, p = .000)* at a *p< .01* level. There was also a weak negative correlation regarding academic college and the Sequence category on the Learning Connections Inventory (*r= -.032, p= .088)* at a *p < .05* level. There was no significant relationship between Technical Reasoning and academic college.

While there were correlations between three of the four learning styles and academic colleges, the correlations were relatively low suggesting that there is little association between a student's LCI scores and their academic college. However, this finding supports Beggs, Bantham, and Taylor (2008) argument that aptitude and fit for the subject area are major influences for deciding on the choice of a major for a student.

Research question 4. What are the strength and limitations of using the LCI in the classroom?

Content analysis was used to analyze the qualitative data collected in interviews conducted with six Rowan University professors and administrators. During these interviews, the strengths and limitations of the LCI were discussed. In regards to the strengths of the Learning Connections Inventory in the classroom, three themes arose: helping both teachers and students understand themselves in their roles, students learning to develop academic strategies, and assisting both teachers and students develop expectations of self and others.

These findings support Johnston's (1998) "Let Me Learn" process which focuses on the abilities of the learner, exploring the path of learning that is best for them. The "Let Me Learn" process utilizes the LCI as a tool that allows educators to create a listening environment where they can hear the needs of the learners, understand them,

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and deliver the best teaching methods for them to be successful. Limitations of use of the LCI in the classroom were also discussed during the interviews. During these interviews, the following themes arose: the lack of a "next step" for students after they have taken the LCI. It was further explained that after the students have taken the LCI and have received their results, there is a lack of guidance on how the students can utilize these results for their academic success. Another limitation noted was the lack of regular use of the LCI at Rowan University. While this is not a limitation with the LCI itself, it has been noted as a limitation on the possible impact the inventory could have on the academic careers of students. The final limitation noted were potential 'misuses' of the LCI. Two examples were noted, including the LCI being used as an excuse for perceived weakness in students learning. Another misuse stated is using the LCI as an anecdote or an aptitude test, by making students fit into a category based on their results. This particular misuse goes against Johnston's (1998) philosophy regarding the LCI and the 'Let Me Learn' process, which was not meant to be used as a curriculum, but rather a guide for instructors.

Research question 5. Can the LCI be an effective tool in guiding undeclared students in the career and academic exploration process?

Content analysis of the data collected during the six interviews was also used to answer this research question. The subjects were asked about the potential uses of the LCI in the career and academic exploration process. The one dominant theme that arose from these data was matching learning styles/aptitudes with certain careers or majors. Supporting Johnston's assertion that the LCI should not be used as a diagnostic tool, all of the subjects did recognize and support the idea of using the student's learning profile

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to explore different careers and majors that would complement them. Since all of the subjects suggested this as a possible use of the LCI, it is reasonable to suggest that the LCI can be used as a supplementary tool in the career exploration process.

Conclusions

The results of this study support the use of the Learning Connections Inventory (LCI) as a supplementary tool in the career and academic exploration process of undeclared students. The data do not support a strong enough relationship between the learning styles of a particular student and their academic major, though it does suggest there is a weak relationship. The data do support the notion that the LCI can unlock the mystery of a student's learning which in turn, can be critical in allowing a student to be more successful in their learning. By understanding themselves as learners, as well as being able to articulate their needs as a learner and what they will contribute, students will have more control over their learning. They in turn can become much more intentional about the decisions they make, such as course selection, study habits, and even major selection. This supports Gati et al. (2010), notion that career decision making styles focus on personality characteristics as well as situational influences. If a student understands their learning style, they can in turn navigate and negotiate their success inside and outside of the classroom. The ability for the LCI to help students and teachers to better communicate with each other is also another powerful aspect of this tool. This supports Johnston's (1998) goal and vision to have the LCI serve as a voice for both the student and the teacher. Having the implementation of the LCI become institutionalized could strengthen the impact it has on the career and academic exploration process of undeclared students. It can be concluded that though the LCI has many influential

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qualities that could assist undeclared students, there is not enough evidence to support that it should be used as a primary tool in the career and academic exploration process with this population.

Recommendations for Practice

Based upon the findings and conclusions of the study, the following suggestions are presented:

1. Colleges and universities should recognize the importance of different learning styles amongst students.

2. All Rowan University professors should be encouraged to utilize the Learning Connections Inventory in the classroom.

3. Additional follow-up and resources such as workshops and seminars should be offered to students who have completed the LCI to further assist in their academic and career exploration process.

4. Faculty and administration should invest more time and resources in the career and academic exploration process of undeclared students.

5. Training for faculty and staff should be provided for learning how to interpret and how to use the LCI in their practice.

Recommendations for Further Research

Based upon the findings and conclusions of the study, the following suggestions are presented:

1. Further studies should be conducted with larger populations to confirm the findings in this study.

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2. Further studies should be done with different groups to confirm accuracy of findings and present possible new research

3. A study could be conducted interviewing students and administrators to go more in-depth into various issues such as factors influencing the career exploration process, and satisfaction with the resources given on career and academic exploration process. Comparisons between students who entered with a major versus those who entered in the Exploratory Studies program could also be done.

4. Further studies should be conducted to explore the significance and impact learning styles have in higher education.

5. Further research should be done to explore the impact learning style inventories have on the career and academic exploration process for undeclared students.

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Appendix A

Learning Connections Inventory

Name_____

Part I.

This is a way to find out about how you accomplish learning tasks. Below are 28 statements each followed by five phrases that indicate how the statement might relate to you--"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 fits what you do to learn. 3) Circle the phrase that matches your response. Be sure that you circle only one phrase for each statement.

Let's practice!

Sample Statements:

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

| NEVER EVER | ALMOST NEVER | SOME-TIMES | ALMOST ALWAYS | ALWAYS |

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

| NEVER EVER | ALMOST NEVER | SOME-TIMES | ALMOST ALWAYS | ALWAYS |

Words of Encouragement: Take absolutely all the time you need, and do the very best you can. Have fun, relax, and enjoy learning more about yourself.

2

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

| NEVER
EVER | ALMOST
NEVER | SOME-
TIMES | ALMOST
ALWAYS | ALWAYS |

2. I need clear directions that tell me what the teacher expects before I begin an assignment.

| NEVER
EVER | ALMOST
NEVER | SOME-
TIMES | ALMOST
ALWAYS | ALWAYS |

3. I generate lots of unique or creative ideas.

| NEVER
EVER | ALMOST
NEVER | SOME-
TIMES | ALMOST
ALWAYS | ALWAYS |

4. I memorize lots of facts and details when I study for a test.

| NEVER
EVER | ALMOST
NEVER | SOME-
TIMES | ALMOST
ALWAYS | ALWAYS |

5. I feel better about an assignment when I double check my answers.

| NEVER
EVER | ALMOST
NEVER | SOME-
TIMES | ALMOST
ALWAYS | ALWAYS |

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

| NEVER
EVER | ALMOST
NEVER | SOME-
TIMES | ALMOST
ALWAYS | ALWAYS |

7. I am interested in detailed information about whatever I am studying.

| NEVER
EVER | ALMOST
NEVER | SOME-
TIMES | ALMOST
ALWAYS | ALWAYS |

3

8. I like to come up with a totally new and different way of doing an assignment instead of doing it the same way as everybody else.

| NEVER EVER | ALMOST NEVER | SOME-TIMES | ALMOST ALWAYS | ALWAYS |

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

| NEVER EVER | ALMOST NEVER | SOME-TIMES | ALMOST ALWAYS | ALWAYS |

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

| NEVER EVER | ALMOST NEVER | SOME-TIMES | ALMOST ALWAYS | ALWAYS |

11. I like to work with hand tools, power tools, and gadgets.

| NEVER EVER | ALMOST NEVER | SOME-TIMES | ALMOST ALWAYS | ALWAYS |

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

| NEVER EVER | ALMOST NEVER | SOME-TIMES | ALMOST ALWAYS | ALWAYS |

13. I need to have a complete understanding of the directions before I feel comfortable doing an assignment.

| NEVER EVER | ALMOST NEVER | SOME-TIMES | ALMOST ALWAYS | ALWAYS |

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

| NEVER EVER | ALMOST NEVER | SOME-TIMES | ALMOST ALWAYS | ALWAYS |

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15. I like hands-on assignments where I get to use mechanical/technical equipment.

      NEVER   ALMOST   SOME-   ALMOST   ALWAYS
      EVER   NEVER   TIMES   ALWAYS

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

      NEVER   ALMOST   SOME-   ALMOST   ALWAYS
      EVER   NEVER   TIMES   ALWAYS

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

      NEVER   ALMOST   SOME-   ALMOST   ALWAYS
      EVER   NEVER   TIMES   ALWAYS

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

      NEVER   ALMOST   SOME-   ALMOST   ALWAYS
      EVER   NEVER   TIMES   ALWAYS

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

      NEVER   ALMOST   SOME-   ALMOST   ALWAYS
      EVER   NEVER   TIMES   ALWAYS

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

      NEVER   ALMOST   SOME-   ALMOST   ALWAYS
      EVER   NEVER   TIMES   ALWAYS

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

      NEVER   ALMOST   SOME-   ALMOST   ALWAYS
      EVER   NEVER   TIMES   ALWAYS

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

| NEVER | ALMOST | SOME- | ALMOST | ALWAYS |
| EVER | NEVER | TIMES | ALWAYS | |

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

| NEVER | ALMOST | SOME- | ALMOST | ALWAYS |
| EVER | NEVER | TIMES | ALWAYS | |

24. I enjoy researching and writing factual reports.

| NEVER | ALMOST | SOME- | ALMOST | ALWAYS. |
| EVER | NEVER | TIMES | ALWAYS | |

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

| NEVER | ALMOST | SOME- | ALMOST | ALWAYS |
| EVER | NEVER | TIMES | ALWAYS | |

26. I like to figure out how things work.

| NEVER | ALMOST | SOME- | ALMOST | ALWAYS |
| EVER | NEVER | TIMES | ALWAYS | |

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

| NEVER | ALMOST | SOME- | ALMOST | ALWAYS |
| EVER | NEVER | TIMES | ALWAYS | |
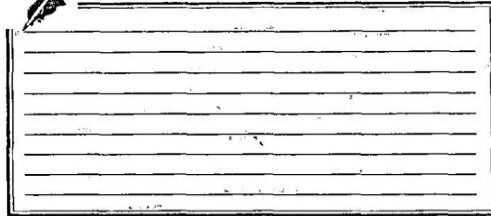
28. I like to make up my own way of doing things.

| NEVER | ALMOST | SOME- | ALMOST | ALWAYS |
| EVER | NEVER | - TIMES | ALWAYS - | |

6
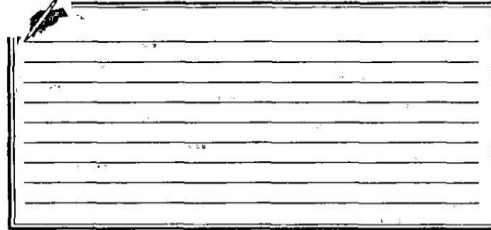
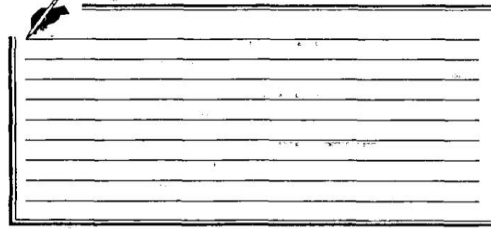Part II: Please answer each of the following questions in your own words.

What makes assignments
frustrating for you?

If you could choose, what
would you do to show what
you have learned?

What has been your most
memorable learning experience?
What made it memorable and
meaningful for you?

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SCORING SHEET
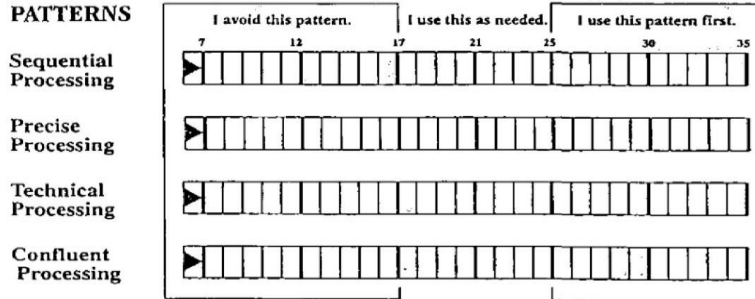
Name_____

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 tumbler. Add up the tumbler numbers and write 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 Combination

Graph the totals from each of the tumbler 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	▶ □□□□□□□	□□□□□□□□	□□□□□□□□

© Johnston & Dainton, 1997.

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Appendix B

Interview Protocol

Informed Consent

I agree to participate in a study entitled "Learning Connections Inventory: Making Major Decisions Among Undeclared Students." which is being conducted by Raven Holloway of the Educational Services, Administration, and Higher Education Department, Rowan University.

The purpose of this study is to examine the effectiveness of existing practices and resources at Rowan University that are designed to assist undergraduate students declare a major and explore career options effectively. In particular, the Learning Connections Inventory (LCI) was examined to see if it has predictive value in assisting undeclared students in the career exploration process. It was also investigated to see if there are dominant learning patterns, as identified in the LCI, amongst declared students as compared to undeclared students. In conjunction with analyzing existing data, it has been identified as particularly useful to explore faculty's use of the LCI and their perceptions on the effectiveness of the inventory to aide in the career exploration process. The data collected in this study will be submitted for publication in Raven Holloway's thesis.

I understand that I will be required to sit down and answer several questions regarding my personal opinions about my use of the LCI in the classroom, as well as the potential and existing uses of the LCI with students. My participation in the study will include one session that should not exceed one hour.

I understand that my responses will be anonymous and that all the data gathered will be confidential. I agree that any information obtained from this study may be used in any way thought best for publication or education provided that I am in no way identified and my name is not used.

I understand that there are no physical or psychological risks involved in this study, and that I am free to withdraw my participation at any time without penalty.

I understand that my participation does not imply employment with the state of New Jersey, Rowan University, the principal investigator, or any other project facilitator.

If I have any questions or problems concerning my participation in this study, I may contact Raven Holloway email: hollow74@students.rowan.edu or Telephone: (267) 970-0716; as well as Burton Sisco, Ed.D email: sisco@rowan.edu or Telephone: 856-256-4500. ext. 3717.

_____ _____

(Signature of Participant) (Date)

_____ _____

(Signature of Investigator) (Date)

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Interview Questions

1. What are your experiences with the LCI?

2. What are some of the uses of the LCI in the classroom?

3. What are some of the strengths of the LCI in the classroom?

4. What are some areas/examples of how the LCI does not work as well?

5. In what ways do you agree/disagree with the following statement:

    a. The LCI is an effective tool to help students 'find themselves' in their
       learning?

6. What are some uses of the LCI could have in the career exploration process of
   students?

7. Are there other ways you feel the LCI could be used in the classroom with
   students?

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Appendix C

Institutional Review Board Approval Letter

Rowan University

April 27, 2011

Raven Holloway
5365 W. Berks St.
Philadelphia, PA 19131

Dear Raven Holloway:

In accordance with the University's IRB policies and 45 CFR 46, the Federal Policy for the Protection of Human Subjects; I am pleased to inform you that the Rowan University Institutional Review Board (IRB) has exempted your project:

IRB application number: 2011-174

Project Title: Learning Connections Inventory: Making major Decisions Among Undeclared Students

If you need to make significant modifications to your study, you must notify the IRB immediately. Please reference the above-cited IRB application number in any future communications with our office regarding this research.

If, during your research, you encounter any unanticipated problems involving risks to subjects, you must report this immediately to Dr. Harriet Hartman (hartman@rowan.edu or call 856-256-4500, ext. 3787) or contact Dr. Gautam Pillay, Associate Provost for Research (pillay@rowan.edu or call 856-256-5150).

If you have any administrative questions, please contact Karen Heiser (heiser@rowan.edu or 856-256-5150).

Sincerely,

Harriet Hartman, Ph.D.
Chair, Rowan University IRB

c: Burton Sisco, Educational Services, Administration and Higher Education, Education Hall

Office of Research
Bole Hall Annex
201 Mullica Hill Road
Glassboro, NJ 08028-1701

856-256-5150
856-256-4425 fax

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Appendix D

Written Approval to Use LCI Database

Rowan University

March 30, 2011

To: The Institutional Research Board

From: Dianne Dorland, Professor, College of Engineering   *Dianne Dorland*

Re: LCI Student Data

Engineering has encouraged entering Freshman to take the Learning Connections Inventory (LCI) since the inception of the College and the first entering class in 1996. Over the years, this data has been maintained in Engineering. Since 2007, the LCI has been administered campus-wide to incoming Rowan freshman and LCI scores are now maintained as institutional data. LCI scores for individual students and for each course section are available in the Rowan University Self Service area, under the secure area for accessing Banner services.

Engineering has continued to maintain a database of students who have taken the LCI and I became directly responsible for handling that data as the Dean of Engineering. I continue to manage this information and am willing to share the data with Ms. Holloway. Note that the available student demographics to be shared will include LCI scores, gender, ethnicity, graduation date, entry and exit or final major, exit or final GPA, SAT Math and Verbal scores, probation and dismissal information, and first/last terms of enrollment, but does not contain student names or ID numbers.

Appendix E

Rules and Procedures for Logical Analysis of Written Data

The following decisions were made regarding what was to be the unit of data analysis (Sisco, 1981):

1. A phrase or clause will be the basic unit of analysis

2. Verbiage not considered essential to the phrase or clause will be edited out- e.g., articles of speech, possessives, some adjectives, elaborate examples.

3. Where there is violation of convention syntax in the data it will be corrected.

4. Where there are compound thoughts in a phrase or clause, each unit of thought will be represented separately (unless one was an elaboration of another).

5. Where information seems important to add to the statement in order to clarify it in a context, this information will be added to the unit by parentheses. The following decisions were made regarding the procedures for categorization of content units:

1. After several units are listed on a sheet of paper, they will be scanned in order to determine differences and similarities.

2. Form this tentative analysis, logical categories will be derived for the units.

3. When additional units of data suggest further categories, they will be added to classification scheme.

4. After all the units from a particular question responses are thus classified, the categories are further reduced to broader clusters (collapsing of categories).

5. Frequencies of units in each cluster category are determined and further analysis steps are undertaken, depending on the nature of the data—i.e., ranking of categories with verbatim quotes which represent the range of ideas or opinions. (p. 177).

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