5-2012

Fortifying the Pipeline: An Exploratory Study of High School Factors Impacting the Information Literacy of First-Year College Students

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FORTIFYING THE PIPELINE: AN EXPLORATORY STUDY OF HIGH SCHOOL FACTORS IMPACTING THE INFORMATION LITERACY OF FIRST-YEAR COLLEGE STUDENTS

by

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Bachelor of Arts
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1999

A dissertation submitted in partial fulfillment
of the requirements for the

Doctor of Philosophy in Educational Leadership

Department of Educational Research, Cognition, & Development
College of Education
The Graduate College

University of Nevada, Las Vegas
May 2012

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

THE GRADUATE COLLEGE

We recommend the dissertation prepared under our supervision by

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entitled

Fortifying the Pipeline: An Exploratory Study of High School Factors Impacting the Information Literacy of First-Year College Students

be accepted in partial fulfillment of the requirements for the degree of

Doctor of Philosophy in Educational Leadership
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May 2012

ABSTRACT

Information literacy—the ability "to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (American Library Association [ALA], 1989, para. 3)—has been widely and increasingly cited as an essential competency for college success, for the workplace, and for life (Bruce, 1997; Eisenberg, 2008; Fitzgerald, 2004; Johnston & Webber, 2003; National Leadership Council for Liberal Education and America's Promise, 2007; Obama, 2009; Rader, 2002). Information literacy best practice and standards state that students optimally develop this skill set through immersion in the research process—often and over time—and this proposition is also supported in the scholarly literature (ACRL, 2000; AASL & AECT, 1998; Eisenberg & Berkowitz, 1990; Stripling & Pitts, 1988; Kulthau, 1986; Irving, 1985). Additionally, best practice emphasizes that students further develop these skills through exposure to problem solving and higher-order thinking activities—a teaching style that best matches that of constructivist learning theory (ACRL, 2000).

The purpose of this mixed-methods study was to explore the relationship between a sample of first-year college freshmen students' high school experiences that are developmentally related to information literacy competency and their scores on the iSkills assessment, an assessment developed by the Educational Testing Service (ETS), which "tests the range of ICT literacy skills aligned with nationally recognized Association of Colleges & Research Libraries (ACRL) standards" (Educational Testing Service, 2011). A second purpose of

this study was to develop a detailed understanding of how these high school factors influence students' development of their information literacy competency.

Participants in the study were drawn from first-time college freshmen, who attended and graduated from high school (not home schooled) in 2011 and enrolled at the University of Nevada, Las Vegas for the Fall 2011 semester. These students self-selected into a program designed for academic success. Ninety-three students were surveyed, took the iSkills assessment, and agreed to provide access to background data. Hierarchical multiple regression analysis was utilized to predict how much of the variance in iSkills scores (dependent variable) can be explained by theoretical variables (independent variables of core GPA, number of honors classes, and number of research projects or assignments in high school), while controlling for demographic and other subject variables (i.e., gender, best language, ethnicity, and type of admission—alternate admit/exploring major). Thirteen of these students participated in a focus group or in-depth interview to explore how students from higher and lower level curricular tracks in high school describe their high school academic experiences related to the acquisition of higher-order information literacy skills.

Through the hierarchical multiple regression analysis, four variables predictive of a significantly higher score on the iSkills assessment at the $p < .05$ level were identified. Among background variables, a student's best language, and to some extent, race, are significant predictors of his or her iSkills assessment score. Among the theoretically important variables, students' cumulative core high school GPAs, as well as their curricular tracks (number of

honors, etc. classes taken) explained a significant amount of the variance in students' iSkills assessment scores. Through methods of qualitative data analysis five themes that shed further light on students' high school academic experiences related to the acquisition of higher-order information literacy skills were identified. These themes are: the meaning of "research," source of guidance, teacher pedagogy, factors affecting pedagogy, and college preparation. Differences in each theme were found between honors and non-honors-track students. Implications of these findings for theory, practice, and future research are discussed in the final chapter.

ACKNOWLEDGMENTS

This PhD has been a ten-year journey in the making. At the beginning of that journey, I had an amazing eight-year-old son. I now have a son who is graduating from high school and a beautiful nine-year old daughter. Thank you, Caden and Jensyn, for your love, patience, and the motivation to finish.

This dissertation is dedicated to my grandparents, Charles E. and Thelma B. Howell. While Grandpa Chuck made sure I understood from the very beginning that education is the most important thing, Grandma Thelma inspired me to reach for its highest rung. Even though neither of you had the opportunity to attend college yourselves, you have left a legacy. I know you are both celebrating with me in heaven.

To my parents, Kent and Sue Fabbi—you have been my rocks from day one. All of those big and little things add up, and I could not have done this, or anything else for that matter, without you.

To my dissertation committee—you have been the perfect team for me. Dr. Bob Ackerman, my committee chair: you have been my cheerleader and ass-kicker with perfect timing. I am graduating; you can finally rest! Dr. Cyndi Giorgis, my teacher, colleague, mentor, and friend since 1998: you have my deepest gratitude for sitting with me and pushing me to work through my self-doubt. Dr.

Bob McCord: thank you for always treating me as an equal. Dr. David Forgues: Thank you for being a true collaborator.

To Dr. Dan Gianutsous at the Academic Success Center—thank you for providing access to your students. Without you, this study would not exist!

To Dr. Jon Grahe at Pacific Lutheran University—thank you for gracing me with your statistical presence at just the right time. Always know that you have made a beautiful life for yourself.

So many wonderful friends and colleagues have supported me through this journey, and I must mention a few by name. Dean Patricia Iannuzzi, my brilliant mentor—you have believed in me when I have not believed in myself. Thanks for making this study possible in so many ways. Dr. Judy Nagai, my spit sister in doctoral studies—if our paths had not crossed, I would be much less of a human being. We're done, girl! Soon-to-be Dr. Su Kim Chung—because of you I was *never* really alone. "Diss Girls" forever! And Dr. Paula McMillen—how can one woman be so accomplished yet make me feel like a rock star? Thank you for your unwavering support and friendship.

One of my favorite quotes by Maya Angelou is: "Intelligence is not always knowing the answer. It is always asking the question." This quote captures my personality, my passion, and my research, and it underscores that for me, the

process is as important as the product. I will never stop asking the question and neither should you.

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CHAPTER 1: INTRODUCTION AND STATEMENT OF PROBLEM

Information literacy—the ability "to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (American Library Association [ALA], 1989, para. 3)—has been widely and increasingly cited as an essential competency for college success, for the workplace, and for life (Bruce, 1997; Eisenberg, 2008; Fitzgerald, 2004; Johnston & Webber, 2003; National Leadership Council for Liberal Education and America's Promise, 2007; Obama, 2009; Rader, 2002). Several related competencies have been identified in the last decade, specifically Information and Communications Technology literacy (ICT literacy), a term used globally for information literacy and one that recognizes the development of information literacy within a technology-rich environment (Allen, 2007; International ICT Literacy Panel, 2007).

Based upon national information literacy standards, students should begin to develop information literacy competency during their K-12 education (American Association of School Librarians [AASL] & Association for Educational Communications and Technology [AECT], 1998), and information literacy has now infiltrated the K-12 educational standards for a number of states (e.g., Bartow, 2009; Nevada Department of Education, 2003). Additionally, the emerging Common Core Standards for K-12 education, an initiative of the National Governors Association Center for Best Practices (NGA Center) and the Council of Chief State School Officers (CCSSO) (2010), address information literacy competency by weaving expectations for students into the English

Language Arts content area standards. However, as of the present time, there has been no mandatory curricular implementation dedicated to the teaching of this important set of competencies.

Many times, teachers and school librarians attempt to teach this competency to students through library skills instruction, a method that is often a stand-alone lesson, independent of the curriculum, and that focuses on lower-order thinking skills and recall of information (Islam & Murno, 2006; Owen, 2010). In addition, there are several models for teaching information literacy as a process of research and inquiry (Eisenberg & Berkowitz, 1990; Irving, 1985; Kulthau, 1986; Stripling & Pitts, 1988), and best practice asserts that the competency is most effectively taught when integrated into the existing curriculum (AASL & AECT, 1998). In these latter models, information literacy competency is developed through the assignment of research and inquiry projects that require students to utilize the library and/or the school librarian as resources (Allen, 2007, Gordon, 1999; Islam & Murno, 2006; Kulthau, 2004; Rader, 2002). Broadly stated, the purpose of this study is to explore selected high school experiences that may influence students' development of information literacy competency.

I framed this study using constructivist learning theory as the theoretical lens. Constructivism was developed in response to perceived shortcomings in previous learning theories and has resulted in significant learner-centered changes over the past several decades (Booth, 2011). Constructivists sought to shift the focus of instruction from passive to active and from educator to learner.

John Dewey was instrumental in forwarding the notion that learning is an active rather than a passive process and a practical, evolutionary function expressed in real-world problem solving (Phillips & Soltis, 2004). Vygotsky argued that each individual has a certain degree of potential to learn in a given situation, which is then facilitated or prevented by the instructional environment (Schunk, 2008). Consistent with this model, existing information literacy standards state the importance of "furthering the influence and impact of such student-centered teaching methods as problem-based learning, evidence-based learning, and inquiry learning," all of which emphasize the development of higher-order thinking skills (Association of College and Research Libraries [ACRL], 2000, para.10).

In a related area of research informed by learning theory, a number of studies report that teachers in classes of high-achieving students are substantially more likely to emphasize higher-order thinking processes with students than teachers in classes of low-achieving students (Hargreaves, 1967; Metz, 1978; Oakes, 1985, 1990; Page, 1990; Raudenbush, Rowan, & Cheong, 1993; Torff, 2006, 2008; Warburton & Torff, 2005; Zohar, Degani, & Vaaknin, 2001; Zohar & Dori, 2003). These studies assert that students who have been placed into a higher-level academic track will more likely be exposed to high critical thinking teaching activities, requiring higher-order thinking skills, while those placed into a lower academic track will experience rote learning teaching styles. Examples of cognitive activities classified as higher order include analyzing, synthesizing, and evaluating information, constructing arguments, making comparisons, asking research questions, dealing with controversies, and

identifying hidden assumptions (Bloom & Krathwohl, 1956), all of which draw directly from constructivist learning theory and relate directly to information literacy best practice.

Several methods have been developed to assess information literacy competency, and they have been classified into the categories of fixed-choice tests, performance assessments, and rubrics (Oakleaf, 2008). Most recently, the Educational Testing Service developed the iSkills assessment to measure ICT literacy. This performance-based exam is an hour-long, real-time, simulated, scenario-based test, and it has been noted that it was created based on constructivist theories of learning, often associated with higher-order information literacy skills and problem-solving (Oakleaf). While a number of researchers have measured the information literacy of certain populations using the iSkills assessment and attempted to relate specific factors to student success on the measure (Allen, 2007; Egan & Katz, 2007; Katz & Macklin, 2007), none have attempted to explore a relationship between students' iSkills test scores and specific high school academic experiences asserted to impact the development of information literacy competency. In addition, no research has been reported on the measurement of the information literacy competency of special populations of students who may require additional academic support in the transition to college, such as students admitted to college on probationary status (henceforth referred to as "alternate admits") or those who matriculate without a declared major (henceforth referred to as "exploring majors"). Finally, while a few studies exist on how the high school library, or library skills instruction, relates to

students' information literacy competency as measured in college, these studies are primarily based on lower-order skills instruction and fixed-choice tests as measures (e.g., Smalley, 2004).

Purpose of the Study

The purpose of this mixed-methods study was to first explore the relationship between a sample of first-year college freshmen students' high school experiences that are developmentally related to information literacy competency and their scores on the iSkills assessment. The two specific factors I have chosen to consider are the number of research assignments completed in high school and the curricular track or level of the student, experiences purported to affect students' development of higher-order thinking and information literacy skills (ACRL, 2000; Bloom & Krathwohl, 1956). Based on existing studies of the iSkills assessment (Katz, 2007; Katz & Macklin, 2007), I have also chosen to explore students' cumulative core high school GPA as a potential predictive factor. A second purpose of this study was to develop a detailed understanding of how these high school factors influenced students' development of their information literacy competency.

Research Questions

Specifically, I addressed the following research questions through this study:

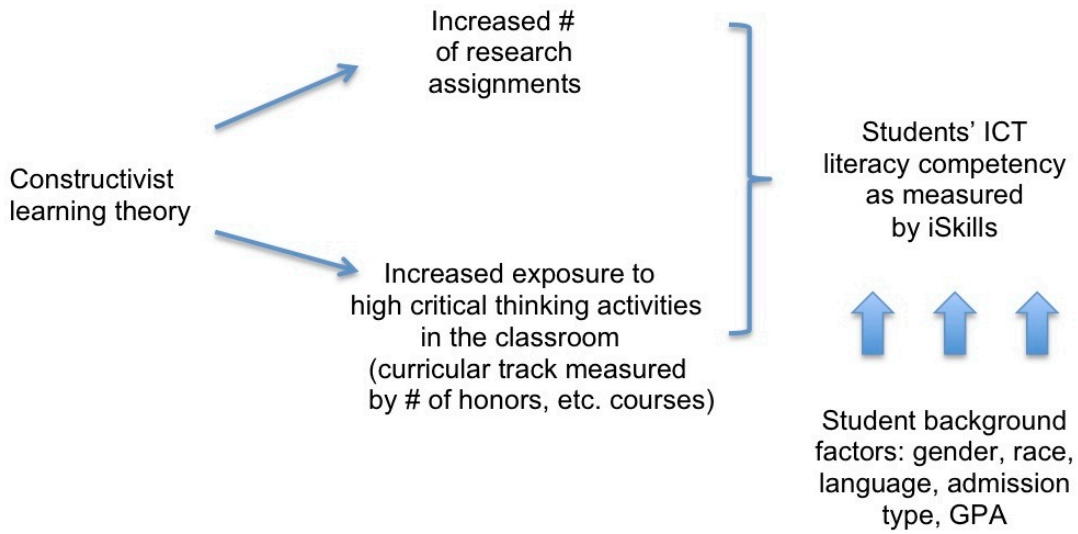
1. How much of the variance in students' iSkills assessment scores is predicted by the theoretically important variables of a) number of research assignments they completed in high school, b) students' high school curricular tracks, and c) students' cumulative core high school GPAs?

2. How much of the variance in students' iSkills assessment scores is predicted by additional background variables—gender, race, best language, and type of admission (alternate admit or exploring major)?
3. How do students from higher and lower level curricular tracks in high school describe their high school academic experiences related to the acquisition of higher-order information literacy skills?

Conceptual Framework

In creating the conceptual framework of this study, I used scholarly literature to further explore articulated professional best practice in the realm of information literacy (see Figure 1). Information literacy best practice and

Figure 1. Visual Model of Conceptual Framework



standards state that students optimally develop this skill set through immersion in the research process—often and over time—and this proposition is also

supported in the scholarly literature (ACRL, 2000; AASL & AECT, 1998; Eisenberg & Berkowitz, 1990; Stripling & Pitts, 1988; Kulthau, 1986; Irving, 1985).

Additionally, best practice emphasizes that students further develop these skills through exposure to problem solving and higher-order thinking activities—a teaching style that best matches that of constructivist learning theory (ACRL, 2000). In order to explore this premise, I chose to pursue the research thread on teacher beliefs about student ability, based on their curricular track, and the resulting pedagogies the teachers employ. Finally, I chose to measure students' information literacy abilities using an assessment that was created with students' critical thinking and problem-solving abilities—rather than information recall—as its basis, again consistent with constructivist theory. This study also both explores and controls for effects of students' background characteristics and cumulative core high school GPAs.

Assumptions

This study relies on two major assumptions, which serve to bridge professional best practice and theory with my research questions. The first is that, with regard to the development of information literacy competency, constructivist approaches to teaching and learning are superior to behaviorist approaches, which rely on rote learning and memorization. Second, it assumes that teachers of students in advanced curricular tracks believe them to be capable of learning higher-order skills, and consequently, they will employ constructivist pedagogies more frequently with these students.

Significance of the Study

I hope, through this study, to make significant contributions to our knowledge about information literacy competency in several ways. First, studies that have previously attempted to explore how high school factors relate to students' information literacy competency, measured once students matriculate to college, have been based on lower-order skills instruction using fixed-choice tests as measures (e.g., Smalley, 2004). In this study, I explored the development of information literacy competency utilizing higher-order skills and a performance-based measure. Second, I explored a relationship between high school experiences asserted to impact the development of information literacy competency and students' iSkills test scores, which has not previously been reported. Third, no literature currently exists on the information literacy competency of special populations of college students, such as alternate admits and exploring majors; thus, this study will add to the literature of information literacy generally, as well as to the very limited literature examining the competency of these subpopulations. Finally, this research has practical significance, as the study's findings can be utilized to improve academic success programs.

Context of the Study

In this study, I explored the high school factors potentially impacting the information literacy competency of those 2011-12 academic year University of Nevada, Las Vegas (UNLV) freshmen who, as alternative admits and/or exploring majors, may require additional academic support in the transition to

college. Approximately 46% of the students in this study's sample were unable meet the minimum requirement of a 3.0 GPA in their core academic high school courses and were admitted to the university using alternate criteria and placed on probationary academic status. Approximately 18% of the 2011-12 UNLV first-time college freshmen are alternate admits, and in previous cohorts, this group of students has consistently had a lower first-year retention rate than students admitted on regular status (Institutional Analysis and Planning, 2010). In addition, approximately 61% of the students in this sample did not declare a major upon entry and have been termed "exploring majors." Approximately 25% of the 2011-12 UNLV first-time freshmen overall are exploring majors (D. Forgues, personal communication, October 21, 2011). Students who are both alternate admits and exploring majors comprise 22% of the sample. The students in this sample self-selected into a suite of services offered by the university's Academic Success Center, including an optional first-year course and academic coaching. A richer description of the research setting is provided in chapter three of this dissertation.

Scope of the Study

The scope of this study is limited to an exploration of the high school factors postulated to predict information literacy competency of UNLV first-time freshmen who have self-selected into an academic success program during the fall semester of the 2011-2012 academic year. Specifically, I examined the independent variables of the number of research assignments completed in high school, high school curricular track or level of the student, and the students' cumulative core high school GPAs, in relationship to the dependent variable,

iSkills assessment score. Additionally, I explored how much variance in student iSkills scores can be predicted by additional background variables, such as gender, race, best language, and type of admission (alternate admit or exploring major).

Limitations

While there are several limitations that may impact the findings and conclusions of this study, I identified four major limitations, which I discuss in this section. First, this study relies, in part, on students' self-report of high school experiences, which may not be reflective of actual quantity or quality of these experiences. Second, there are a number of stages at which the UNLV alternate admits/exploring majors will self-select into the study sample, leading to a degree of self-selection bias. Due to the nature of the population and context of the study, self-selection bias was a difficult challenge to overcome and is a potentially significant weakness of this study. Third, findings from this study are limited to associations between variables and cannot be used to establish causation. Finally, the study is based on a relatively small sample size that, while appropriate for the statistical methods utilized, may inhibit the significance of quantitative results.

Definition of Key Terms

Key concepts used in this study are defined as follows:

Alternate admit student: A member of a group of students at UNLV who did not meet the minimum requirement of a 3.0 GPA in his/her core academic high

school courses. The student was admitted to the university using alternate criteria for admission and placed on probationary academic status.

Constructivist learning theory: This theory of knowledge primarily argues that learning is an active rather than a passive state and a practical, evolutionary function expressed in real-world problem solving (Dewey, 1952).

Cumulative Core GPA: This grade point average calculation is based on the weighted average of high school academic units in English, mathematics, social science, and natural science courses (University of Nevada, Las Vegas, 2011d).

Curricular Track: For the purposes of this study, curricular track refers to the number of honors, advanced placement (AP), international baccalaureate (IB), or college preparatory (CP) courses—referred to as “honors” courses throughout this dissertation—that each student completed as indicated by his/her official high school transcripts. For the purposes of this study, students who have taken less than five of these high-level classes throughout their high school curricula are designated as “low” curricular track. Students who have taken five or more of these high-level classes are designated as “high” curricular track. Ranges for “high” and “low” curricular track are further articulated in chapter three of this dissertation.

Exploring major: This group of students has been defined as "unwilling, unable or unready to make educational or vocational decisions" (Gordon, 1995, p. X).

Higher-order thinking skills: This term is used to delineate cognitive activities beyond the stages of understanding and lower-level application (Bloom &

Krathwohl, 1956). Based on Bloom's taxonomy, memorization and recall of information are classified as lower-order thinking skills, while analyzing, synthesizing, and evaluation are classified as higher order (Resnick, 1987).

iSkills: An assessment developed by the Educational Testing Service (ETS), which "tests the range of ICT literacy skills aligned with nationally recognized Association of Colleges & Research Libraries (ACRL) standards" (Educational Testing Service, 2011). For the purposes of this study, the student's score on this assessment indicates his/her level of information literacy competency. This assessment has also been known as iCritical Thinking and ICT Literacy.

Information Literacy: The ability "to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (ALA, 1989, para. 3).

Information and Communications Technology (ICT) Literacy: The ability to "use digital technology, communications tools, and/or networks to access, manage, integrate, evaluate, and create information in order to function in a knowledge society" (International ICT Literacy Panel, 2007). In this study, I use ICT literacy synonymously with information literacy (Allen, 2007).

Structure of the Study

In the first chapter of this dissertation, I articulated the research problem, questions, and significance. In chapter two, I review the literature related to information literacy, including how it is most effectively taught, its assessment, its relevance to college success, and the unique benefit of the development of this competency to underachieving students. I also review pertinent educational

theories that inform my conceptual framework, as well as the research on teacher beliefs about student ability, based on their curricular track, and the resulting pedagogies the teachers employ. In chapter three, I describe the methodology chosen for this study. In chapter four, I report the results for both the quantitative and qualitative portions of the study, and in chapter five, I discuss the findings in context of the literature and suggest areas for future research.

CHAPTER 2: REVIEW OF LITERATURE

In this chapter, I review the literature related to information literacy, including how it is most effectively taught, its assessment, its relevance to college success, and the unique benefit of the development of this competency to underachieving students. I provide a broad overview of information literacy: its history and definition, related literacies, and K-12 and postsecondary information literacy standards. Next, I give an overview of the literature on information literacy and its relationship to college success. I then review pertinent educational theories, specifically constructivist learning theory, in order to situate this study within a larger body of research and theory.

In the next sections of the literature review, I provide a rationale for the variables I employed in my study. Within the context of learning theory, I give a more detailed review of the literature on assessment of information literacy and the development of the iSkills assessment. Next, I review literature on the research process and its purported effect on the development of information literacy competency. I then review the research on teacher beliefs about student ability, based on their curricular track, and the resulting pedagogies the teachers employ. I also review specific studies on information literacy and curricular track. I conclude with a brief mention of literature on alternate admits and exploring majors, to further describe the population from which my study sample is derived.

Through this literature review, I position this study within the larger body of research on information literacy, highlight gaps in what is known about information literacy assessment, and illustrate how this study will contribute to a

better understanding of high school factors impacting first-year college students' information literacy competency.

Overview of Information Literacy

This section of the literature review addresses the definition and history of information literacy. It also outlines the relationship between information literacy and related literacies, specifically, ICT literacy. Finally, it gives an overview of key K-12 and postsecondary information literacy standards.

History and Definition

The concept "information literacy" and its associated skill set have a history rooted in the field of librarianship, dating back to 1974. In a report by Zurkowski (1974), written on behalf of the National Commission on Libraries and Information Science, the phrase "information literacy" was first used to describe the "techniques and skills" that those with this competency have "for utilizing the wide range of information tools as well as primary sources in molding information solutions to their problems" (p.6). Rader (2002) documents that from 1973 to 2002, there was tremendous growth in publications related to library user instruction and information literacy; in her review of the literature, only 28 publications relating to these topics were reviewed in 1973, while over 300 were reviewed in 2002. In her examination of more than 5000 publications on the topic in that thirty-year span, she found that teachers, faculty, and employers, in addition to librarians, have become increasingly interested in the topic of teaching people appropriate information and technical skills for improved learning and job performance. As Rader asserts, most publications in 2002 were no

longer limited to the education and library literature, but had branched out to business and other disciplines. Additionally, in the 1990s, a marked increase in publications related to a global concern for information literacy was observed.

The concept of information literacy evolved significantly with the creation of the American Library Association's Presidential Committee on Information Literacy in the late 1980s. This committee's final report, issued in 1989, outlined the importance of the concept and defined information literacy as the ability "to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (American Library Association [ALA], 1989, para. 3). This report highlighted information literacy as a critical skill set for an informed and prosperous citizenry and as essential to lifelong learning.

Later in 1989, due to the recommendations of this committee, the National Forum on Information Literacy (NFIL)—now a coalition of over 90 national and international organizations—was formed. This nonprofit organization "is dedicated to the global integration of information literacy competency in citizens from all sectors of society" (Weiner & Jackman, 2010, p. 114). The forum meets approximately three times a year in Washington, D.C., as a method of raising the visibility of information literacy and influencing key decision makers. While libraries have done much to advance information literacy in both K-12 and postsecondary institutions, NFIL has made it one of their strategies to reach out to organizations outside of libraries, and keynote speakers at forum meetings are typically leaders in the fields of government, healthcare, business, and education (Weiner & Jackman).

In 2003, NFIL, together with the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and the National Commission on Libraries and Information Science, held its first international meeting of information literacy experts in Prague. This produced the "Prague Declaration: Toward an Information Literate Society," which describes information literacy as a "key to social, cultural and economic development of nations and communities, institutions and individuals in the 21st century" and declared its acquisition as "part of the basic human right of lifelong learning" (Prague Declaration, 2003). NFIL, UNESCO, and the International Federation for Library Associations (IFLA) held a second international meeting in Alexandria, Egypt, in 2005.

In October 2009, U.S. President Barack Obama issued a proclamation for National Information Literacy Month. In this proclamation, he cited the vast amount of information that inundates our lives on a daily basis and the skills that are needed to "acquire, collate, and evaluate information for any situation" (para. 1). In addition to the need for Americans to recognize and acquire these skills, Obama's proclamation outlines the communication technologies that one must be competent with to "effectively navigate the Information Age" (para. 1). Educators and institutions of learning are advised that information literacy must be addressed—and on the same level of importance with basic skills such as reading, writing, and arithmetic—as it will be applied to "countless life decisions, whether financial, medical, educational, or technical" (para. 3).

Related Literacies

Several initiatives have served to define the concept of information literacy and its relationship to other competencies and forms of literacy. Breivik (2005) asserts that information literacy is best envisioned as a broader concept that encompasses several other literacies—computer literacy, library literacy, media literacy, network literacy, and visual literacy. She categorizes information literacy as a kind of critical thinking ability, but states, “a person who is information literate specifically uses critical thinking to negotiate our information-overloaded existence” (p. 23). Recently, it has been suggested that information literacy be reframed as a meta-literacy, an “overarching, self-referential, and comprehensive framework that informs other literacy types” (Mackey & Jacobson, 2011, p. 70). These authors suggest this reframing because so many related and competing literacies have evolved over time in response to emerging technologies without fully developing or recognizing the connection to information literacy. These literacies include media literacy, digital literacy, visual literacy, cyber-literacy, and information fluency.

The Partnership for 21st Century Skills (2004a, 2004b) presents a holistic view of 21st-century teaching and learning that combines a discrete focus on student outcomes (a blending of specific skills, content knowledge, expertise and literacies) with innovative support systems to help students master the multi-dimensional abilities required of them in the 21st century. Its framework for student learning outcomes includes both information literacy and Information and Communications Technology (ICT) literacy. In this framework, information

literacy is defined by the competencies of: “access[ing] information efficiently (time) and effectively (sources); evaluat[ing] information critically and competently; us[ing] information accurately and creatively for the issue or problem at hand; manag[ing] the flow of information from a wide variety of sources; and apply[ing] a fundamental understanding of the ethical/legal issues surrounding the access and use of information” (Partnership for 21st Century Skills, 2004b). Similarly, ICT literacy is defined by the competencies of: “us[ing] technology as a tool to research, organize, evaluate, and communicate information; us[ing] digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools, and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy; and apply[ing] a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies” (Partnership for 21st Century Skills, 2004a). ICT literacy was further defined by the International ICT Literacy Panel (2007) as “using digital technology, communications tools, and/or networks to access, manage, integrate, evaluate, and create information in order to function in a knowledge society” (p. 2). This report does not mention information literacy explicitly; however, it shares the same goals for accessing, evaluating, and creating/using information. Allen (2007) asserts that ICT literacy, or ICT digital literacy, is simply the enactment of information literacy skills through technological mediums. In addition, Allen has found that amongst the international community, there is consensus on curricular integration of information literacy (called ICT literacy).

Standards

There are two chief sets of standards for integrating information literacy into education—one for K-12 and one for postsecondary. In addition, there are related best practices and educational standards. These standards emphasize the need for the use of student-centered, active, and collaborative learning methods in teaching information literacy (Wilson, 2001).

In 1998, the American Association of School Librarians and the Association for Educational Communications and Technology published *Information Power: Building Partnerships for Learning*, which established specific goals for K-12 information literacy education, defining nine standards for K-12 students in the categories of "information literacy," "independent learning," and "social responsibility" (AASL & AECT, 1998). For each standard, several more specific student indicators are listed, with even more detailed descriptions of levels of student proficiency for each (see Appendix 1). Also, for each standard, there are content-area activities that can be linked to the information literacy standard to encourage librarians and teachers to integrate information literacy skills into the curriculum. Although many states have adopted and adapted the *Information Literacy Standards for Student Learning* (e.g., Bartow, 2009; Nevada Department of Education, 2003) and have even shown that test scores increase as school librarians spend more time teaching information literacy skills and teaching cooperatively with teachers (e.g., Lance, Rodney, & Hamilton-Pennell, 2000), there is no mandated instructional time allocated for these standards to be taught in the high school curriculum.

In 2000, the Association for Colleges and Research Libraries published the *Information Literacy Competency Standards for Higher Education*. These standards divide information literacy into five categories—determining the information need, accessing information, evaluating information, using information effectively, and understanding the economic, social and legal issues surrounding information. Specific learning outcomes for students are identified in each. In one of only two times that it has endorsed a policy position, the American Association for Higher Education (AAHE) signed on to the *Information Literacy Competency Standards for Higher Education* (Weiner & Jackman, 2010).

The ACRL (2000) standards document asserts:

> Achieving competency in information literacy requires an understanding that this cluster of abilities is not extraneous to the curriculum but is woven into the curriculum's content, structure, and sequence. This curricular integration also affords many possibilities for furthering the influence and impact of such student-centered teaching methods as problem-based learning, evidence-based learning, and inquiry learning." (p. 5)

Furthermore, the standards document differentiates between "lower-order" and "higher-order" thinking skills and gives an example of this in the following outcomes (p. 7):

"Lower-Order" thinking skill:

Outcome 2.2.2. Identifies keywords, synonyms, and related terms for the information needed.

"Higher-Order" thinking skill:

Outcome 3.3.2. Extends initial synthesis, when possible, to a higher level of abstraction to construct new hypotheses that may require additional information.

In recognizing these different levels of thinking skills, the standards assert that different instruments or methods are essential to assess these different types of outcomes (ACRL, 2000).

Cahoy (2002) has described the K-12 standards as more theoretical and the higher-education standards as more practical and detailed, and researchers have compared and contrasted the standards (Cahoy; Carr & Rockman, 2003). In 2000, the AASL/ACRL Task Force on the Educational Role of Libraries issued *Blueprint for Collaboration* to recommend strategies to effect a closer working relationship between librarians in K-12 and postsecondary educational settings. In 2001, the two divisions of the American Library Association charged a new AASL/ACRL Joint Task Force on Information Literacy to implement the *Blueprint* and "ease the transition that high school students face when they enter the college setting as first-year students" (Carr & Rockman, p. 53). Recommendations within the *Blueprint for Collaboration* call for a "seamless continuation" of standards and increased information literacy-related professional development opportunities for teachers (AASL/ACRL Task Force on the Educational Role of Libraries, 2000, para. 8). While there have been further calls for collaboration (e.g., Carr & Rockman, 2003; Cahoy, 2002; Donham, 2003; Macklin, 2007) and evidence of small-scale collaborations presented in the literature (e.g., Burhanna & Jensen, 2006; Hull & Taylor, 2004; Jackson & Hansen, 2006; Nichols, Spang, & Padron, 2005), this revision of information literacy standards to reflect a continuum between K-12 and postsecondary education thus far has not been undertaken.

Additional educational standards have been developed, and while they may not always explicitly address information literacy, the competency is interwoven into content area standards. For example, the most recent K-12 educational standards to be developed are the Common Core Standards, an initiative of the National Governors Association Center for Best Practices (NGA Center) and the Council of Chief State School Officers (CCSSO) (2010). The Common Core Standards in English Language Arts (2010) state:

> To be ready for college, workforce training, and life in a technological society, students need the ability to gather, comprehend, evaluate, synthesize, and report on information and ideas, to conduct original research in order to answer questions or solve problems, and to analyze and create a high volume and extensive range of print and nonprint texts in media forms old and new. The need to conduct research and to produce and consume media is embedded into every aspect of today's curriculum. (p. 4)

In this fashion, information literacy skills and competencies are embedded throughout the Standards rather than treated in a separate section. While early information literacy standards focused on the importance of librarians in teaching information literacy and on their collaborative role with classroom teachers to enact this, later standards recognize information literacy as a skill set that teachers should take responsibility for helping students develop within content area curriculum.

Information Literacy and College Success

In addition to the existing standards for postsecondary information literacy, several authors and organizations have articulated the importance of information literacy for college success. A review of these initiatives demonstrates the importance of information literacy competency—including the ability to find and

evaluate information effectively, engage in problem-based learning and analytical thinking, and synthesize and integrate information into written and oral communication—to college and post-graduation success.

Carr and Rockman (2003) assert that in Fall 2004, 75% of high school seniors would attend some post-secondary institution, be it a trade school or community college, liberal arts college, or comprehensive or research university. Fifty percent of these students would fail to earn a certificate or degree. These authors further assert that a contributing factor to this is the inability of students to find and evaluate information effectively, pointing to the need for students to develop these skills across the educational experience.

Understanding University Success, a report from the Association of American Universities (AAU) and Pew Charitable Trusts (Conley, 2003), looked to answer the question "What must students know and be able to do in order to succeed in entry-level university courses?" Four hundred faculty members answered, addressing both content and habits of mind. Habits of mind were considered by many to be more important than content knowledge and included problem-solving, analytical and critical thinking, communication skills, and the ability "to discern the relative importance and credibility of various sources of information" (p. 8).

Vanderpol, Brown & Iannuzzi (2008) reviewed key initiatives in reforming undergraduate education, including the Association of American Colleges and Universities' *Liberal Education and America's Promise: College Learning for the New Global Century* (The National Leadership Council for Liberal Education and

America's Promise, 2007); the Documenting Effective Educational Practice (DEEP) project from the Center for Postsecondary Research at Indiana University (Kuh, Kinzie, Schuh, & Whitt, 2005); *Learning Reconsidered: A Campus-wide Focus on the Student Experience*, the product of a joint effort on behalf of the National Association of Student Personnel Administrators and the American College Personnel Association (2004); and the Boyer Commission on Educating Undergraduates in the Research University's (1998) *Reinventing Undergraduate Education: A Blueprint for America's Research Universities* (also known as the Boyer Report). The authors found that all four of these initiatives promoting reform in the undergraduate educational mission articulate a need to develop skills and abilities that contribute to student success. These skills include information literacy, communication competencies, and other cognitive abilities crucial to lifelong learners in the new knowledge economy, and the authors note, "Reformers are acknowledging the need for a deepening of these skills and abilities at the postsecondary level, and a new degree of focus on core skills that is due to an increasingly mobile and fast-changing environment" (Vanderpol, Brown, & Iannuzzi, p. 9).

Kuh (2008), in his large-scale study of National Survey of Student Engagement (NSSE) data, has shown that there are several educational practices in colleges and universities—including writing-intensive courses, undergraduate research, and inquiry-based learning—that have a strong effect on student success. His research shows that these practices have an even

stronger effect for students that are lower achieving as measured by standardized test scores and GPA.

Project Information Literacy has issued a recent report about college students and their information-seeking strategies and research difficulties, including findings from 8,353 survey responses from college students on 25 campuses distributed across the U.S. in spring 2010 (Head & Eisenberg, 2010). Even though most respondents considered themselves adept at finding and evaluating information, especially when it was retrieved from the Web, students reported difficulties getting started with research assignments and determining the nature and scope of what was required of them. Overall, the findings suggest students use an information-seeking and research strategy, driven by efficiency and predictability for managing and controlling all of the information available to them on college campuses. Conducting comprehensive research and learning something new is important to most, along with passing the course and the grade received. Recommendations are included for how campus-wide stakeholders—faculty, librarians, and higher education administrators—can work together to help inform pedagogies, including the incorporation of research rubrics into assignment guidelines, rethinking and revising resource-focused training by librarians, holding students more accountable for the research they do conduct, and assessing how students are being prepared for the 21st-century workplace.

Oakleaf & Owen (2010) report that in a syllabus study, where 139 syllabi of courses taken by first year freshmen were reviewed, students had to apply critical thinking skills to interact with at least one information source to create a

new inquiry-based research product. Ninety-five percent interacted with web sites, 94% interacted with articles, and 85% interacted with books. Oakleaf & Owen assert that the evidence produced by this study reveals a gap in that first semester, first year college students must interact with information using 21st century skills and dispositions they may not have been taught in high school.

A small amount of research has been reported on the impact of high school libraries on the success and behavior of students once they reach college. In a research study looking at students from three California school districts, Smalley (2004) provides evidence that students from high schools with library media specialists are more familiar with basic library use concepts, fundamental ideas about the way information is organized, and how to use a library catalog, and are more likely to get an A in an Information Research course than their peers coming from high schools without library media specialists.

Learning Theory

Constructivist learning theory gives a theoretical basis for this study. Constructivism was developed in response to perceived shortcomings in previous learning theories, namely behaviorist and cognitivist learning theories, and has resulted in significant learner-centered changes over the past several decades (Booth, 2011). In order to fully situate this study, a brief review of behaviorist and cognitivist theory is warranted.

In behaviorist learning theory, learning is demonstrated when a correct response (answer) is given to a particular stimulus (question), and the important consideration is how to ensure correct and consistent responses by shaping

actions with consequences (Booth, 2011). Practice and repetition are key, followed by testing to provide evidence of learning. Fixed-choice tests are a product of behaviorist theories of learning and educational measurement, where learning tasks are broken down into fundamental building blocks to be taught by instructors, learned by students, and then measured by instructors (Oakleaf, 2008). In evaluating student mastery of content, educators whose practice is based in behaviorism seek “precise standards of measurement…to ensure that each skill was mastered at the desired level” (Shepard, 2000, p. 4). Thorndike’s associationism (1922) and the behaviorism of Skinner (1938, 1954), Hull (1943), and Gagne (1965) have had significant impact on the way that students are assessed today. Within behaviorist learning theory, transfer of knowledge is limited, so each objective must be explicitly taught (Shepard, 2000). Behaviorist instruction involves learning targets, assessment via tests, organized content communication, and consistent reinforcement (Booth).

Cognitivist learning theorists, known as Gestalt theorists, challenged the idea that learning is the result of behavioral conditioning, proposing instead that in the real world, learning is a series of internal processes that result in moments of insight that cannot be satisfactorily explained by trial and error or repetition (Booth, 2011). Cognitivism internalized the study of learning, shifting its focus from outward behavior to the psychology of information processing and to some degree, motivational and emotional factors that contribute to knowledge formation. In the early 1950s, Piaget (1963) argued that an individual is constantly building and revising “mental models” to categorize information and

make sense of experience. When individuals draw connections between new pieces of information, they gradually revise old ideas to account for new input. Thus, by linking new content with familiar concepts or experiences, a teacher lays the foundation for a learner to be able to contextualize new information and make it personally relevant and usable. Cognitivist instruction involves capturing learning attention, using advanced organizers, separating content into units and modules, pacing instruction, and promoting metacognition, where students reflect on their own goals and abilities (Booth).

In contrast to behaviorism and cognitivism, constructivists sought to shift the focus of instruction from passive to active and from educator to learner (Dewey, 1952). John Dewey was instrumental in forwarding the notion that learning is an active rather than a passive state and a practical, evolutionary function expressed in real-world problem solving (Phillips & Soltis, 2004). Vygotsky argued that each individual has a certain degree of potential to learn in a given situation, which is then facilitated or prevented by the instructional environment (Schunk, 2008). The central idea of constructivist learning theory is that both the individual and the social context exert a profound influence on the learning process and that learners create meaning from their environments by interpreting them through personal attributes, values, and perceptions. Constructivist theory incorporates elements of individual agency and social learning less dominant in other theories. According to Gabler and Schroder (2003) a constructivist environment for students integrates learning promoted through active engagement and purposeful interaction in the real world, authentic

problem solving, critical thinking, and knowledge creation. Now widely accepted by most educational researchers (Lamon, 2003), this constructivist approach to teaching and learning (e.g., Piaget & Inhelder, 1960; Vygotsky, 1978) is in opposition to the earlier models firmly based in the behaviorist camp.

The concept of learner-centered instruction is one of the most lasting contributions of constructivism. In constructivist learning theory, meaningful instruction should be based upon “engaging learners with realistic, relevant problems in an authentic, community-based atmosphere” (Booth, 2011, p. 40). Consistent with constructivist learning theory, existing information literacy standards state the importance of “furthering the influence and impact of such student-centered teaching methods as problem-based learning, evidence-based learning, and inquiry learning,” all of which emphasize the development of higher-order thinking skills (ACRL, 2000, p. 5).

Information Literacy Assessment

In her conceptual map of information literacy assessment approaches, Oakleaf (2008) relates each approach to the learning theory from which it is derived. She categorizes each type of assessment measure into one of three groups: fixed-choice tests, performance assessments, or rubrics. Generally, fixed-choice tests are equated with behaviorist theories of learning, while performance assessments and rubrics are equated with constructivist theories of learning. In addition, motivation theories and assessment theory, specifically “assessment for learning” theories are also connected with performance assessment and rubrics.

Oakleaf's (2008) second category of assessment—performance assessment—is grounded in constructivist educational theory. The category of performance assessment has a wide range of manifestations—from observations of students as they perform a task to an examination of the products that result from a task (Silver, 2003). Specific types of performance assessments include the analysis of bibliographies or citations, portfolio assessment, or the recently-developed, computer-based performance test of ICT competencies called iSkills (Oakleaf, 2008).

Elmborg (2002) states that, "The essential defining trait of [constructivist] theorists is an insistence that knowledge is 'constructed' by individuals rather than passed on fully-formed from teachers to students" (p. 457). According to Oakleaf (2008), based on constructivist approaches, performance assessments should meet a number of goals:

1. They should be meaningful, authentic, and involve actual "performances, not drills" (Wiggins, 1996, pp. 3-4).
2. They should simulate as much as possible the situations in which students would make integrated use of new knowledge, skills, and values (Sweet, 1993).
3. They should require "complex and challenging mental processes from students. They should acknowledge more than one approach or right answer and should place more emphasis on un-coached explanations and real student products" (Shepard, 1996, p. 4).

4. They should be open-ended enough to allow each student “to bring to it his individual gifts and to maximize individual learning” (Farmer, 1997, p. 12).

As stated in the ACRL (2000) *Information Literacy Competency Standards for Higher Education*, “institutions need to recognize that different levels of thinking skills are associated with various learning outcomes—and therefore, different instruments or methods are essential to assess those outcomes” (p. 6). Both "higher-order" and "lower-order" thinking skills are evident throughout the outcomes, and it is strongly suggested by both Oakleaf (2008) and in the ACRL Standards (2000) that assessment methods appropriate to the thinking skills associated with each outcome be identified as an integral part of each institution’s implementation plan. Specifically, the term “higher-order thinking skills” may also be used to delineate cognitive activities beyond the stage of understanding and lower-level application according to Bloom’s taxonomy (Bloom & Krathwohl, 1956). Based on Bloom’s taxonomy, memorization and recall of information are classified as lower-order thinking skills, while analyzing, synthesizing, and evaluation are classified as higher order.

iSkills

I have chosen iSkills—a performance based information literacy assessment—as the measure of information literacy competency for the purposes of this study. iSkills is a measurement tool developed by the Educational Testing Service (ETS) to assess Information and Communication Technology (ICT) literacy levels. The test consists of fourteen real-time,

simulated, scenario-based task items that students must navigate in a digital environment, and is categorized by Oakleaf (2008) as a performance-based assessment of information literacy. This tool is unique in several ways. As the first and only large-scale assessment measure of ICT-literacy skills, it was designed to be administered and scored across units of an institution or across institutions. It is the first scenario-based measure to test ICT literacy skills, which describe the types of information problems students should be seeing in their academic, personal and work environments. Finally, as a simulation-based assessment, it goes beyond what is possible in a multiple-choice format, immersing students in simulated digital interactive environments and eliciting higher-order thinking skills (Katz, 2007).

The iSkills measure went through a robust development process starting in January 2001, when the ETS convened an international panel to study the increasing importance of ICT. At that time, the panel had three recommendations; one of them was that “ETS and others should work with governments, educators, industry, and labor to develop specific diagnostic assessments focusing on the measurement of ICT literacy, or on the capacity of individuals to develop it” (International ICT Literacy Panel, 2007, p. 4). In 2003, a group of librarians, faculty members, assessment directors, and administrators from seven charter institutions, in partnership with ETS cognitive scientists, test developers, and statisticians, came together to develop a definition and proficiency model for ICT literacy based upon the work done in 2003 (Brasley, 2006). This development group defined ICT literacy as:

> [The] ability to use digital technologies, communication tools, and/or networks to solve information problems in order to function in an information society. This includes the ability to use technology as a tool to research, organize, evaluate, and communicate information and the possession of a fundamental understanding of the legal/ethical issues surrounding information literacy. (Brasley, p. 7)

The assessment was designed to measure cognitive skills covering the seven proficiencies of: define; access; manage; integrate; evaluate; create; and communicate (see Appendix 2). As stated by Brasley: "These proficiencies integrate both cognitive and technical aspects while considering the social, ethical, and economic issues related to applying ICT technologies to solve information problems" (p. 7).

While I established above that ICT literacy has been used as the more global term for information literacy, when applied to the iSkills assessment, the most important factor in choosing the measure for this study is the relationship between the ACRL (2000) definition of information literacy (define, locate, evaluate, and use—the most widely-recognized definition in the United States and the expectation for student competency in postsecondary education), which informed the iSkills measure, and ETS' definition of ICT literacy. Brasley (2006) in looking for congruency between these two sets of competencies, found much in common. While ETS disaggregates the "use" competency into "create" and "communicate," she found that the distinguishing feature of ICT literacy for ETS is the digital environment. Brasley states: "You can measure information literacy using only print sources, but ICT literacy relies on the digital context to assess a person's ability to solve information problems" (p. 44). As Ilene Rockman stated, "It [ICT literacy] is literally a bridge between information literacy and technical

literacy. …By bridging information literacy and information technology, the ICT Literacy Assessment [iSkills assessment] fills an important assessment gap for educators concerned about students' knowledge, skills, and abilities" (Rockman & Smith, 2005, p. 588). ETS has subsequently published a document outlining how the iSkills assessment aligns with the ACRL standards (ETS higher education iSkills assessment fit with ACRL standards, 2010).

In developing the test, ETS used Evidence-Centered Design, ensuring a direct connection between experts' views of ICT literacy and the purpose, proficiencies, evidence, and tasks that iSkills addresses (Brasley, 2006; Katz, 2007; Williamson, Katz & Kirsch, 2005). Each interactive task presents a real-world scenario framing an information problem. Students then solve the tasks using simulated software (e.g., e-mail, a web browser, or a library database), which have the look and feel of typical applications (Katz). The scoring for the iSkills assessment is automated and allows for alternative paths leading to a solution. After extensive usability testing and field trials, several higher education institutions piloted the assessment to further test the platform, student reactions, and task performance. After modifications, ETS launched an operational version of iSkills in 2005, testing simulation tasks and scoring methods on 4800 students nationwide (Egan & Katz, 2007). At that point, several modifications were made including reducing the time required for taking the exam. By Spring 2006, more than ten thousand students at sixty-five institutions had taken the iSkills assessment, with institutions selecting which students they would assess based on their own goals—some students enrolled in a particular course, some

students in a random sampling process, and others as an open invitation offering gift certificates or other small incentives (Egan & Katz). Beginning August 2006, the assessment was available to order and administer via ETS. In October 2006, the National Forum on Information Literacy announced the formation of the National ICT Literacy Policy Council in partnership with ETS to recommend a set of national standards to inform the creation of cut scores, representing the minimum exam score needed to determine whether students meet ICT literacy standards (Katz, 2007; Weiner & Jackman, 2010). Through this process, two independent panels converged on recommended scores corresponding to the foundational levels of ICT literacy competency (Tannenbaum & Katz, 2008).

iSkills was initially developed as two measures, consisting of Core and Advanced measures aimed at different audiences. However, beginning in 2009, iSkills was combined into one measure taken in a period of one hour—shortened from its original time of 75 minutes. Also, in the original iteration of the test, students were given individual task performance feedback along with their overall score, and studies reported findings for student groups at the subscale level (Egan & Katz, 2007; Katz, 2007). The test is marketed as suitable for students from grade 10 through college, as well as teachers, employers, adult workforce, and those seeking employment (Educational Testing Service, 2011).

Validity evidence for the iSkills assessment supports the premise that higher scores on the assessment should reflect stronger ICT literacy competency of students and includes:

1. The estimated reliability of iSkills assessment scores is .88 (Cronbach alpha), as a measure of test score consistency across various administrations (Katz, 2007). Many other respected content-based assessments, such as the Advanced Placement exams, share a comparable level of reliability (Katz, 2007).
2. The Evidence-Centered Design approach involved the continuous involvement of the library community and ensures a direct connection between experts' views of ICT literacy and the assessment. Each of thirty tasks and detailed scoring was reviewed by a panel of experts and given a level of endorsement or suggested revision (Brasley, 2006; Katz, 2007).
3. Over four thousand students participated in a validity study, which investigated three types of self-report measures developed from a demographic and academic experiences questionnaire administered prior to the assessment. In this study, students' self assessment of their ICT literacy competency (self-confidence and skills in course technology), self-sufficiency (figures out problems on own, asked for help, and number of ICT literacy skills learned on own), and overall GPA correlated significantly with performance on the iSkills assessment, supporting the convergent validity of the assessment (Katz & Macklin, 2007). The correlations are at a level consistent with research comparing self-report measures of competency to assessment scores. In addition, GPA correlated only weakly with the self-assessment and self-sufficiency measures, demonstrating that all measures are distinct from one another

while still contributing to ICT literacy competency (and distinguishing the ICT skills measured from that of general academic performance).

4. This study (Katz & Macklin, 2007) also found a low correlation between students' ICT literacy scores and their self-reported frequency of ICT literacy activities (such as how frequently they use the Internet). While there was a strong correlation between frequency and confidence in their skills, only confidence aligned with their performance on the assessment, supporting the discriminate validity of iSkills.

Due to its derivation from the ACRL (2000) information literacy standards and its basis on constructivist, active learning theory, I have chosen iSkills—a performance based information literacy assessment—as the measure of information literacy competency for the purposes of this study.

Information Literacy and the Research Process

Several researchers and authors believe it is through practicing information literacy skills repeatedly within the context of research assignments and at increased levels of difficulty over the course of the high school experience that students learn the skills that will transfer to new situations (Allen, 2007; Harris, 2003; Islam & Murno, 2006; Kulthau, 2004). There are several existing models for teaching information literacy as a process of research and inquiry (Eisenberg & Berkowitz, 1990; Irving, 1985; Kulthau, 1986; Stripling & Pitts, 1988). In these models, information literacy competency is developed through the assignment of research and inquiry projects that require students to utilize

the library and/or the school librarian as resources (Allen, 2007; Islam & Murno, 2006; Kulthau, 2004; Rader, 2002; Gordon, 1999). Harris (2003) states that

> …information literacy is not a set of discrete, declarative skills that can be taught once and internalized by the learner, to be recalled and applied in a variety of situations. Individual skills may be acquired, but are not easily transferable to new situations, which is where we see the disconnect between what students should know and what they actually do know. Like critical thinking skills, information literacy skills must be taught and practiced in multiple ways and in a variety of settings over time. Because of the complexity of information in today's world and the variability of information problems students encounter, information literacy must be learned as a tool of strategy rather than a tool of procedure. (p. 218)

Kulthau (2004) found that the most significant improvement in information literacy and student learning occurred in schools where other reform efforts were going on, especially more constructivist approaches to learning emphasizing inquiry in the research process for students. Likewise, Islam & Murno (2006) cite pedagogy that is not rooted in inquiry-based learning as a frequently identified hindrance to optimal information literacy instruction. This is supported by Allen (2007), who sees information literacy performance of students as a responsibility of the entire school, rather than a technology or library problem. The literature (e.g. Kulthau, 2004; Loertscher & Woolls, 2002) tells us that information literate students are products of a coherent information literacy curriculum featuring: a process approach, course-integrated instruction, inquiry-based learning, and collaboration between teachers and librarians. Because of this emphasis on the research process as a contributor to information literacy competency for students, I explored the number of research projects or assignments in high school as a predictive variable in this study.

Student Pedagogical Experiences and Curricular Track

Teachers' Use of High-Critical Thinking Activities

The research reviewed in this section outlines a dichotomy between behaviorist (e.g., passive learning) and constructivist (e.g., active learning) teaching practices that teachers may employ based on their beliefs about student ability. In addition, it emphasizes potential disparities in teaching method that students may experience based on their curricular track.

Over the last three decades, there has been a noticeable trend toward teaching for understanding and higher-order thinking in K-12 schools. More recent efforts to teach higher-order thinking skills are different in a fundamental way from past efforts, in that today's efforts are geared toward all students rather than a small, elite segment of the population (Zohar, et al., 2001; Resnick, 1987). The aspiration to make thinking and problem solving a goal for the entire student population has multiple sources, including: 1) changes in technologies and in the job market result in an increased demand for more sophisticated, highly literate workers; and 2) contemporary views of teaching and learning within the education system itself require that thinking and problem solving be taught to all students (Zohar, et al., 2001).

Confusion has arisen as a result of multiple (or varying) definitions of higher-order thinking skills and available curricular options (Marzano, et al., 1988). To clarify this confusion, Resnick (1987) wrote that thinking skills resist precise forms of definition; yet, higher-order thinking skills can be recognized when they occur. Some of the characteristics of higher-order thinking, according

to Resnick, are: it is non-algorithmic, it tends to be complex, it often yields multiple solutions, and it involves the application of multiple criteria, uncertainty, and self-regulation. Based on Bloom's taxonomy (Bloom & Krathwohl, 1956), memorization and recall of information are classified as lower-order thinking skills, while analyzing, synthesizing, and evaluation are classified as higher order. Additional examples of cognitive activities that are classified as higher order include constructing arguments, making comparisons, asking research questions, dealing with controversies, and identifying hidden assumptions (Resnick, 1987). Zohar & Dori (2003) state that it is justified to group such varied cognitive activities into the same category of "higher-order thinking" activities, as they all follow the same characteristics of higher-order thinking according to Resnick (1987). Additionally, these activities would also be classified into stages that are beyond recall of information and comprehension according to Bloom's taxonomy.

Contemporary views of teaching and learning, one source of the trend toward teaching higher-order thinking skills to all students according to Zohar, et al. (2001), underscore a transition from the behaviorist theories of learning to constructivist views of teaching and learning. Behaviorist theories emphasized learning objectives that were sequenced to progress from simple, lower-order cognitive tasks to more complex ones. Complex understanding was only thought to occur by the accumulation of basic, pre-requisite learning (e.g., Bloom & Krathwohl, 1956; Gagne, 1977). As argued by Shepard (1991), the most serious consequence of these behaviorist theories is that higher-order skills that occur

late in the learning hierarchy are not introduced until after prerequisite skills have been mastered. Therefore, some students may never get the opportunity to engage in higher-order skills. Shepard also demonstrated a related consequence of behaviorist learning theories: that learning often becomes hierarchical in terms of levels of students. Low-achieving students may chronically experience lower-order instructional emphasis because educators see these students as stuck in the early phases of the learning process. In contrast, higher-achieving students, having mastered the basic skills, may be viewed as prepared to handle more complex learning tasks.

In contrast to behaviorist theories, constructivist learning theories view understanding as evolving while learners are engaged in thinking and inquiry in contexts that make sense to them. More recent educational approaches consider aspects of “high” literacy as essential for tackling the complexities of contemporary life. According to Zohar & Dori (2003), as information and knowledge are growing at a far more rapid rate than ever before, the meaning of “knowing” has shifted from being able to remember and repeat information to being able to find and use it effectively. Cognitive research on children’s learning of basic skills reveals that reading, writing, and arithmetic involve important elements of inference, judgment, and active mental construction (Zohar, et al., 2001). Resnick & Resnick (1992) state that the traditional view that the basics can be taught as routine skills, with thinking and reasoning to follow later, can no longer guide educational practice. As a result of this, thinking is no longer viewed

as an optional activity that learners may or may not get to at the final stages of learning a subject. Instead, thinking is applied to all learning and all learners.

This view—that teaching for higher-order thinking is important for the learning of all students in all academic tracks—and even that it is precisely the lower-achieving students who stand to benefit the most from this instruction, is emphasized by several researchers. Newmann (1990) discusses higher-order thinking in the context of the social sciences, proposing that it is important for all learners. Peterson (1988) suggests the need for an increased instructional focus on teaching higher-level skills in mathematics to all students, emphasizing that such an increased focus may be particularly important for lower-achieving students who have more difficulty than their peers in learning these higher-order skills on their own. White & Frederiksen (1998, 2000) assessed the impact of a specialized physics and inquiry curriculum and found that it was particularly beneficial for low-achieving students, as performance on their research projects and inquiry tests was significantly closer to that of high-achieving students than was the case in the control group classes. Zohar & Dori (2003) describe four separate projects whose goal was to foster students' higher-order thinking in science classes. Results of all four studies showed that low-achieving students improved their thinking following curricular interventions, and in one of the studies, students who were initially classified as low academic achievers scored higher on assessment measures than students who were initially classified as high academic achievers. Other studies also show that low-achieving students

may gain considerably from programs whose main goal is to foster higher-order thinking (e.g., Levine & Ornstein, 1993; Pogrow, 1988, 1996).

Since teachers' knowledge, beliefs, and practices are crucial factors to determining the effect of any educational endeavor, researchers have found it important to study them in the context of teaching thinking (Zohar, et al., 2001). Many of these studies have found that in educational practice, the above recommendations and suggestions are often disregarded. Raudenbush, et al. (1993) describe a number of studies reporting that teachers in classes of high-achieving students are substantially more likely to emphasize higher-order thinking processes with students than teachers in classes of low-achieving students (Hargreaves, 1967; Metz, 1978; Oakes, 1985, 1990; Page, 1990). Raudenbush et al. suggested the following hypothesis: the higher the academic track of a class, the more likely a teacher will be to report an emphasis on teaching for higher-order thinking in that class. They asked teachers in 16 schools to identify their instructional goals for each of their classes and constructed an instrument to capture higher-order emphasis in math, science, social studies, and English. A regression analysis revealed a powerful effect of track on higher-order objectives in all disciplines, especially math and science. These results confirm the hypothesis regarding a within-teacher variation, showing that the same teacher tends to emphasize higher-order thinking when teaching students of higher academic achievement than when teaching students of lower academic achievement.

In their 2001 study, Zohar, et al. characterized the patterns of teachers' beliefs regarding low-achieving students and instruction of higher-order thinking. Their results showed that 45% of the teachers believe that higher-order thinking is inappropriate for low-achieving students. Some of the teachers (20%) drew no distinction between high and low achieving students, viewing higher-order thinking as an appropriate goal for all students. Warburton & Torff (2005) investigated teachers' beliefs about critical-thinking activities for different populations of learners using the Critical Thinking Belief Appraisal (CTBA). They found that teachers rated both high- critical thinking and low-critical thinking activities as more effective for high-advantage learners than low-advantage ones. Further, they rated high-critical thinking activities as more effective than low ones for both high-advantage and low-advantage learners. While these results are inconsistent with the assertion that teachers favor low-critical thinking activities over high ones for low-advantage learners, the results still suggest that low-advantage learners may receive fewer high-critical thinking activities in schools, hindering their academic performance. Torff (2006, 2008), found that, while overall teachers' beliefs manifested more support for high-critical thinking activities when teaching high-advantage learners than low-advantage learners, there was a weaker effect relative to the beliefs of "expert" teachers (as opposed to a group of randomly-selected ones). However, because expert teachers are more often recruited to teach higher-level curricular tracks, this finding may contribute even more to the rigor gap established in these studies (Darling-Hammond, 1998).

Raudenbush, et al. (1993) suggest three possible explanations for the disparity between high- and low-achieving classes in the instructional goals teachers have been found to pursue:

1. Metz (1978) has argued that teachers resort to basic skills instruction in classes serving low-achieving students as a classroom management strategy. In this view, the routine tasks and "busy work" keeps students occupied while accommodating their supposed preferences for easy work.
2. Founded in Neo-Marxist and critical theories, the disparity of instruction across academic tracks flows from the educational system's intention to reproduce social inequality.
3. The traditional behaviorist learning theories reviewed earlier are pervasive. The literature shows that teachers' theories and beliefs have strong implications for the way they practice teaching (e.g., Brickhouse, 1990; Clark & Peterson, 1986; Hashweh, 1996; Nespor, 1987). Thus, the belief that achieving goals related to instruction of higher-order thinking is beyond the abilities of lower-ability students may have enormous instructional consequences.

Zohar, Degani, & Vaaknin's (2001) data also suggests that teachers' beliefs about low-achieving students and instruction of higher-order thinking skills are connected to their general theory of instruction. They discovered that there is a relationship between teachers who view learning as hierarchical in terms of students' academic levels and the view of learning as hierarchical in terms of cognitive levels. Based on this study, on the findings of Raudenbush, et al.

(1993), and on findings from related studies listed above, it is logical to assume that the preconceptions of many teachers regarding low-achieving students and instruction of higher-order thinking may hinder successful implementation of programs designed to teach critical thinking (Zohar, et al., 2001).

This research thread draws a dichotomy between behaviorist and constructivist teaching practices that teachers may employ based on their belief of student ability, and emphasizes potential disparities in teaching method that students may experience based on their curricular track. Thus, it provides a rationale for using curricular track as a variable when exploring whether or not exposure to the purported active learning methods encouraged in information literacy best practice are predictive of information literacy competency.

Information Literacy and Curricular Track

There are few studies that explore the integration of information literacy into the curriculum and the effect upon curricular track. Kulthau (2004) implemented the information search process in six high schools with 147 diverse high school seniors categorized as high achievers, middle college-bound, and lower-level achievers based on their GPAs and national percentile scores on a standardized test. This study revealed that the top two groups of college-bound students approached information seeking as a process over time in which thoughts evolved and feelings of confidence increased. However, due to a high level of absenteeism, researchers were unable to collect sufficient data for analysis from the lower-level students. Therefore, the information seeking process for lower-achieving students could not be determined because their

frequent absences made it difficult for them to consistently take part in the assignments (Kulthau, 2004).

Vansickle (2002) looked at three different academic tracks of tenth-grade students to explore their knowledge of the Web and their ability to search for and use information on the Web. She hypothesized that there is a relationship between academic placement and a student's general knowledge and use of the Web and that there is a relationship between academic placement and a student's Web searching skills. Results indicated that there was a significant difference for technical track students and their general knowledge of the web. Discussion illuminated that perhaps this could result from this group not having access to computers or the Internet at home in order to develop and practice skills. There was no difference between the way that students in different tracks searched for and used information on the Web. Most of the students indicated that they had learned these skills by themselves or from their friends. While a culture has developed amongst these students about searching for information, not all students are alike in their abilities to determine topics or the best way to search (Vansickle, 2002).

Lower-level students may have a more difficult time knowing what they need to know than their higher-achieving peers. Latham & Gross (2008), using competency theory as a framework, found that lack of motivation on the part of low-skilled students stems less from the fact that they do not see value in an activity than from their failure or inability to recognize that they have a need to improve their own skill levels. Students who were not proficient in the information

literacy measures used in this study tended to greatly overestimate their perceived skills, while those who were proficient expressed confidence in their abilities but did not believe they had an unusually high skill level. While the majority of all students reported that they were largely self-taught in terms of their information literacy skills, lower-performing students tended to identify peers as sources of information literacy knowledge while proficient students tended to identify school librarians and teachers. I explored several of the themes in these studies—specifically student guidance and motivation—in student focus groups.

Student Admission Type

Alternatively Admitted Students

A broad definition of alternative admissions policies and programs are those that provide enrollment opportunities for high school or college transfer applicants who do not meet the regular admissions requirements of many colleges and universities, and they are offered by hundreds of higher education institutions across the United States (Needle, 1991). These policies and programs reflect an unresolved tension in higher education between excellence and access and challenge a larger societal context that values selectivity and avoids the harder question of whether education is truly meant for all (Astin, 1999). There are no national alternative admissions standards, and each policy or program is unique to the individual institution. Generally, a student who is admitted though an alternative process is one whose high school grade point average (GPA) and/or standardized test scores (SAT or ACT) do not reflect his

or her ability to complete a college degree. The assessment of ability to complete may instead rely on non-standardized or more subjective criteria.

Although all alternative admissions policies and programs have the goal of offering opportunities to students who do not meet regular admissions criteria, institutions vary on the means they use to achieve that goal. A basic categorization includes alternate admissions policies and structured alternative programs (Needle, 1991). Institutions with alternative admissions policies may require a separate orientation and also require students admitted under this policy to complete certain courses. While they may also provide some support services, there is not a special faculty or curriculum offered to these students, and these schools typically do not charge students additional fees. In contrast, institutions with structured alternative admissions programs characteristically require students to complete a certain curriculum over a specified period of time (Needle). These programs offer extensive support services to assist students in completing the program successfully so that they can matriculate and typically involve additional cost to the student. With the creation of its Academic Success Center (ASC), UNLV is currently transitioning to a structured alternative program (D. Forgues, personal communication, December 11, 2011).

Exploring Majors

While relatively little has been written about exploring majors (i.e., undeclared majors) as a group, they have been labeled an academic and career advising challenge (Gordon, 1995). A commonly held assumption in higher education is that students who are undecided about a college major are at

greater risk for attrition than students with a declared major (Cuseo, 2005). However, this prevalent belief is not well supported by empirical evidence. For example, Lewallen (1993) gathered data on a representative national sample of more than 18,000 first-year students from over 400 colleges and universities, while controlling for confounding variables known to affect student retention (e.g., academic preparedness and socioeconomic status). He discovered that knowledge of whether students were decided or undecided did not have any significant effect on predicting or explaining their retention. In a subsequent study, Lewallen (1995) examined a national sample of over 20,000 decided and undecided students at six different types of postsecondary institutions, and he found that undecided students actually displayed higher levels of academic achievement (average GPA) and were more likely to persist to graduation than decided students.

Cuseo (2005) asserts that the mistaken belief that exploring majors are necessarily “at risk” students may have evolved from a misinterpretation of early research on student retention, which indicated that students who have low aspirations or lack commitment to educational and occupational goals are more likely to leave college (e.g., Astin, 1975; Noel, Levitz, & Saluri, 1985). Over time, these findings may have evolved into a common conception that exploring students are uncommitted students who lack long-term academic plans, career goals, or sense of direction and that they are thus at risk for attrition.

In a study by Laverghetta and Nash (2010), exploring majors were shown to score higher than declared majors on an anti-intellectualism scale, one that

measures general mistrust and/or hostility toward intellectual endeavors and those who engage in intellectual activities. However, these students were also the youngest in the sample, so this attitude could also be explained by age. While a study by Gayton, Clavin, Clavin, & Broida (1994) found that exploring majors score higher than others on an indecisiveness scale, other writings (e.g., Schuster, 2009) suggest that more recently, students are postponing a decision on choosing a major due to an unstable economy. Overall, exploring majors are a growing population of undergraduate students in higher education (Cuseo, 2005).

Chapter Summary

In this chapter, I provided a broad overview of information literacy and described how it is related to ICT literacy, the competency that is measured by the iSkills assessment. I provided a review of learning theory, with an emphasis on constructivist theory, in order to situate the study within a theoretical framework. I then related constructivist learning theory to the selection of study variables: the iSkills assessment, the research process and students' development of information literacy competency, and literature on curricular track. I concluded with a review of alternate admit programs and exploring majors in higher education in the United States, as this is the population I am studying. Through this literature review, I have highlighted gaps in what is known about factors impacting development of information literacy competency, and I have illustrated how this study will contribute to a better understanding of high school factors impacting first-year college students' information literacy competency.

CHAPTER 3: METHOD

The purpose of this study was to explore the relationship between first-year college freshmen students' high school experiences that are recognized to potentially impact the development of their information literacy competency and their scores on the iSkills assessment. In this study, I sought to answer the following research questions:

1. How much of the variance in students' iSkills assessment scores is predicted by the theoretically important variables of a) number of research assignments they completed in high school, b) students' high school curricular tracks, and c) students' cumulative core high school GPAs?
2. How much of the variance in students' iSkills assessment scores is predicted by additional background variables—gender, race, best language, and type of admission (alternate admit or exploring major)?
3. How do students from higher and lower level curricular tracks in high school describe their high school academic experiences related to the acquisition of higher-order information literacy skills?

Research Design

In this study, I utilized a mixed-methods design. A basic principle of research design is to let the problem determine the methodological approach (Creswell, 2009). Research questions 1 and 2 sought to learn more about the relationship between three independent variables—students' numbers of research assignments in high school, their high school curricular tracks, and their cumulative core high school GPAs—and a dependent variable—students' iSkills

exam scores—using quantitative methods. Additionally, question 3 sought to understand how students from high and low high school curricular tracks perceived their high school curricular experiences in relation to the acquisition of higher-order information literacy skills.

Historically, there has been tension between qualitative and quantitative research methodologies due to different philosophical constructs. However, some researchers do not accept such a dichotomy. According to Newman, Ridenour, Newman, and DeMarco (2003), using a mixed-methods approach allows researchers to examine questions "within a wide variety of ways of knowing" (p. 170) as opposed to a single right way of investigation. The data gathered from both quantitative and qualitative methods can be complementary in that the results from the quantitative study can be elaborated and expanded on in the qualitative portion of the study (Greene, Caracelli, & Graham, 1989). Given the research questions, a mixed-methods approach provides a richer understanding of high school factors influencing students' information literacy competency.

I used a correlational design to guide the quantitative portion of this study. Correlational studies seek to understand relationships and patterns among different variables and are appropriate to use when one wants to examine the covariance of variables, the direction of the relationship, and the strength of such a relationship (Smith & Glass, 1987). I did not attempt to establish causation; but rather, to understand the strength, directionality, and existence of a relationship

between high school factors influencing students' information literacy competency and their iSkills assessment scores.

The initial stage of this research was deductive in nature. I approached this study believing that high school experiences, asserted to impact the development of information literacy competency, actually do. The quantitative methods are designed to determine the amount of variance in the students' iSkills scores that can be predicted by these high school factors. The qualitative methods will be used to examine how students from high and low high school curricular tracks perceive their high school curricular experiences in relation to the acquisition of higher-order information literacy skills.

To guide the qualitative portion of the study, I utilized focus groups to follow up on the quantitative analysis. According to Morgan (1997), focus groups can be used at the later stages of a survey, after the data has been collected, to follow up on exploratory aspects of the analysis and have considerable potential for contributing to survey research. The combination of survey research and focus groups is one of the most thoroughly studied combinations of qualitative and quantitative methods (Morgan).

Focus groups are defined as groups of "people who possess certain characteristics and provide qualitative data in a focused discussion to help understand the topic" (Krueger & Casey, 2009, p. 10). Stewart, Shamdasani, & Rook (2007) discuss the "theoretical pillars" of focus group research, which are reflected in the title of Goldman's (1962) article, "The Group Depth Interview."

These pillars include: focused research, group interactions, in-depth data, and humanistic interview.

As Krueger & Casey (2009) state, the intent of the focus group is to promote self-disclosure among participants. The goal is to create an environment that is comfortable and permissive and to select participants who have something in common. Morgan (1997) discusses homogeneity in the composition of focus groups. This technique of segmentation is most appropriate when the participants share homogeneity in background, but not necessarily homogeneity in attitudes. Focus groups are usually composed of five to ten people, but the size can range from as few as four, to as many as twelve (Krueger & Casey, 2009).

Advantages of focus groups include (Stewart, Shamdasani, & Rook, 2007):

1. They provide data much more quickly and at less cost than individual interviews.
2. They allow the researcher to interact directly with the respondents, providing opportunities for clarification, follow-up, and probing.
3. The open response format provides an opportunity to obtain large and rich amounts of data in the respondents' own words.
4. They allow group members to react to and build on the responses of other members, providing a synergistic effect and data that may not have been uncovered in individual interviews.
5. They are very flexible.

6. The results are user-friendly and easy to understand.

Limitations of focus groups include (Stewart, Shamdasani, & Rook, 2007):

1. A small number of respondents limit the ability to generalize results.
2. The interaction of respondents with one another both restricts generalizability of results and sometimes results in data that is biased by very opinionated group members.
3. The open-ended nature of responses can make summary and interpretation difficult.
4. The moderator may bias results by providing cues about what responses are desirable or seeking to achieve group consensus.

As the focus group moderator, it was my responsibility to mitigate these potential limitations by providing clear and unbiased questions and providing "air time" for each participant in the group.

Research Setting

This study took place at the University of Nevada, Las Vegas (UNLV), a doctoral-degree granting institution. According to the Carnegie Foundation for the Advancement of Teaching (2012), UNLV is classified as a "Research University-High research activity" institution. The University was founded in 1957 and currently offers approximately 220 undergraduate, masters, and doctoral degree programs (University of Nevada, Las Vegas, 2011a). UNLV is accredited by the Northwest Commission on Colleges and Universities (NWCCU) and operates on an academic calendar of two semesters (fall and spring) and three summer sessions held from May through August (University of Nevada, Las Vegas,

2011b). In Fall 2011, the UNLV student headcount enrollment was 27,364, with 22,138 (81%) of those students being undergraduates (University of Nevada, Las Vegas, 2011b).

UNLV Admissions

At the UNLV, the minimum admissions requirements are a 3.0 weighted GPA in the core courses of English (four years), mathematics (three years), social science (three years), and natural science (three years), for a total of thirteen units (University of Nevada, Las Vegas, 2011d). If students have completed the thirteen units but without a 3.0 GPA, they may be admissible by having a combined score from the SAT Critical Reading and Math sections of at least 1040, or an ACT composite score of at least 22 (University of Nevada, Las Vegas, 2011d). Any student not meeting these requirements, or those who have earned a GED or who have been home schooled, must pursue admissions under alternate criteria.

At UNLV, alternate criteria for admission include “a combination of test scores and grade point average that indicate potential for success, special talents and/or abilities, improvement in your academic record, other evidence of potential for success, overcoming adversity or special hardship, and special circumstances” (University of Nevada, Las Vegas, 2011c, para. 3). To initiate the appeal process, a prospective student must submit a personal statement explaining the circumstances surrounding his/her academic performance; two letters of recommendation from teachers, counselors, or an official who can address his/her academic abilities; and an official copy of his/her ACT or SAT

scores to the Faculty Senate Admissions Committee for admittance under alternate criteria (University of Nevada, Las Vegas, 2011c). The common criterion tying all alternate admits together is their less-than-3.0 weighted high school GPA. Otherwise, their circumstances may differ greatly. In addition, there is no explicit requirement for any incoming UNLV student to declare a major upon entry.

UNLV Academic Support Programs

In Fall 2008, UNLV opened an Academic Success Center (ASC) on campus, with the mission of partnering "with the entire campus to both welcome and mentor students from pre-admission to First Year Programs to a successful graduation" (University of Nevada, Las Vegas, 2010a, para. 4). The ASC offers support programs for students, from tutoring and advising to testing, and they especially target the student populations of alternate admits, exploring majors, and non-traditional students (D. Forgues, personal communication, February 28, 2011). At the beginning of the 2010-11 academic year, the ASC launched a new academic coaching program for alternate admits. All alternate admits were invited during summer 2010 (prior to their first semester in college) through surface mail and electronic mail to participate in this program, where they are paired with an academic coach (a graduate student) to work with them through their first year of college at UNLV.

According to the "What is Coaching?" webpage (University of Nevada, Las Vegas, 2010b), the goal of the academic coaching program is to "provide students with skills that will help them succeed in their future academic and

professional career goals." The ASC advertises academic coaching as a program that empowers students by helping them:

- objectively assess barriers to academic success
- establish attainable educational goals.
- develop and maintain positive daily routines.
- improve time management and organizational skills.
- enhance self-esteem and self-advocacy skills.
- develop a study schedule.
- become active learners and class participants.
- take effective lecture notes.
- prepare for exams.
- balance academic and social demands.
- establish rapport with professors.
- utilize college resources.

(University of Nevada, Las Vegas, 2010b)

As part of this program, students undergo diagnostic testing and, based on their scores, they work one-on-one with their academic coach through a series of interventions to help them develop skills considered essential to reaching their academic goals.

One of the diagnostic measures used in the academic coaching program for 2010-11 was the iSkills assessment, developed by the Educational Testing Service (ETS) to assess Information and Communication Technology (ICT) literacy levels. The test consists of fourteen real-time, simulated, scenario-based

task items that students must navigate in a digital environment and is categorized by Oakleaf (2008) as a performance-based assessment of information literacy.

In addition, the Academic Success Center coordinates and delivers a course for first-year students aimed at exploring majors, IDS 100: Academic and Major Exploration. This course is designed to help first-year students achieve academic success and become engaged members in the UNLV community (University of Nevada, Las Vegas, 2010c). The academic skills component of the course emphasizes learning as an active process. Students are taught learning strategies such as time management and study skills, which emphasize critical thought and creativity. Major and career exploration topics are also central components to the course content. Students are explicitly required to investigate a blend of personal development activities and information literacy skills in order to explore potential major and career choices. As a component of this course, students take the iSkills assessment and then reflect upon their scores in order to create a plan for further skills development. Although alternate admits and exploring majors are the targeted groups for these programs, they are open to any undergraduate student who opts to participate.

Participants

iSkills Assessment and Survey

This study sampled from a population of 1,333 alternate admits/exploring majors admitted to UNLV for the 2011-12 academic year. Students included in the sample met the following criteria:

1. Are first-time freshmen (not transfer students) who attended and graduated from high school (not home schooled) in 2011.
2. Enrolled as UNLV students for the Fall 2011 semester.
3. Self-selected into the Academic Success Center's academic coaching program or enrolled in IDS 100.
4. Took the iSkills assessment.

Of the 1,333 students who met criteria one and two, 95 students both self-selected into the Academic Success Center's programs and took the iSkills assessment. Ninety-three of those students agreed to participate in this study. This sample represents 7% of the population being studied.

According to Sterba & Foster (2008), a sample is "self-selected when the inclusion or exclusion of sampling units is determined by whether the units themselves agree or decline to participate in the sample, either explicitly or implicitly" (p. 806). The students in this sample self-select into it at two levels: when they commit to participate in the ASC academic success programs (coaching or course) and when they elect to take the iSkills assessment. There are both strengths and weaknesses to the nature of the self-selected sample. The strengths of a self-selected sample, a type of nonprobability sampling, include: participants are likely to be committed to taking part in the research study, and it is less expensive and can be implemented more quickly than probability sampling (Battaglia, 2008). Weaknesses include a degree of self-selection bias, as a reflection of some inherent bias in the characteristics of the participants, which can lead to the sample not being representative of the

population of 2011-12 UNLV alternate admits/exploring majors, or exaggerating some particular finding from the study. However, after testing the normality of the sample based on the incoming core GPA of UNLV alternate admits/exploring majors, I found that this was not a large problem in the sample.

Focus Groups

A total of thirteen students participated in three scheduled focus groups (one, three, and nine participants, respectively). Although one participant does not constitute a focus group as defined above, the in-depth interviewing data collection method provides a detailed account of the participant's thoughts and motivations using his or her own words and allows for all of the benefits of focus groups except for the synergistic effect created when group members react to and build on the responses of other members (Bogdan & Biklen, 2003). While ideally the focus groups were to be divided based on the number of honors courses that each student completed as indicated by his/her official high school transcripts, the third and largest focus group was a mix of students. Ultimately, six of the students participating in focus groups took five or more honors courses in high school, while seven of the students took four or less. The division of students in this way was guided based on the quantitative data analysis preceding the focus groups.

Working from the list of students from the sample who volunteered to participate in the focus groups, I utilized purposive sampling. In this study, the proposition was that students who have been placed into a higher academic track in high school would more likely benefit from experiencing high-critical

thinking activities, or exercising higher-order thinking skills, while those placed into a lower academic track would experience rote learning and teaching styles. The participants with high and low curricular tracks serve to give weight to the validity of the proposition being analyzed.

Data Collection Techniques

It is common for mixed-methods studies to use a variety of data collection techniques. Below is a brief description of the instruments I utilized to gather data regarding high school experiences and information literacy competency of the sample.

Survey

According to Babbie (1990), surveys can be useful tools to describe, explain, or illuminate the traits, attributes, attitudes, and relationships that exist in a sample of participants. A primary objective of this study was to determine what kind of relationship exists between high school experiences and information literacy competency in alternate admits. Surveys are one method that can highlight such relationships in a large sample of participants and are an economical way to quickly examine, on a large scale, the extent to which such variables are associated with students' information literacy competency levels.

I developed the survey based on my review of the literature, and questions were generated based on two elements: 1) those that replicate questions found to be significant in previous surveys given to students concurrently with the iSkills assessment; and 2) those that represent the gap in the literature on high school factors and their potential impact on students' iSkills scores. I reduced and

streamlined survey questions based upon a data collection pilot project during Spring 2011 and dissertation committee feedback. The survey can be found in Appendix 3.

Because students will immediately embark on taking an hour-long, web-based assessment, an electronic survey, as opposed to a print survey, is deemed appropriate. One benefit of streamlining the survey is that questions could be integrated into the iSkills assessment itself, so students were not required to fill out the survey in an additional online system. Thus, there was no need to link the survey and iSkills data using a student number, as all responses were reported as a package. Although the survey includes items that are not utilized in this particular study, the revised survey, through a pilot study, was tested with five UNLV students prior to being given, and overall, it did not take more than seven minutes to complete.

iSkills Assessment

After arriving at the ASC's Testing Center (for those students in the academic coaching program) or the main library's computer classroom (for those enrolled in IDS 100), students received informed consent documents, approved by UNLV's IRB (see Appendix 4), disclosing that they may experience mild testing fatigue or test anxiety. The documents also inform them that, for the purposes of the study, their iSkills assessment scores will be kept confidential and will only be reported in the aggregate (see Appendix 5). After registering for the test and taking the survey, students were directed to the iSkills assessment. Computer stations with privacy screens were used for the students to take the

exam, and they had a period of no more than one hour to complete fourteen real-time, simulated, scenario-based task items. Students received their scores no more than ten days after they completed the assessment. They were notified by email when the scores were ready, and they were asked to retrieve them by using the private login/password information they created when registering to take iSkills. The estimated reliability of iSkills assessment scores is .88 (Cronbach alpha), as a measure of test score consistency across various administrations (Katz, 2007). Scores on the iSkills assessment range from 0-500 and are allocated in ten-point intervals. The cut score (i.e., the minimum exam score needed to determine whether students meet ICT literacy standards) is 260.

Student Background Information

Utilizing a password-protected account on the MyUNLV Student Information System, I was able to extract and confirm additional information about the sample. I was given administrative access to student information for this project and was able to use it as a data point in this study as long as the students provided consent. This information includes each student's cumulative core high school GPA and information allowing me to validate his/her high school curricular track. While I originally proposed to rely on a combination of self-report and high school transcript information to determine curricular track (i.e. Standard, Advanced, or Honors diploma), the information was not presented consistently in transcripts due to the differences in students' school districts. I ultimately reviewed each student's transcript and counted the number of honors, AP, IB, and CP courses he/she had taken as the most reliable and valid method of

determining curricular track for the purposes of this study. I went through each student's transcript two times in order to ensure accuracy and consistency.

Journal Entries

After taking the iSkills assessment, students in sections of the IDS 100 course were asked to respond to a reflection question in the format of an electronic journal entry. The question they were asked to respond to is: "The iSkills assessment uses technology to test your skills in information evaluation and management, as well as skills needed to create and communicate information. Please address how you think you developed your skills in these areas up to this point. How did your high school curriculum address these types of skills?" Although the results of this exercise did not provide rich data, a review of the results provided further information on the students' understanding of information literacy as a concept and helped to formulate additional areas to probe during focus groups.

Focus Groups

Knowing the strengths and weaknesses of focus group methodology, I believe it was the ideal qualitative method to further and enhance the quantitative component of my study. First, I scheduled two focus groups, with two different groups of students (guided by my quantitative findings): one was with students who had taken zero to four honors courses in high school, and the second was with students who took five or more honors courses. All students were invited by me through their IDS 100 course sections to attend the focus groups scheduled to take place in a conference room in the main library. Working from a group of

student volunteers, I confirmed student participation through phone calls, text messages, and emails. Due to student attrition, the first two groups were very small (three participants for the high curricular track group and only one for the low curricular track "group," making it an in-depth interview). These students were offered refreshments and a $5 gift card in return for their participation.

I further worked with one of the IDS 100 course instructors to schedule an additional focus group during the students' scheduled class time. This focus group, although mixed in terms of students' curricular tracks, yielded nine participants. I took this into account by noting students' curricular tracks as I analyzed the data. These students were not offered any incentives (other than missing their class) in return for their participation. All focus groups were both video and audio recorded, and before any focus groups took place, students were asked to sign an additional consent form acknowledging that they were being recorded.

When asking students about their high school experiences, I used open-ended questions that served to further explore the findings of the quantitative portion of my study. For example, as might have been predicted, the self-report variable of "number of research projects and assignments" was very difficult to interpret quantitatively. I used the focus groups to ask several questions exploring that variable. I also utilize the "think-back" method, established by Krueger & Casey (2009). This method helped to establish a context for the response and let participants know that I wanted them to be specific and grounded in reporting their experiences. This focus on the past "increases the

reliability of the responses because it asks about specific experiences as opposed to current intentions or future possibilities" (Krueger & Casey, p. 58). An example of a question I asked the focus group participants is: Think back to your most memorable high school research assignment. What made it memorable? See Appendix 6 for a full list of focus group questions.

I utilized a transcribing service to compete the audio transcription of the data. To become more familiar with the data, after having the audio transcribed, I reviewed each transcript against the video recording. This helped me to become more familiar with each participant, especially in the large, mixed focus group, for which I created a diagram of participants and their curricular track. The review against video recording also included further preparation of the transcripts for data analysis such as checks for content and spelling accuracy of responses (Fossey, Harvey, McDermott, & Davidson, 2002).

In summary, I used survey questions, the iSkills assessment, student records, journal entries, and focus groups to collect data for this study. Table 1 pairs each research question with the data collection points and when the data was collected chronologically.

Table 1. Research Questions Mapped to Data Collection Techniques

Research Questions	**Primary Data**	**Secondary Data**	**When Collected**
Q1- How much of the variance in students' iSkills assessment scores is predicted by the theoretically important variables of a) number of research assignments they completed in high	Survey Responses, iSkills assessment scores, Student Records	Student Records	June-September, 2011

school, b) students' high school curricular tracks, and c) students' cumulative core high school GPAs?			
Q2 - How much of the variance in students' iSkills assessment scores is predicted by additional background variables—gender, race, best language, and type of admission (alternate admit or exploring major)?	iSkills assessment scores, Student Records	None	June-September, 2011
Q3 - How do students from higher and lower level curricular tracks in high school describe their high school academic experiences related to the acquisition of higher-order information literacy skills?	Focus Groups with selected students from the sample	Journal Entries	September-October, 2011

Data Analysis Techniques

Because this research study employs a mixed-methods approach, I utilized data analysis strategies appropriate to quantitative and qualitative methodologies. In this section, I articulate the data analysis techniques I used.

Quantitative Analysis

I used the survey data, student records, and iSkills assessment scores to answer Research Questions 1 and 2 regarding the relationships between high

school factors, cumulative core high school GPA, background characteristics, and iSkills assessment scores. Using SPSS statistical software, I employed a hierarchical multiple regression analysis to examine the association between number of research assignments completed in high school and high school curricular track (ordinal data), cumulative core high school GPA (interval data), and iSkills assessment score (interval data). Multiple regression is a flexible method of data analysis that may be appropriate whenever a quantitative variable (the dependent or criterion variable) is to be examined in relationship to any other factors (expressed as independent or predictor variables) (Cohen, et al., 2003). Hierarchical multiple regression requires that the minimum ratio of valid cases to independent variables be at least 5 to 1 (Brace, Kemp, & Snelgar, 2009). The ratio of valid cases (93) to number of independent variables (6) was 15.5 to 1, which is greater than the minimum ratio. The requirement for a minimum ratio of cases to independent variables was satisfied.

I used hierarchical multiple regression analysis to predict how much of the variance in iSkills scores (dependent variable) can be explained by the theoretical variables (independent variables of core GPA, number of honors classes, and number of research projects or assignments in high school), while controlling for demographic and other subject variables (such as gender, ethnicity, and type of admission—alternate admit/exploring major). Hierarchical multiple regression allowed me to specify a fixed order of entry for variables in order to measure the effects of several different independent variables on the dependent variable at one time, while controlling for the effects of covariates, or

to test the effects of certain predictors independent of the influence of others. I employed the multiple regression model expressed below:

Independent/Predictor variables

STEP 1: *Gender* (Nominal)
- Male (0)
- Female (1)

STEP 2: *Best Language* (Nominal)
- English best (0)
- English not best (1)

STEP 3: *Race* (Nominal)
- Caucasian (0)
- African Am (1)
- Asian (2)
- Hispanic and Other (3)

STEP 4: *Admission Type* (Nominal)
- Alternate Admit
  - No (0)
  - Yes (1)
- Exploring Major
  - No (0)
  - Yes (1)

STEP 5: *Cumulative Core High School GPA* (Interval-mean deviated)
- Scale of 0-4.0

STEP 6: *Curricular Track* (Ordinal)
- No Honors courses (0)
- 1-4 Honors courses (1)
- 5-12 Honors courses (2)
- 13+ Honors courses (3)

Dependent/Criterion Variable

iSkills Assessment Score (Interval)
- Scale of 0-500

As explained previously, the variable of “curricular track” was much more reliable and valid as reported based on the number of honors courses completed

by the student as indicated in their official high school transcripts, turning it into interval data. As part of this process, I examined issues related to the regression assumptions and found that this variable was not normally distributed. By looking at the frequency distribution of honors courses, I divided the students into four relatively equal groups, so my categories for curricular track based on numbers of honors courses are: none, 1-4, 5-12, 13 or more. The only self-reported variable, number of research assignments or projects in high school, confounded results in early tests (Cohen, et al., 2003). Due to this, I decided not to use this variable in the statistical model and instead, it became the central premise of my focus group interviews.

The degree to which the predictor variables are related to the iSkills criterion variable are measured by the correlation coefficient R, for which the value is between 0 and 1. A Pearson correlation value of 1 between a predictor variable and the iSkills criterion variable would indicate a perfect correlation, while a Pearson correlation value of 0 would indicate no correlation between these variables (Neuman, 2011). A statistically significant relationship ($p = < .05$) between any of the high school factors (curricular track or cumulative core high school GPA) or background variables and the iSkills score criterion variable were interpreted as a predictor of alternate admits' information literacy (Howell, 2008). However, a statistically non-significant relationship ($p > .05$) between any of the predictor variables and the iSkills assessment score was still explored in a qualitative manner due to the exploratory nature of this study.

Qualitative Analysis

To answer Research Question 3, I used data analysis techniques appropriate for qualitative research methods. Morgan (1997) states that "[w]hen a project using focus groups fits the typical goals for qualitative research in the social sciences…then the general procedures for analyzing qualitative data in the social sciences will apply" (p. 58). Yin (2003) proposes three general strategies for analyzing case study data: relying on theoretical propositions, considering rival explanations, and developing a case description. Yin argues that relying on the proposition is the strongest of the three. This study builds on the proposition that students who have been placed into a higher academic track will more likely benefit from high-critical thinking activities, or exercising higher-order thinking skills, while those placed into a lower academic track will experience rote learning and teaching styles. As such, I examined the qualitative data to ascertain if students' perceived high school academic experiences are the same or different for students with high versus low curricular tracks, treating them as case studies.

As described previously, once the interviews were digitally recorded, the data was transcribed. Upon reviewing the transcriptions and listening to the audio, I made notes related to my ideas and speculations to assist with the analysis (Bogdan & Biklen, 2003). I uploaded the transcribed data into the qualitative data analysis software, ATLAS.ti, in order to organize and analyze qualitative data.

I used a constant comparative method of data analysis to code the data and

attempted to gather new information by “constantly comparing them to an emerging category to develop and saturate the category” (Creswell, 1998, p. 240). By comparing comments and incidents from the focus groups with others, I was able to develop tentative categories, which were then compared with each other and to other instances (Merriam, 1998). The focus group transcripts were analyzed for themes, commonalities, and differences across each focus group and across each student curricular track type (case) (Merriam, 1998).

I constructed categories by applying codes related to those variables that were to be further explored (e.g., students’ research experiences) and also by identifying common and unique themes (Fossey et al., 2002; Merriam, 1998). Open coding was completed to develop categories, axial coding allowed for the relevant categories to be interconnected between the two cases (students from high and low curricular tracks), and selective coding was used to help build a “story” to illuminate the research question (Creswell, 1998). See Appendix 7 for a full outline of the study’s coding schema.

First, I built an inventory of open codes by reviewing the focus group transcripts line by line and making notes, comments, and observations (Merriam, 1998). This resulted in an initial list of categories and sub-categories, which are recurring themes in this study. I further grouped and analyzed the relevance of these codes and made notes on each category for follow-up questions as I further reviewed the data.

I then used axial coding to establish several main categories within each of the focus group transcripts, which served as cases for high or low curricular track

by linking codes with student comments (Merriam, 1998). Focus group one was actually an in-depth interview with one student from a low curricular track. Focus group two was with three students from a high curricular track. In focus group three, there was a mix of students—six from a low curricular track and three from a high curricular track. For focus group three, I had already noted in the transcript which curricular track each participant fell into, so while this served as a mixed case, I was able to distinguish the curricular track of the student making the comments. After going through the open coding process, the codes were assembled in new ways so that central categories about the phenomenon were explored and delineated (Creswell, 1998). After completing this analytical process, I selected core categories for each of the cases (see Appendix 7).

After the open and axial coding processes were completed, I utilized selective coding. This required identifying the core categories employed for each case that serve as the foundation for this study's findings. The result is a case study "story line" which integrates the numerous categories based on the axial coding so that results can be presented (Creswell, 1998). Upon completing the analysis of each case, I compared and contrasted the high and low curricular track (including mixed) cases to develop a more sophisticated explanation for the phenomenon of the study (Merriam, 1998).

I utilized ATLAS.ti throughout the data analysis process to organize, code, and categorize the data (Cresswell, 1998). I uploaded each transcript to ATLAS.ti prior to beginning data analysis and coding process. After I completed the data coding process, I used network views to further explore the emerging themes

and concepts, which also help to illustrate the findings of the study.

Validity, Reliability and Trustworthiness

I do not claim that the results of this study can be used in contexts beyond UNLV, and I am not seeking to make causal inferences. The assessment that I used to measure students' information literacy is an already validated instrument developed by ETS. For the survey, I made a reasonable attempt to examine existing survey questions and borrow items and language when they fit the study's context. I also attempted to increase the content validity of the instrument by having students and experts review the items in advance of the survey being implemented, including a small pilot study of the survey in spring of 2011. In reviewing the students' self-report data on their curricular track, I decided to use a more reliable and valid method of collecting this data through student transcripts located in the student information system.

For the multiple regression analysis, I tested for the four assumptions of regression to ensure the trustworthiness of my results and reduction of the possibility of Type I or Type II error, or over- or under-estimation of significance of effect size (Osborne & Waters, 2002). However, a strength of regression is that it is robust to moderate violations of homogeneity and normality (Cohen, et al., 2003). While focus groups tend to be strong on validity, they tend to have problems with reliability. However, these can be lessened if questions are relatively specific. In addition, I used the "think-back" method described above to increase reliability. I took several steps to ensure that the focus group results are trustworthy. These included pilot testing the questions to ensure they were

understood; listening carefully to participants, observing how they answered, and seeking clarification on areas of ambiguity; and asking participants to verify summary comments at the end of each focus group (Krueger & Casey, 2000). I also used systematic analysis procedures.

In summary, I utilized multiple regression to analyze the data related to Research Questions 1 and 2 and qualitative coding strategies to analyze the data for Research Question 3. I made efforts to increase validity of the survey instrument and to increase the trustworthiness of my findings using a variety of strategies.

Ethical Considerations

This project was submitted to the UNLV Office for the Protection of Research Subjects and approved by the UNLV Institutional Review Board (see Appendix 4). The primary ethical consideration was that the student information system database is confidential and may only be used for official university business unless otherwise approved. Therefore, it was imperative to gain approval to use student background information. The Associate Dean of the Academic Success Center approved my gaining access to the student information system database for the purposes of this project.

Chapter Summary

In this chapter, I outlined in detail how I answered the proposed research questions. Since the research questions are quantitative and qualitative in nature, I utilized a mixed-methods design. I surveyed students to acquire information on their number of research assignments in high school and their

high school curricular track to answer Research Question 1. Student background data including high school transcripts provided more detailed information on the high school curricular track data point from the survey and provided the students' cumulative core high school GPAs to answer Research Questions 1 and 2. Finally, students' scores on iSkills, a previously validated assessment, provided the dependent variable for Research Questions 1 and 2. To answer Research Question 3, I described my rationale for choosing focus groups to illuminate quantitative data. I used multiple regression analysis to analyze the data related to Research Questions 1 and 2 and a variety of systematic coding strategies to analyze the data for Research Question 3. I have made efforts to increase validity of the survey instrument and to increase the trustworthiness of my findings using a variety of mechanisms.

CHAPTER 4: FINDINGS AND ANALYSIS

In this chapter, I present the results of quantitative and qualitative data analysis based on the methodology employed in this study, as outlined in chapter three. In order to most fully explore the research questions, I utilized a mixed-methods design: hierarchical multiple regression analysis coupled with in-depth focus groups with students in the sample. Results are presented in two sections. The first is the outcome of the multiple regression analysis including a summary of the multilevel model utilized, as well as reliability and validity statistics. The second includes the central themes contributing to students' information literacy competence, as identified through focus groups with students from high and low high school curricular tracks. The themes and their respective attributes are substantiated by the comments from the study's participants. In using a mixed-methods design, I am able to provide a richer understanding of the potential impact of the independent variables on students' information literacy competency as measured by the iSkills assessment.

Quantitative Analysis and Findings

The purpose of the quantitative portion of this study is to examine predictors of first-time freshmen students' information literacy competency as measured by the iSkills assessment. Although learning theory and information literacy standards assert best practice in students' development of this competency, few previous studies have focused efforts on identifying variables related to the development of higher-order skills with a performance-based measure as its basis. In addition, research on the information literacy

competency of special populations, such as alternate admits and exploring majors is needed, as it holds promise for the improvement of programs aimed at enhancing student success. Version 19 of the SPSS statistical package was used to analyze the quantitative data.

Descriptive Statistics

In this sample, 56% of participants were female, and 44% were male. In terms of "best language," 84% responded that English only was their best language, while 16% responded that "English and another language" or "another language" was their best language. A small majority of the sample was Caucasian (39%), with 22% African-American, 15% Asian, and 25% identifying as Hispanic and "other." Alternate admits comprised 46% of the sample while 61% were exploring majors. Students who were both alternate admit students and exploring majors made up 22% of participants.

In Table 2, I present descriptive statistics for and correlations among all study variables. Scores on the iSkills assessment range from 0-500 and are allocated in ten-point intervals, with the cut score (i.e., the minimum exam score needed to determine whether students meet ICT literacy standards) at 260. Overall, the mean for students' reported iSkills scores was below the cut score (M = 207.85, SD = 58.18). The group's mean cumulative core high school GPA exceeded a 3.0, which is the GPA needed for regular admission to UNLV (M = 3.15, SD = .58). Finally, the mean number of honors courses taken by the group in high school was 6.20, with a standard deviation of 6.11. Additional means and

Table 2. Descriptive Statistics and Correlations among Study Variables

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Gender	--										
2. English not Best Language	-.05	--									
Race: 3. African Am	-.01	-.22*	--								
4. Asian	-.17*	.34*	-.22*	--							
5. Hispanic and other	.11	.31*	-.30*	-.24*	--						
Admission type: 6. Alt Admit	.13	-.02	.14	-.03	.02	--					
7. Exploring Major	-.04	-.04	-.28*	.03	.05	-.28*	--				
8. Core GPA (mean deviated)	-.05	-.04	-.15	-.05	.01	-.80*	.32*	--			
# of Honors courses: 9. 1-4	-.24*	.00	.00	-.03	.02	.07	-.01	-.03	--		
10. 5-12	.16	-.01	.01	.02	.10	-.07	.11	.01	-.28*	--	
11. 13+	.01	.00	-.06	-.17*	.02	-.38*	.10	.53*	-.33*	-.28*	--
12. iSkills Score (*M* = 207.85, *SD* = 58.18)	.07	-.28*	-.13	-.22*	-.04	-.22*	.21*	.37*	-.30*	.22*	.36*
M	.56	1.17	.22	.15	.25	.46	.61	.00	.25	.19	.25
SD	.50	.41	.41	.36	.43	.50	.49	.58	.43	.40	.43

*$p < .05$

standard deviations provided in Table 2 are based on dummy-coded variables (gender, best language, race, and admission type).

There were significant correlations between iSkills assessment scores and almost all predictor variables (see Table 2). iSkills score correlated positively at the $p < .05$ level with exploring major, core GPA, and the categories of 5-12 and 13+ honors courses. iSkills score correlated negatively at the $p < .05$ level with English as not best language, Asian race, alternate admit students, and the category of 1-4 honors courses. There was not a significant correlation between iSkills score and gender, and African American and Hispanic & other races.

Regression Analysis

I performed a hierarchical multiple regression to test the variance in iSkills assessment scores explained by student background characteristics and theoretically important variables. I entered student gender into the first block, best language into the second block, and student race into the third block. I entered admission type, including alternate admit or exploring major status, into the fourth block. I entered core cumulative GPA into the fifth block and curricular track (number of honors courses) into the sixth block. I performed the analysis using SPSS REGRESSION. Tables 3 and 4 show the results of the model. In hierarchical multiple regression analysis, each dummy-coded variable must have a reference group to which it is compared (Cohen, et al., 2003). In this analysis, the reference group characteristics are: male, English as best language, Caucasian, and both an alternate admit and an exploring major. Students in this

group, on average, scored a 207.85 on the iSkills assessment and provide a basis to which other students are compared, reflected as CONSTANT in Table 4. As shown in Table 3, three of the variables explained unique variance in the dependent variable, iSkills assessment score: best language (R^2_{change} = .08, p < .01), cumulative core GPA (R^2_{change} = .06, p = .01), and high school curricular track (R^2_{change} = .14, p < .001). Race (R^2_{change} = .08, p = .07) and type of admission (R^2_{change} = .05, p = .07) contributed smaller effects. Gender was not a significant predictor of iSkills score (R^2_{change} = .01, p = .52).

Table 3. Hierarchical Regression Analyses Predicting Performance on iSkills

	Step 1 Gender	Step 2 Eng not Best	Step 3 Race	Step 4 Adm type	Step 5 Core GPA	Step 6 # Honors courses
R^2	.01	.08	.15	.20	.27	.40
Adj R^2	-.01	.06	.10	.14	.19	.32
R^2_{change}	.01	.08	.07	.05	.06	.14
F_{change}	.42	7.39**	2.48+	2.70+	6.73*	6.45***
df_{change}	1, 91	1, 90	3, 87	2, 85	1, 84	3, 81

+ p < .10 *p < .05 **p < .01 ***p < .001

As shown in Table 4, the effect of English as not best language was reflected such that this predictor was consistently related with the iSkills assessment score negatively across the regression model (β = -29.50, p = .05). For race, the two predictors that still had a moderate effect in step 6 were: African American significantly predicting iSkills score (β = -28.72, p = .05) and

Table 4. Hierarchical Regression Coefficients

Predictor	Step 1 β	*SE*.β	Step 2 β	*SE*.β	Step 3 β	*SE*.β	Step 4 β	*SE*.β	Step 5 β	*SE*.β	Step 6 β	*SE*.β
CONSTANT	203.42	9.11	250.42	19.40	260.70	20.32	256.58	23.55	239.46	23.73	235.41	23.07
Gender	7.93	12.19	6.31	11.80	3.13	11.71	6.50	11.59	4.56	11.24	-6.54	10.78
English not Best Language			-39.33**	14.47	-32.25+	16.63	-31.13+	16.40	-28.51+	15.90	-29.50*	14.68
Race												
African Am					-36.67*	15.36	-27.40+	15.80	-25.48+	15.31	-28.72*	14.08
Asian					-36.30+	19.39	-34.26+	19.05	-30.56	18.49	-29.75+	17.50
Hispanic and other					-13.96	16.10	-11.87	15.83	-12.26	15.33	-15.04	14.18
Admission type												
Alt Admit							-20.97+	11.86	15.95	18.29	23.47	16.98
Exploring Major							12.73	12.48	8.14	12.21	6.04	11.27
Core GPA (mean deviated)									41.05*	15.83	32.26*	16.41
# of Honors courses												
1-4											-21.46	14.54
5-12											39.67*	15.36
13+											32.85+	17.39

+ p < .10 *p < .05 **p < .01 ***p < .001

Asian as a moderate predictor (β = -29.75, *p* = .09). Cumulative core GPA remained a positive predictor of iSkills score through step 6 (β = 32.26, *p* = .05). When added in as the final step, the categories of 5-12 honors courses (β = 39.67, *p* = .01), and at a moderate level, 13+ honors courses (β = 32.85, *p* = .06) were significant positive predictors of iSkills score.

There are four assumptions of regression that should be tested to ensure the trustworthiness of the results (Osborne & Waters, 2002). I tested assumptions by examining normal probability plots of residuals and scatter diagrams of residuals versus predicted residuals. With one exception, no violations of normality, linearity, or homoscedasticity of residuals were detected. While cumulative core GPA and curricular track demonstrated collinearity, the categories of 5-12 and 13+ honors courses do explain unique variance as indicated in the hierarchical regression and are strong predictors of iSkills score. In addition, box plots revealed no evidence of outliers. The Durbin-Watson test for autocorrelation value is 2.07, indicating that residuals are normally distributed, and the values are independent (Cohen, et al., 2003).

Summary

Using existing information literacy standards, constructivist learning theory, and research on teacher beliefs of student ability as my guide, I identified two variables predictive of a significantly higher score on the iSkills assessment. Research Question 1 is: How much of the variance in students' iSkills assessment scores is predicted by the theoretically important variables of a) number of research assignments they completed in high school, b) students' high

school curricular tracks, and c) students' cumulative core high school GPAs? Among the theoretically important variables, students' cumulative core high school GPAs, as well as their curricular tracks (number of honors classes taken) explained a significant amount of the variance in students' iSkills assessment scores.

Using student background characteristics as exploratory variables, I identified one variable predictive of a significantly higher score on the iSkills assessment. Research Question 2 is: How much of the variance in students' iSkills assessment scores is predicted by additional background variables, such as gender, race, best language, and type of admission (alternate admit or exploring major)? The variable of English as best language explained a significant amount of the variance in students' iSkills scores.

Qualitative Analysis and Findings

The purpose of the qualitative portion of this study is to explore Research Question 3, which is: How do students from higher and lower level curricular tracks in high school describe their high school academic experiences related to the acquisition of higher-order information literacy skills? In focus groups, I was able to speak in-depth with students from both honors and non-honors tracks. Findings are presented by theme and further broken down by differences between the groups. I issued each student a number in order to demonstrate the variance of focus group evidence across all thirteen students.

Findings by Theme

Theme One: The Meaning of "Research"

Overall, I found that while students from both honors and non-honors groups discussed some similar components of the research process with regard to their high school research assignments, there were subtle differences between what research meant for the honors students versus the non-honors students.

All students discussed being introduced to research tools in high school, such as research databases (e.g., Ebsco databases) and citation creation tools (e.g. Zotero). They also talked about the acceptability of sources (e.g., "Don't use Wikipedia!") and the requirements to cite the sources where they acquired their information. Both honors and non-honors track students discussed the amount of effort they were required to put into a research project; the more effort that was required, the more memorable the process was for them. Generally, they characterized the research process as "taking a lot of time" or as "a long process." A non-honors track student describes this as follows:

> Student 1: *You know, I guess, like a typical research paper, you don't put that much, like, that much like effort into it. Like, you put a lot of effort but not as much as something that's more memorable because I guess, like you -- I consider something more memorable, like something that's worth more.*
>
> Interviewer: *Worth more credit?*
>
> Student 1: *Worth more credit and like worth more towards you, towards you like progressing further. I mean like a typical, a typical research paper does, like get you further, but most of the time they're just like, well, just more busy work. Like when we didn't have anything to do, she'd like throw like a ream of paper out. But, our most, like memorable ones were something that, like we had to do for like graduation. Or we had to do for a big part of our grade. Just put a lot of like pride and effort into.*

Both honors and non-honors track students discussed how it is important to be engaged in their research projects, and this was often coupled with the concept of the ability to choose one's research topic. A non-honors track students comments on topic choice and engagement below:

> Student 2: *…we finally got to pick our own topic, and so I was so excited and I just wrote – we're supposed to write five to eight pages and I wrote eight and a half because I was so excited to do so much research on her just because I love the books and everything. So, I was excited.*

Across the board, students' most memorable research projects were those where they felt invested in the assignment because they had the opportunity to choose the research topic. Topic choice was not typical for students, however, and most of the time, they were assigned topics.

Finally, I was able to confirm that all thirteen students in the focus groups believed that they misestimated the number of research projects and assignments they did in high school when answering the survey question given at the time of the iSkills assessment. When I asked them individually during the focus groups and later compared these answers to their survey responses, all students except for one estimated a higher number of research endeavors in high school in the focus group than they had reported in the survey. A non-honors track student describes why she believes the misestimation occurred:

> Student 2: *It's actually really hard just because I just spaced them all, you know just trying to –especially through high school, I was just trying to hurry and get the papers done, so I'd always forget that I wrote all those papers. It's like sitting down and remembering it, it was just like "I forgot."*

Differences

While subtle, there were differences between honors and non-honors track students' discussions of research. For non-honors students, the concept of "report writing" was mentioned frequently, while it was not mentioned within the honors group. An example of what "report writing" entails for the non-honors students is:

> Student 2: *Some of the research projects we did were just we would read a book and then we'd have to research more about the book and the author and stuff and all of that….or like history, we'd have to research a certain war or something like that and write five pages on it. You know and just writing like we learned about it and then the research on it.*

Non-honors track students were also more likely to express a negative affect, such as frustration, associated with the research experience:

> Student 2: *I mean some of the time, you had to do more research because some of the subjects were so like, they just weren't known very well, so they weren't very easy to find. So, it's more frustrating when that happened, but they're pretty much all the same, just different subjects.*

The honors students, on the other hand, discussed writing research papers and the place of their "own opinions" and "drawing their own conclusions" in the research process.

Regarding the format in which they were asked to produce their research, honors students discussed the visual aspect of their research assignments, and this was often tied to engagement, as confirmed by an honors track students below:

> Student 3: *…and that was just fun because I was really into the author that I had. So, it was like more – it was more, I was able to like engage in it more because we had to do a PowerPoint. So it was like a lot easier to do, more fun.*

and

Student 4: *You have to have at least like two pages fully typed and, most of mine, like I had to make a poster about it, whatever I was researching.*

and

Student 3: *You'd have to like make it more like, more like poster board and stuff. And like display it and like talk a lot about it.*

They were asked to create PowerPoint presentations, posters, videos, or to include images in their work. Many times, their projects included some kind of presentation. This aspect was not present in the discussions of non-honors track students. Overall, there were differences in the research products that students were expected to produce.

Theme Two: Source of Guidance

In focus groups, all students discussed teachers, family members, and librarians as sources of guidance, to some extent, in the research process. However, there were substantial differences between honors versus non-honors track students when it came to how teachers guided students. In addition, honors track students discussed peers as sources of guidance.

Both honors and non-honors track groups discussed the role of teachers as guides in the research process. Teachers, across the board, set expectations for research projects, set aside time for students to visit the library or work with a librarian, and made themselves available to answer student questions. A non-honors track student describes the role of her teachers in guiding her through the research process below:

Student 2: *I mean the teachers would sit and show you websites and we would as a class, go to the library and there would be a certain instructor*

there. She would teach you like what kind of websites you should go to and how you should use them and stuff. So, I mean that helped a lot.

Several students discussed asking one of their parents or another adult family member for help with research and writing assignments. For example, two non-honors students discuss asking their mothers for help:

Student 2: *I really just asked my mom because she's really good at writing. And so, I'd have her just help me make it sound better or make it, I don't know. But, she would never do it for me. She would just like teach me how to write the paper better.*

and

Student 5: *…my mom was good at writing papers. So she kind of would help me. I would cite things and stuff and she was just good at it so she just helped me how to learn.*

Students who asked their family members for help expressed that they were more comfortable asking someone at home or that it was more convenient for them to ask someone at home for guidance.

With regard to librarians giving students guidance in the research process, many students from both honors and non-honors tracks discussed their school librarians. Many times, teachers would reserve time in the library for students to work on their research assignments. Librarians would introduce students to resources and tools:

Student 6: *But, uh, she* [the librarian] *just gave me a lot of websites and where I could go to find more information and find reliable research…*

and

Student 7: *They help you find a lot of information. Give you a lot of resources you can use for, for your research papers and stuff. And just a lot of sources you can go to get what you need for the paper.*

However, students from both curricular tracks confessed that they did not make

good use of the time allotted in their school libraries. An honors student describes how she and her peers spent their time in the library below:

> Student 4: *Like we went to the library a lot, but we'd always like, mess around. We'd be like – I'm just going to do this at home. So, let's talk and what not. And I'm like, you know, like occasionally we'd look at a website and write something down. Just to show that I did something. Show my teacher – but didn't work on it.*

Differences

As opposed to non-honors students, when it comes to teacher guidance, honors track students stressed the importance of being proactive in order to get assistance from their teachers. Two honors students describe this below:

> Student 4: *I got a lot* [of guidance] *because I always ask questions. And, I don't know, like I want to do good on my assignment. So, I definitely wanted to know what I had to do.*

and

> Student 3: *My teacher, all the teachers I had, fortunately in high school, were very helpful. So, if I ever had like questions or whatever. I mean, you had to be, the student had to be more, I guess you had to ask for it more. 'Cause some felt like they didn't really get that much help. But they* [the teachers] *were always there, though.*

In addition, honors students discussed getting guidance on the research process from their peers, a concept that was not raised by non-honors students. However, the extent that peers were drawn upon was mixed, as illustrated in the discussion between two honors students below:

> Student 3 *: I would just have to say like other students in my class. People that I know. I really didn't know any other like, adults or teachers that I could go to.*
>
> Student 4: *I never really asked my friends about it. 'Cause it's normally like I had better grades than them.*
>
> Interviewer: *You were the one that they asked.*

Student 4: *Kinda, yeah. Or like they were like smart enough and didn't need it. Uh, sometimes I ask my mom, like, "Oh, does this sound good?" But I wouldn't get, get any help outside of that. Just kind of like get it over with and do it myself.*

The emphasis on honors students' proactivity in interacting with their teachers and some reliance on peers for guidance through the research process set the honors track students apart from the non-honors track students.

Theme Three: Teacher Pedagogy

In focus groups, students remarked on the teaching approaches, or pedagogies, their teachers used to teach them. Between honors and non-honors track students, there were substantial differences in pedagogies employed.

All students discussed the use of lecture, specifically PowerPoint-based lectures, by their teachers to transmit information to them. However, for the most part, students discussed lecture in a negative fashion. For example:

Student 6: *And the lecture, if you're just talking to me and talking and talking. I'm not going to pay attention.*

and

Student 1: *Anything besides lecture.*

Student 8: *Yeah. PowerPoint is so boring.*

However, all students did mention the use of media, such as video clips or documentaries, to supplement lecture, and this was talked about in a more positive light.

Additionally all students mentioned the use of interactive games to review for tests, and this was also discussed more positively, as described by an honors track student:

Student 3: *I would say like uh, when it came to like uh, studying for the*

test, like group interactive where everybody was involved and like doing, I guess like involving the games.

All students also discussed quizzes, tests, student debate, and student reflection through journal writing as mechanisms their teachers would employ when teaching and assessing them.

Differences

One of the major differences between the honors and non-honors track groups was teachers' use of peer teaching to engage student learning. Across the board, the honors students discussed how they were required to master material independently and then to teach their peers. For example, one honors student described her most memorable research assignments as:

> Student 4: *They were both PowerPoints where we have to teach the class. And, they're most memorable because uh, I don't know. I find PowerPoints really easy to do. And it was like kind of fun to teach the class. It was be a teacher for a day.*

Although students enjoyed being the teacher, their sentiment around learning from their peers seemed to be mixed:

> Student 4: *It depends on the people presenting it. Like if it's kids that just want to get it over with and don't really care. Like they'll just throw something together and try to teach it and you know, kind of like – and then some kids explain it really well. And, I mean like, sometimes I get things more when, when the students teach it. But then sometimes it's more confusing and not as helpful.*

While all students discussed group work, the students' attitudes toward group work were qualitatively different, based on whether they were honors track students or non-honors track students. Non-honors track students simply mentioned group work as one of several pedagogies employed by their teachers. Honors track students tended to speak about group work in a more functional

and detailed way, as illustrated below:

> Student 4: *Group projects were way harder than individual. Because most of the time you get some kids that you knew, like they didn't want to do anything. And me, like I always wanted to be the leader in the group because I wanted an A. I wanted a good grade and no one else, was like that forward about it. So I was like, all right. You do this. You do this. You do this. And most of the time someone would not do something. Almost every time I've done a project, someone messes up*.
>
> and
>
> Student 9: *I had an anatomy project where we did it with uh, we did it in a group of like two. And we had to make this huge binder. And we had to like, um, figure out everything about the digestive, uh, system, and like teach the class and all that stuff….It was a lot of work. Like you had, uh, there was like coloring sheets and you had – like there was a lot of work behind it. So since there were like more people in it, you could break it off and say, "Okay. I'll do this. I'll have this done by then. You do that. You have that done by then*."

Debate was a pedagogy discussed by all students; however, there were differences between honors track and non-honors track students' characterizations of this mechanism. While non-honors students talked about intense discussions in the later (junior and senior) years of their English and history curricula, honors students gave detailed accounts of special programs designed for their learning through debate.

For example, one honors track student experienced an entire semester of her Advanced Placement government course taught in a style of debate:

> Student 6: *…we had to prepare a 3-minute, exactly 3 minute answers to each of the three questions. And each question contained like 2 bullets – two more questions. And we had to memorize our parts whenever like the judges either – they were either judges or lawyers or like, um, journalists….And they would be our judges and we had to, from that answer, those answers that we gave them; they would ask us questions and we had to be experts on our units and one of our, our schools, we got like, we got first place. We got a unit award. Which was really hard.*

Additionally, while all students discussed pedagogies employing "hands-on" learning, honors track students talked about being immersed in these pedagogies, while non-honors track students discussed the desire for more hands-on learning opportunities. For example, two non-honors track students describe the desire for more activities:

> Student 1*: Yeah -- something that gives me a clear picture what you're trying to tell me. Like that. Like the videos were perfect because he would explain first and he would go like into a mini lecture and he'll put the video on and you're like, okay, I see what he's trying to get to and then yeah, that helps you learn.*
>
> Student 8: *'Cause when they talk all period you kind of lose interest and stuff.*

Conversely, honors-track students gave more concrete examples of being immersed in hands-on learning experiences, such as:

> Student 6: *So he really made us learn – like the way he taught. I, I got all the information. And the book, I really didn't need it 'cause he would just cover everything* [through a hands-on program called 'We the People"].

Overall, the discussion of peer teaching, group work, in-depth debate, and hands-on learning practices to engage student learning set the honors track students apart from the non-honors track students with regard to teacher pedagogy.

Theme Four: Factors Affecting Teacher Pedagogy

In focus groups, students discussed several possible explanations for the utilization or non-utilization of the pedagogies employed above. These ranged from the subject of the course to the experience of the teacher. There were substantial differences in these factors for honors students.

Across the board, students confirmed that the majority of their research projects and assignments were assigned in their English and history classes. One non-honors track student stated:

> Student 2: *I had* [research projects] *mostly in English and History and then I would have a couple in my Science class just because I was in forensic science, so we had to do more like fingerprints and things like that. But that was really about it.*

Science classes tended to include a moderate number of research projects, but students discussed that they often included the most group projects. Again, a non-honors track student offered:

> Student 2: *We did a ton of group work especially in science and foreign language. We'd always have like the group, with three or four and get to do a project on it or whatever.*

Very few students mentioned their math or foreign language classes. One outlier student discussed the two research papers he was assigned in his math class.

Another similarity between honors track and non-honors track students is that they both discussed the concept of "bad" teachers and "new" teachers as employing different types of pedagogies. "Bad" teachers were teachers who students did not trust the content knowledge of, or who gave students busy work that students would try to work around. As one non-honors student stated:

> Student 2: *We had arguments in math all the time just because we always thought the teacher was wrong.*
>
> Interviewer: *So, you sort of questioned the expertise of the teacher?*
>
> Student 2: *Yeah. I don't know if that really counts but.*
>
> Interviewer: *That's interesting, okay. Do you think the teacher did that on purpose or do you think that the teacher just didn't know what they were talking about?*
>
> Student 2: *I don't think so, she was kind of, not to be like rude, but she*

was kind of spacey. And so we would always question her.

Further, an honors track student discussed teachers who showed longer documentaries in class and assigned busy work to attempt to keep students engaged:

> Student 9: *The teacher would give you like a sheet that would have like questions on it. The questions would be like super easy. But if you like did fall asleep, you didn't get the grade on it. So, uh, you could get around it. 'Cause like the person next to you, tell them to fall asleep and I'll get you this time the next time we switch.*

Students also discussed "new" teachers as being stricter than those who are more experienced. For example, an honors track student spoke of one of her most memorable teachers:

> Student 3: *She was -- some people said that she was strict. But I mean she was there to do her job and that is to teach you know, English in the right way. And, and she did that but she was also fun too because she was young.*

A non-honors track student shared his characterization of new teachers:

> Student 1: *I hate new teachers because they try to be too strict. They don't really understand that old teachers are more relaxed because they know how to -- they've been doing it so long.*

Differences

Within this theme, non-honors track students differed from honors track students in their discussion of teachers' classroom management, as well as the influence of the geographic location of their schools, in their education. Honors track students differed from non-honors track students in that they discussed magnet programs as well as the concept of the "good" teacher. Honors track students also contrasted their experiences in honors versus non-honors classes.

They believed that many of the differences in these classes affected the pedagogies employed by their teachers.

Non-honors track students spoke about the need for classroom management in their classes. Several students discussed the use of certain pedagogies, such as “popcorn reading,” where students never knew when they might be called on to read, or playing games for test review, as strategies for keeping students’ attention. They also described the environment in their non-honors classes as “everybody talking” and “distracting at times.” These students also broached the topic of geography, or the area of the country where they went to school, as an explanation for their educations. For example, students talked about New York and California as having better K-12 educational systems than Arizona. The topic of geography did not emerge with the honors students.

Honors students, in addition to speaking about “bad” and “new” teachers, also discussed the concept of the “good” teachers. These teachers were ones who showed passion for teaching and for their subjects, who put in effort, and who communicated well with their students. Honors track students stated:

> Student 10: *I think for the teacher part…the teacher actually communicates with their students and teachers who are willing to, to have their students learn more and work -- really putting their effort into their work rather than the other teachers who are just laid back. Just give them whatever work when they come into class. Just have them pass the time and that’s it. Get their paycheck. So -- you know, I guess teachers who are willing to do their job right and put in all the effort so that they can communicate well with their students. I guess they do better for themselves as well.*

and

> Student 6: *So you have to like show me. Give me visual stuff and compare*

it to other things in order for my brain to actually understand the concept….and also, if a teacher has, like a lot of passion for what they do, that shows, that shows me that they actually want to teach me. And if not, then it's like, ugh, I don't want to be here.

Honors students also discussed being enrolled in magnet programs at their high schools, and the magnet program classes they discussed tended to require research assignments. For example:

Student 6: *…I was in the magnet program, and we had to do this big presentation at the end of the year which is part of it for -- I was a law major, and I had to choose this topic and relate it to law.*

Finally, when contrasting their experiences in honors versus non-honors classes, students discussed class size and agreed that their honors classes were substantially smaller in size than their non-honors classes.

Student 9: *Like an honors may have like 25 or 30 people. And an AP class may have like 15.*

Student 11: *Yeah. AP classes are 21.*

Student 9: *But a regular class may have anywhere from 40 to 50 depending on where you went to school.*

The students believed that their honors classroom settings were more "calm" and "strict" across the board when compared to their non-honors classes. For example:

Student 3: *…the honors, I would definitely say was like more like the calm, structured like class. Everybody knew what they had to do, I mean you know, you do it.*

and

Student 12: *Honors classes, they are more strict. Like "I talked to you guys. You should know this." Or, "In college it's going to be hard. So I'm just preparing you for college." But in not-honors classes, they try to help more. Like days before the test, "This is what's going to be on the test." Like that.*

Additionally, there was strong agreement that their honors teachers expected a much higher level of independence than their non-honors teachers. This is evidenced by the comments of several honors track students:

> Student 4: *And like in honors classes, like you're just expected to do more, and like if you didn't do it then you failed. And so -- and some kids didn't care if they failed. But there was only like -- in honors classes there are normally like only one or two kids in the whole class who were like that. And in normal classes, you know, half the class is like, "I don't care what my grades are. I don't need school."*
>
> and
>
> Student 6: *I was a student aide. So I was in a regular class. That's where I began to see like the difference in how the teacher would -- she would baby -- baby them like a lot. You know, like, "what are you doing?" They're in high school. They're seniors. Then I would see her honors class and she'd just: "Do this and that." It was a composition class. So she just, she had the same questions for both of them…*
>
> and
>
> Student 10: *Honors classes to me were more, more like independent. Like they told you what to do. They didn't aid you like regular classes did. They didn't like, they taught you, but they didn't like -- if you had like something to do, they were like "Okay, you have to do this. Do that." But they wouldn't like, "Oh, do you need help on this?" They were like, they want to see what you can do on your own. Yeah. They like, thought you should be independent with your work.*

Finally, as might be expected, honors track students believed that their honors teachers required more work than non-honors classes. For example:

> Student 3: *…in science we had more, it was definitely more projects. Like honors, in high -- well in my high school…it was basically -- like you learn the same information, but it's more about like -- I guess doing more. Like having more projects and whatever. That's kind of what it comes down to.*
>
> and
>
> Student 9: *I know in my English class, I was in an honors English class, and we had to write like a six-page essay. And then the regular English class only had to write like three. So actually they only had to do half of*

what we had to do.

In addition, honors track students observed that their honors classes moved at a much faster pace than non-honors classes. One student experienced the same class in both honors and non-honors form:

> Student 12: *With me, yeah. 'Cause my junior year I started off with AP composition or something. And I switched to American lit honors. Then I switched to regular American lit. So I had to re-do American lit honors my senior year. And, it, it was pretty much faster. It wasn't really hard. Probably because I already had it the year before. So I was like, I know what's going to happen. I know most of the stuff -- 'cause I had the same teacher, too. And, it was just faster.*

Overall, class size, class environment, teacher expectation of independence, and amount and pace of work were the major differences found between honors and non-honors courses when it came to factors affecting teacher pedagogy.

Theme Five: College Preparation

In focus groups, all students discussed college preparation and the characteristics of teachers who they believed had specifically helped them to prepare for college. However, while non-honors track students focused on teachers who encouraged them through the completion of high school so they could get to college, honors track students focused on their most challenging teachers who they believed taught them in a way that they would be prepared for college coursework.

For example, a non-honors track student stated:

> Student 2: *I was with her the last semester of my senior year and I was struggling trying to get out of my senior year just because I had a hard time in English. She would always help me and tell me that as long as I get through this, I can get through college.*

An honors student, however, stated:

> Student 4: *I got to say that the teacher that I hated the most would have to be the one that prepared me the most. 'Cause it was 10th grade, and I never got higher than a C in his class. And we had so many projects that one year that I was in his class. We had at least like 15 projects alone in his class. And he'd give us really random tests and every final or semester exam we had was like super hard and it definitely tested like how much we learned and like I don't even know if like we even need all the extra stuff he wanted us to learn, but it was just like I learned so much from doing all those projects.*

Although there is only a small amount of data available for this theme, I believe it is pertinent to the study and highlights an important potential difference for honors versus non-honors track students.

Summary

I identified five emerging themes through qualitative analysis of focus group data. These themes and differences between honors and non-honors track students are summarized in Table 5.

Table 5. Qualitative Themes

Theme	Description	Differences
The Meaning of "Research"	Research tools Acceptability of sources Effort Process Engagement Topic choice Misestimation	Non-honors: Report writing
		Honors: Place of opinion Visual aspect of product
Source of Guidance	Teachers Librarians Family members	Non-honors: None
		Honors: Proactivity Peers
Teacher Pedagogy	Lecture Use of media Quizzes	Non-honors: Hands-on (desire for)

	Tests Debates Student reflection Group Work	Honors: Peer teaching Group work (detail) Debate (detail) Hands-on (actual)
Factors Affecting Pedagogy	Subject "Bad" teachers "New" teachers	Non-honors: Need for classroom management Geography
		Honors: "Good" teachers Magnet programs Small class size Independence Quantity of work Faster pace
College Preparation	Teachers affecting	Non-honors: Complete high school
		Honors: Challenge for colleges

Discussion of Findings

The results of my exploratory quantitative analysis supported my conceptual framework. Best practice emphasizes that students develop information literacy competency through exposure to problem solving and higher-order thinking activities—a teaching style that best matches that of constructivist learning theory (ACRL, 2000). In order to explore this premise, I chose to pursue the research thread on teacher beliefs about student ability, based on their curricular track, and the resulting pedagogies the teachers employ. As suggested by Oakleaf (2008), I chose to measure students' information literacy abilities using an assessment that was created with students' critical thinking and problem-solving abilities as its basis, which is consistent with constructivist theory. With this framework as my guide, I expected that students who

experienced a higher curricular track in high school—students who had taken greater numbers of honors courses—could be predicted to score significantly higher on the iSkills assessment than their peers, who had experienced a lower curricular track in high school. While this expectation was confirmed in my quantitative results, there could be many explanations for it. However, even when controlling for factors such as gender, language, race, and admission type, curricular track continued to be a significant and strong predictor of iSkills score.

One interesting element of the quantitative findings arises when examining results by curricular track breakdown. In order to normally distribute the curricular track variable, I categorized students into groups of those who took no honors classes in high school, those who took 1-4 honors classes, those who took 5-12 honors classes, and those who took 13 or more honors classes. While the 5-12 honors classes category was significant at the $p = .01$ level, the 13+ honors classes category was only significant at the $p = .08$ level. When examining the 13+ group further, I noted that there was a large amount of variance in iSkills scores of the group, perhaps causing the predictive result to be less statistically significant.

In focus groups, I asked students how well they feel the iSkills assessment measured the critical thinking and problem solving skills they developed in high school. This question resulted in comments about iSkills that may shed light on the phenomenon described above. While non-honors track students talked about test anxiety, honors track students discussed two items about the assessment that non-honors students did not: the desire to get the right answer and the fact

that the test bored them. In regard to their desire to get the right answer, some honors track students mentioned that this caused them to run out of time on the test (which, in turn, would have lowered their scores). For example:

> Student 4: *I never got to it 'cause I was just trying to get that one task right and -- I was just focusing on it so much. I ran out of -- you know I didn't finish 'em. But it was like, if, 'cause I only had a little bit of time I just wanted to finish it. So like maybe the last two questions, I was like, okay. Whatever. Just clicking. Whatever.*
>
> and
>
> Student 4: *I felt like if I just had more time I could have gotten a way better score. I suck at, I suck at timed anything. Like SAT's. Like since they're all timed, like I definitely got more problems wrong than I would have if I, I just had enough time.*

In addition, two honors students discussed being bored by the assessment, especially toward the conclusion:

> Student 6: *I really got bored at the end. I was just like feeling whatever.*
>
> Student 9: *Yeah, I don't think it was accurate.*
>
> Student 6: *Just to get it done. In the end. 'Cause it was long.*

Thus, while there is no definitive answer on why students taking 13 or more honors classes did not consistently score higher than those taking 5-12, the discussion in focus groups did bring to light some interesting factors that very well could have influenced scores.

The exploratory quantitative results helped to shape the topics I explored with students in focus groups. For example, I realized early on that students may have been greatly misestimating, specifically underestimating, the number of research projects and assignments they reported on the pre-iSkills survey, and I was able to utilize the focus groups to confirm that. However, it was not just the

quantity of research assignments, but also distinct differences in the quality of the assignment that arose in focus groups. For non-honors track students, the concept of “report writing” was mentioned frequently, while it was not mentioned within the honors group. The honors track students, however, discussed writing research papers, and the place of their “own opinions” and “drawing their own conclusions” in the research process.

According to Gordon (1999), the typical research assignment in high school, as a function of the English class, does not require students to do research but to report and reflect on the facts and findings of others and to draw conclusions based on reading. Gordon states: “The research assignment acts as a reporting exercise when student involvement is limited to information gathering, which is usually demonstrated by reading, taking notes, and writing a summary. Reporting has masqueraded as researching for so long that the terms are used interchangeably” (para. 3). While Gordon concedes that this type of reporting is appropriate for short-term assignments, she encourages teachers and librarians to elevate expectation of independent student work to the standards of research as it is practiced by real researchers, placing students in a more active role of collecting data and constructing meaning.

Students in my focus groups seemed to agree. Both honors and non-honors track students discussed the amount of effort they were required to put into a research project; the more effort that was required, the more memorable the process was for them. They tended to perceive a typical research assignment as “busy work.” The longer research projects, where students felt more invested,

not only allowed them to exercise information literacy competency at a higher level but also encouraged them to make the leap between extrinsic motivation (e.g., by a grade or class “credit”) to intrinsic motivation (e.g., by the “pride and effort” they put into the assignment). At the very least, all students expressed a desire to choose their own topics.

An emphasis on peers, both as a source of guidance in the research process and on peer teaching, was an element mentioned by honors track students that was not discussed by non-honors track students. While it may make sense that non-honors track students would not tend to rely on peers in their non-honors classes for assistance, it is something that teachers could encourage. Damon & Phelps (1989) distinguished differences between peer tutoring, peer cooperative learning, and peer collaboration. They found that peer collaboration, where a pair of relative novices work together to solve challenging learning tasks that neither could do on their own prior to the collaborative engagement, is high in both equality and mutuality, creating engagement rich in mutual discovery, reciprocal feedback, and frequent sharing of ideas. This also applies to group research as a type of pedagogy employed by teachers. While non-honors track students simply mentioned group work as one of several pedagogies employed by their teachers, honors track students tended to speak about group work in a more functional and detailed way. While none of the discussion in focus groups embodied the rich learning environment described by Damon & Phelps (1989), it is something that teachers could strive to facilitate.

Based on Bloom's taxonomy (Bloom & Krathwohl, 1956), memorization and recall of information are classified as lower-order thinking skills, while analyzing, synthesizing, and evaluation are classified as higher order thinking skills. Resnick (1987) offers additional examples of cognitive activities that are classified as higher order, such as constructing arguments, making comparisons, asking research questions, dealing with controversies, and identifying hidden assumptions. Teachers' use of pedagogies employing higher order thinking skills when working with groups of students who they believe are capable of learning in this manner was confirmed in focus groups. For example, while "debate" was a pedagogy discussed by all students participating in focus groups, there were differences between honors track and non-honors track students' characterizations of this pedagogy. While non-honors students talked about intense discussions in the later (junior and senior) years of their English and history curricula, honors students gave detailed accounts of special programs designed for learning through debate. Overall, the discussion of peer teaching, group work, in-depth debate, and hands-on learning practices to engage student learning set the honors track students apart from the non-honors track students with regard to teacher pedagogy.

Several factors likely to affect teachers' use of pedagogy, in addition to whether students are honors or non-honors track, were identified by students in focus groups. To paint a picture, non-honors track students often found themselves in classrooms that were loud, sometimes chaotic, and overcrowded. Honors track students were more likely to be in calm, more seminar-like,

structured environments. Examples where classroom environment and teacher pedagogy intersect include a non-honors student's description of "popcorn reading," a strategy for keeping students' attention where students never knew when they might be called on to read. Honors students, however, experienced teachers who showed passion for teaching and for their subjects, who put in effort, who communicated well with their students, and who were not afraid to challenge them. Possibly, these teachers were also more likely to learn about and exercise pedagogies that engaged students and encouraged them to exercise higher order thinking skills. While I expected that students in focus groups would discuss their honors classes as covering more material and moving at a faster pace, the teacher expectation of independence as a major difference between honors track and non-honors track students is one that might be examined further.

Chapter Summary

In this chapter, I discussed the findings of my quantitative and qualitative data analysis. Using a hierarchical multiple regression analysis, I identified four variables predictive of a significantly higher score on the iSkills assessment at the $p < .05$ level. Among background variables (Research Question 1), a student's best language, and to some extent, race, are significant predictors of his or her iSkills assessment score. Among the theoretically important variables (Research Question 2), students' cumulative core high school GPAs, as well as their curricular tracks (number of honors, etc. classes taken) explained a

significant amount of the variance in students' iSkills assessment scores. Each of these variables contributes unique variance to the model.

Using methods of qualitative data analysis, I identified five themes that shed further light on students' high school academic experiences related to the acquisition of higher-order information literacy skills (Research Question 3). These themes are: the meaning of "research," source of guidance, teacher pedagogy, factors affecting pedagogy, and college preparation. I also found differences in each theme between honors and non-honors-track students.

When placing these findings into the broader context for discussion, I was able to show that the results of my exploratory quantitative analysis supported my conceptual framework. Focus group findings gave further depth to the quantitative analysis by uncovering details on issues including the quality of the research assignment, an emphasis on peer interaction and additional factors affecting teacher pedagogy.

CHAPTER 5: INTERPRETATIONS AND RECOMMENDATIONS

The purpose of this study was to explore selected high school academic experiences that may influence students' development of information literacy competency. In Chapter 1, I provided the background for this dissertation and stated the research questions. In Chapter 2, I provided a review of the literature from the following areas: 1) information literacy, 2) pertinent educational theories in order to situate this study within a larger body of research and theory, 3) teacher beliefs about student ability and the resulting pedagogies the teachers employ, and 4) literature on alternate admits and exploring majors, both groups that are subpopulations of my sample. Each of these areas and the research threads included within relate to the topic of this study. In Chapter 3, I detailed the research design including the quantitative and qualitative research methods I employed. In Chapter 4, I presented the findings from both the hierarchical multiple regression analysis and the themes I identified in the qualitative analysis of focus group data. I also presented the differences between honors and non-honors track students in the focus groups. Finally, I offered a discussion of findings situated within the literature. As the final chapter, in Chapter 5, I discuss implications for theory and practice, and recommendations for future research.

Implications for Theory

Ultimately, this study is informed by constructivist theory and further informs the literature on constructivist practices. Kuhlthau (1997) states:

> Constructivist type of learning is transferable to situations in the real world. Students learn to think through issues that do not have prescribed responses or preset solutions. Students learn to identify what is important to them, to construct new meanings, and to explain their new

> understanding to others in some way that is authentic to the topic." (p. 711)

Through quantitative explorations, I have shown that even after controlling for background characteristics and GPA, students who have experienced an honors-intense curriculum in high school are more likely to score significantly higher on the iSkills assessment, a measure that, consistent with constructivist theory, was created with students' critical thinking and problem-solving abilities as its basis. Through focus groups, I was able to explore themes and confirm differences in pedagogy between honors and non-honors track students that have been suggested to impact the acquisition and further development of higher-order information literacy competency.

Implications for Practice

Through this study, I have been able to identify and/or confirm some recommended practices for educators to facilitate the development of higher-order information literacy competency in high school students. These practices should be followed regardless of student curricular track. In addition, these practices may continue to be effective into the college years:

1. Research projects and assignments should be focused not only on information access and summarization, but higher-order skills, such as evaluation, synthesis, and drawing conclusions. Whenever possible, students should be encouraged to collect their own data through interviews, observations of real-world phenomena, or administering a survey (Gordon, 1999).

2. Students should be encouraged to choose their own specific research topics within a general theme or parameters. This allows students to be invested in their research from the start and also encourages them to generate research questions, which is a higher order information literacy skill in itself (ACRL, 2000).
3. Research assignments should be substantial in both the amount of credit they are allocated and the amount of time they require to once again allow students to be invested in their projects. These projects should be broken up into multiple parts over the allotted time to allow students the option to self-correct by integrating teacher feedback.
4. Educators should encourage students to work in peer groups, both when mastering material and presenting it to the class and when completing research projects. Educators should facilitate and assess group interactions to assure that they are rich in mutual discovery, reciprocal feedback, and frequent sharing of ideas (Damon & Phelps, 1989).

Furthermore, focus group data revealed additional educational practices—such as reduced class size, effective classroom management, and disciplinary practices—which if followed, would most likely increase the ability of teachers to engage in pedagogies where students are developing higher level information literacy skills through focused inquiry, intellectual independence, and challenging assignments.

Implications for Further Research

This study examines educational practices that have been in use for over fifty years. One of the study's major assumptions revolves around the belief that, with regard to the transfer of information literacy competency, constructivist approaches to teaching and learning are superior to behaviorist approaches, which rely on rote learning and memorization. However, within the realm of information literacy, the study serves to validate recommendations in standards and best practices that have not previously been empirically tested. In that regard, there is still far to go when it comes to understanding how students best develop information literacy competency.

The second assumption of this study is that teachers of students in advanced curricular tracks believe them to be capable of learning higher-order skills, and consequently, they will employ constructivist pedagogies more frequently. While this assumption played out in my focus groups, there are many other ways that this phenomenon could be studied and confirmed, both generally and specifically within the realm of information literacy.

While the research design employed was appropriate for the exploratory nature of the study, there is reason to believe that a larger, randomly-drawn sample could produce different results. That being said, there is an interesting quantitative result that deserves further exploration. That is to explore if there is, in fact, a real phenomenon explaining the findings that students who took 13+ honors courses in high school are less likely to score as high on the iSkills assessment as those who took 5-12 honors courses. Simply stated, is there a

“sweet spot” for honors students—a point after which additional courses make no difference or may in fact be detrimental when it comes to information literacy competency?

The population of the study begs further examination in terms of granularity. For example, while honors track is defined broadly in this study, a more specific study of students in Advanced Placement or International Baccalaureate curricula may yield different results.

At the time of this study, there is no mandatory information literacy curriculum, regardless of existing standards. However, as the emerging Common Core Standards for K-12 education, an initiative of the National Governors Association Center for Best Practices (NGA Center) and the Council of Chief State School Officers (CCSSO) (2010), are implemented, they may further impact students’ development of information literacy competency. Therefore, a repetition of this study in five years is warranted.

One area that emerged during student focus groups was that honors track students were expected by their teachers to be much more independent in figuring things out than their non-honors track peers. In addition, honors track students benefited from teachers who challenged them at a level that they could expect in college. A further examination of how this teacher expectation for independence and resulting challenge affects students’ development of information literacy competency is warranted. Methodology involving gathering data directly from high school teachers and studying students longitudinally would be ideal.

Finally, although outside the scope of this study, there is evidence to suggest that the same pedagogies and educational practices recommended for high school students and their development of information literacy competency would continue to benefit them into the college years. This study has sparked a very real interest in a longitudinal cohort study to examine these same students' college curricular experiences and whether they might predict score increases in further iSkills testing at exit.

Conclusion

Through this study, I have contributed to our knowledge about information competency and the factors that impact its development. Studies that have previously attempted to explore how high school factors relate to students' information literacy competency, measured once students matriculate to college, have been based on lower-order skills instruction using fixed-choice tests as measures (e.g., Smalley, 2004). In this study, I explored the development of information literacy competency utilizing higher-order skills and a performance-based measure and was able to show that curricular track is a significant predictor of information literacy competency, regardless of student gender, language, race, admission type, or GPA. Although I was unable to confirm a quantitative link between numbers of research projects or assignments students completed in high school and information literacy competency, I was able to further pursue this thread through qualitative methods to better understand what "research" meant to these students.

Through focus groups, I was able to further explicate the quantitative findings by comparing non-honors and honors track students' high school academic experiences related to the acquisition of higher-order information literacy skills. Overall, the quality of the research assignment, peer interactions, and constructivist pedagogies employed by teachers contributed a much richer understanding of the quantitative results. By exploring the relationship between high school experiences asserted to impact the development of information literacy competency and students' iSkills test scores, I was able to validate the efficacy of information literacy standards and best practices. Finally, this study adds to the literature of information literacy generally and provides a basis for further study of the information literacy competency of special populations, such as alternate admits and exploring majors.

APPENDIX 1

Sample of AASL Information Literacy Standards for Student Learning

http://www.ala.org/ala/mgrps/divs/aasl/aaslarchive/pubsarchive/informationpower/InformationLiteracyStandards_final.pdf

Standard 1. The student who is information literate accesses information efficiently and effectively.

The student who is information literate recognizes that having good information is central to meeting the opportunities and challenges of day-to-day living. That student knows when to seek information beyond his or her personal knowledge, how to frame questions that will lead to the appropriate information, and where to seek that information. The student knows how to structure a search across a variety of sources and formats to locate the best information to meet a particular need.

Indicators
Indicator 1. Recognizes the need for information

Levels of Proficiency
Basic Gives examples of situations in which additional information (beyond one's own knowledge) is needed to resolve an information problem or question.
Proficient When faced with an information problem or question, determines whether additional information (beyond one's own knowledge) is needed to resolve it.
Exemplary Assesses whether a range of information problems or questions can be resolved based on one' own knowledge or whether additional information is required.

APPENDIX 2

iSkills Competencies Assessed

DEFINE	**Understand and articulate the scope of an information problem in order to facilitate the electronic search for information:** - By distinguishing a clear, concise and topical research question from poorly framed questions, such as ones that are overly broad or do not otherwise fulfill the information need - By asking questions of a "professor" that help disambiguate a vauge research assignment - By conducting effective preliminary information searches to help frame a research statement
ACCESS	**Collect and/or retrieve information in digital environments. Information sources might be web pages, databases, discussion groups, e-mail or online descriptions of print media. Tasks include:** - Generating and combining search terms (keywords) to satisfy the requirements of a particular research task - Efficiently browsing one or more resources to locate pertinent information - Deciding what types of resources might yield the most useful information for a particular need
EVALUATE	**Judge whether information satisfies an information problem by determining authority, bias, timeliness, relevance and other aspects of materials. Tasks include:** - Judging the relative usefulness of provided web pages and online journal articles - Evaluating whether a database contains appropriately current and pertinent information - Deciding the extent to which a collection of resources sufficiently covers a research area
MANAGE	**Organize information to help you or others find it later:** - By categorizing e-mails into appropriate folders based on a critical view of the e-mails' content - By arranging personnel information into an organizational chart - By sorting files, e-mails or database returns to clarify clusters of related information
INTEGRATE	**Interpret and represent information, using digital tools to synthesize, summarize, compare and contrast information from multiple sources:** - By comparing advertisements, e-mails or websites from competing vendors by summarizing information into a table - By incorporating information from different sources to conduct a scientific experiment and report the results - By placing results from an academic or sports tournament into a spreadsheet to clarify standings and decide the need for playoffs
CREATE	**Adapt, apply, design or construct information in digital environments:** - By editing and formatting a document according to a set of editorial specifications - By creating a presentation slide to support a position on a controversial topic - By creating a data display to clarify the relationship between academic and economic variables
COMMUNICATE	**Disseminate information tailored to a particular audience in an effective digital format:** - By formatting a document to make it more useful to a particular group - By transforming an e-mail into a succinct presentation to meet an audience's needs - By selecting and organizing slides for distinct presentations to different audiences - By designing a flyer to advertise to a distinct group of users

APPENDIX 3

Pre-iSkills Student Survey

Academic Success Center

1. What type of high school curriculum most closely matches the courses you took in high school?
   __Standard Curriculum: I completed all requirements and passed my high school proficiency exams
   __Advanced Curriculum: In addition to all standard curriculum requirements, I completed 4 math classes, and an additional science and social studies, arts and humanities/occupational education elective.
   __Honors Curriculum: I completed all requirements in the advanced curriculum and was enrolled in 12 credits or more of honors classes.

2. While in high school, how many papers or assignments requiring research (finding, evaluating, and/or using information) did you complete?

   __None
   __1-3
   __4-8
   __9-15
   __More than 15

3. Would you have needed more or fewer of these papers/assignments to have adequately prepared you to do more advanced versions?

   __many fewer
   __fewer
   __just right
   __more
   __many more

   The iCritical Thinking instrument uses technology to test your skills in information evaluation and management, as well as skills needed to create and communicate information.

4. How would you rate your skills in these areas?
   __Very high
   __High
   __Average
   __Low
   __Very low

5. How would you rate your skills compared to other students?
   __Much better
   __Better
   __Average
   __Lower
   __Much lower

6. How important do you think skills using technology in information and communication tasks/problems are?
   __Very important
   __Important
   __Neutral
   __Unimportant
   __Very unimportant

7. How important is it to you to do well on this test?
   __Very important
   __Important
   __Neutral
   __Unimportant
   __Very unimportant

8. How well do you expect to perform on this test?
   __Very Well
   __Well
   __Average
   __Poorly
   __Very poorly

APPENDIX 4

Social/Behavioral IRB – Expedited Review Approval Notice

NOTICE TO ALL RESEARCHERS:

Please be aware that a protocol violation (e.g., failure to submit a modification for any change) of an IRB approved protocol may result in mandatory remedial education, additional audits, re-consenting subjects, researcher probation, suspension of any research protocol at issue, suspension of additional existing research protocols, invalidation of all research conducted under the research protocol at issue, and further appropriate consequences as determined by the IRB and the Institutional Officer.

DATE: March 28, 2011

TO: **Dr. David Forgues**, Center for Academic Enrichment and Outreach

FROM: Office of Research Integrity - Human Subjects

RE: Notification of IRB Action by /Charles Rasmussen/
Dr. Charles Rasmussen, Chair
Protocol Title: **Evaluating the Success of a Student Retention Program Provided by UNLV's Academic Success Center (ASC)**
Protocol #: 1010-3598
Expiration Date:March 27, 2012

This memorandum is notification that the project referenced above has been reviewed and approved by the UNLV Social/Behavioral Institutional Review Board (IRB) as indicated in Federal regulatory statutes 45 CFR 46 and UNLV Human Research Policies and Procedures.

The protocol is approved for a period of one year and expires March 27, 2012. If the above-referenced project has not been completed by this date you must request renewal by submitting a Continuing Review Request form 30 days before the expiration date.

PLEASE NOTE:
Upon approval, the research team is responsible for conducting the research as stated in the protocol most recently reviewed and approved by the IRB, which shall include using the most recently submitted Informed Consent/Assent forms and recruitment materials. The official versions of these forms are indicated by footer which contains approval and expiration dates.

Should there be *any* change to the protocol, it will be necessary to submit a **Modification Form** through ORI - Human Subjects. No changes may be made to the existing protocol until modifications have been approved by the IRB. Modified versions of protocol materials must be used upon review and approval. Unanticipated problems, deviations to protocols, and adverse events must be reported to the ORI – HS within 10 days of occurrence.

If you have questions or require any assistance, please contact the Office of Research Integrity - Human Subjects at IRB@unlv.edu or call 895-2794.

APPENDIX 5
Academic Success Center Consent Form

TITLE OF STUDY: Evaluating the Success of a Student Retention Program Provided by UNLV's Academic Success Center (ASC)

INVESTIGATOR(S): Dr. David Forgues & Jennifer Fabbi

CONTACT PHONE NUMBER: 774-4613

Purpose of the Study

The Academic Success Center is offering a program to students on effective ways to prepare themselves academically. The program will include individual assessment and interventions based on those assessments for students who choose to participate. The interventions will be delivered to individual students by Academic Success Coaches. Several elements being examined are time management, test taking skills, test anxiety, note taking skills and critical thinking skills. This research is gathering information to help in that examination. **Please note that you do have a choice whether to allow or not allow your individual data to be gathered and included in the research study. Either way, you will receive all of the benefits of the Academic Success Center coaching program.**

Participants

You are being asked to participate in the study because you are a part of the Academic Success Center coaching program. The coaching program at the Academic Success Center is an optional program.

Procedures

You are being asked to participate in the research by taking tests on information, communication and technology skills (iCritical Thinking) and learning and study strategies (Learning and Study Strategies Inventory) to determine at what skill levels you are entering UNLV, as well as to allow access to additional information about yourself to help the researchers make better sense of the test scores.

Benefits of Participation

There will be direct benefits to you as a participant in this study:

- You will learn about your own skill levels in regards to learning and study strategies and critical thinking and will work with Academic Coaches on strategies for improving these skills;
- Study strategy and information literacy skills may help you in your academic performance at UNLV.
- All students who complete the exam will receive a score report. If you receive a passing score, a printed certificate will also be provided.

Participant Initials _____

Approved by the UNLV IRB. Protocol #1010-3598
Received: 03-16-11 Approved: 03-28-11 Expiration: 03-27-12

TITLE OF STUDY: Evaluating the Success of a Student Retention Program Provided by UNLV's Academic Success Center (ASC)

Risks of Participation

There are risks involved in all research studies. There is minimal stress or discomfort associated with this assessment. Minimal stress or discomfort may be test anxiety or test fatigue.

Cost /Compensation

The Academic Success Center coaching program is free of charge. There is no additional time cost or compensation for participating in the research study.

Contact Information

If you have any questions or concerns about the study, you may contact Dr. David Forgues at **774-4613.** For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact **the UNLV Office of Research Integrity – Human Subjects at 702-895-2794 or toll free at 877-895-2794 or via email at IRB@unlv.edu.**

Voluntary Participation

Your participation in this study is voluntary. You may refuse to participate in this study or in any part of this study. You may withdraw at any time without prejudice to your relations with the university. You are encouraged to ask questions about this study at the beginning or any time during the research study.

Confidentiality

All information gathered in this study will be kept completely confidential. No reference will be made in written or oral materials that could link you to this study. All records will be stored in a locked facility at UNLV for seven years after completion of the study. After the storage time the information gathered will be destroyed.

Participant Consent:

I have read the above information and agree to participate in this study. I am at least 18 years of age. A copy of this form has been given to me.

_____ _____

Signature of Participant Date

_____

Participant Name (Please Print)

Participant Note: Please do not sign this document if the Approval Stamp is missing or is expired.

Participant Initials _____

Approved by the UNLV IRB. Protocol #1010-3598
Received: 03-16-11 Approved: 03-28-11 Expiration: 03-27-12

APPENDIX 6

Focus Group Questions

Exploring the research assignment variable. Ask these questions of both low and high honors groups:

“You were asked to approximate the number of research projects or assignments you had in high school. Think back to high school.”

1. How would you describe a typical research project or research assignment?
2. How much guidance did you get from your teachers on these assignments? Did anyone else give you guidance? Did anyone tell you where or how to do the research, how to write it up? Were there specific instructions about number of citations, etc.?
3. What classes were you more likely to have these types of assignments in (probe both subject and track)? Name all five core academic content areas (English, math, science, social science, and foreign language).
4. Think back to your most memorable high school research assignment. What made it memorable?
5. Remember the first question I asked about your typical research assignment. Was your typical high school research assignment similar to your most memorable assignment? How were they the same/different?
6. [Bring data on number of research projects question]. How many research projects or research assignments do you think you had in high school?

How difficult was it to remember how many of these assignments you had in high school?

Ask these next questions of both low honors and high honors groups. Compare for qualitative differences.

7. Think back to your core academic high school classes. What kinds of in-class activities were most common? (Probe with reading and in-class discussion, group work, quizzes, tests, etc.)
8. In what ways were these assignments different from one another? (e.g., in-class worksheets versus debate)
9. Think back to the one high school teacher you think prepared you the most for college. In what ways do you think that teacher prepared you the most?

These questions are to explore possible explanations for why 5-12 honors classes have more explanatory power than 13 or more. Ask of high honors group:

1. What differences did you find between the honors classes and regular classes that you took in high school? (probe for the way teachers taught, pace, quality of learning with peers, etc.)

Ask of all:

1. How well do you feel that the iSkills exam measured the critical thinking and problem solving skills you developed in high school?

APPENDIX 7

Coding Schematic for Qualitative Analysis

Italics = generated as open coding
Bold = added in upon further review
*Different between groups

Honors

- Research
  - **Essays (place of opinion)*
  - *Tools: Databases, Citation tools*
  - *Acceptable resources*
  - *Citations*
  - **Visual aspect*
  - *Motivation*
    - *Effort*
    - *Engagement*
    - *Topic choice*
  - *Process (length of time)*
  - *Number of research projects (misestimation)*

- Guidance
  - *Teacher*
    - **Proactivity*
  - *Family member*
  - *Librarian*
  - **Peers*

- Types of pedagogy
  - *Review*
    - *Games (interactive)*
    - **Worksheets*
  - *Debates*
  - *Group work*
  - *Quizzes*
  - **Tests*
  - **Peer teaching*
  - *Hands-on*
  - *Lecture (PowerPoint)*
  - *Use of media*
  - *Journal, reflection*

- Factors affecting pedagogy
  - *Subject of course*
    - *English*
    - *Foreign Language*

History
Math
Science
**Magnet Program*
Honors courses
**More work (quantity)*
**Teacher expectation of independence*
**"Strict" "Calm"*
**Quality of peers*
**Fast paced*
**AP test prep*
**Class size*
Teacher
**"Good" teacher*
"Bad" teacher
New teacher

iSkills exam
Test anxiety-Timed test
Difficulty
**Boring*
Right answer
Relevance

Other
College preparation
*******Challenge*

Non-Honors

Research
**Report Writing*
Tools: Databases, Citation tools
Acceptable resources
Citations
**Affect*
Motivation
Effort
Engagement
Topic choice
Process (length of time)
Number of research projects (misestimation)

Guidance
Teacher
Family member
Librarian

Types of pedagogy
- *Review*
  - *Games (interactive)*
- *Debates*
- *Group work*
- *Quizzes*
- *Hands on (desire for)*
- *Lecture (PowerPoint)*
- *Use of media*
- *Journal, reflection*

Factors affecting pedagogy
- *Subject of course*
  - *English*
  - *Foreign Language*
  - *History*
  - *Math*
  - *Science*
- ****Management of Attentio**n*
- *Teacher*
  - *"Bad" teacher*
  - *New teacher*
- *****Geograph**y*

iSkills exam
- *Test anxiety-Timed test*
- *Difficulty*
- *Right answer*
- ***Relevance***

Other
- *College preparation*

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