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# Factors Influencing Information Literacy Self-Efficacy of Prelicensure Baccalaureate Nursing Students

Meagan White

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FACTORS INFLUENCING INFORMATION LITERACY SELF-EFFICACY OF  
PRELICENSURE BACCALAUREATE NURSING STUDENTS

A Dissertation

Submitted to the School of Graduate Studies and Research

in Partial Fulfillment of the

Requirements for the Degree

Doctor of Philosophy

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December 2018

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Information literacy (IL) is essential to nurses' delivery of quality patient care due to its role in evidence-based practice. Consequently all nursing students must achieve IL competence upon graduation. However, few publications have explored factors that influence IL skills of prelicensure baccalaureate nursing students and even less is known about current pedagogical strategies employed by faculty to promote IL competence.

This study used a mixed method design to examine student factors and educational strategies that influence IL self-efficacy of senior-level prelicensure baccalaureate nursing students. The purpose was three-fold to describe nursing students' IL self-efficacy levels utilizing a valid and reliable tool; to analyze relationships between demographic factors, educational strategies, and IL self-efficacy; and to provide a description of educational strategies employed by nursing programs to achieve IL competency of graduates. A convenience sample of 260 prelicensure nursing students from baccalaureate programs across the United States was used. Additionally, eight qualitative interviews were conducted with faculty and administrators from participating sites. The Information Literacy Self-Efficacy Scale (ILSES) was used to assess IL self-efficacy amongst this cohort of students and directed content analysis helped to identify qualitative categories and themes relating to IL educational interventions under the framework of Rogers's Diffusions of Innovation (DOI) theory.

A statistically significant relationship was found between IL self-efficacy and student age, online search preference for Google, frequent use of textbook as information sources, and frequent use of professional journals as information sources as these factors accounted for 13.9% of the variance in ILSES scores ( $F(4, 252) = 10.192, p < .0005, R^2 = .139$ ). Further statistical analysis indicated two student factors, younger age and preference of Google for online searching, were associated with lower IL self-efficacy scores. Additionally, a coding matrix developed using DOI theory was used to explore six qualitative themes that emerged from faculty interviews relating to IL educational strategies. The study's most prominent theme relating to faculty's use of IL pedagogies was focused on communication channels and social systems. Implications from this study's results may be used by nurse educators, administrators, and policymakers to develop innovative evidence-based IL pedagogies and improve nursing program curricular designs.

*Keywords:* information literacy, information literacy self-efficacy, evidence-based practice

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## CHAPTER ONE

### INTRODUCTION<sup>1</sup>

#### **Factors Influencing Information Literacy Self-Efficacy**

Nurses must be adept at navigating vast amounts of information in today's technology-rich care environment. As hospitals seek to improve the quality of care and information sharing among patients and care providers, information and communication technologies (ICTs) dominate the healthcare landscape (Bashshur et al., 2009). Despite efficiencies in delivering patient care afforded by ICTs, the threat of overlooking vital information due to an overload of digitized data is now a reality for nurses. The rapid proliferation of information sources available to healthcare professionals has led to the identification of information literacy (IL) as essential to the provision of safe, quality patient care (Institute of Medicine [IOM], 2001). In turn, scholars are calling for the restructuring of nursing education to incorporate IL skills necessary for utilization of research associated with evidence-based care (Greiner & Knebel, 2003; Kohn, Corrigan, & Donaldson, 2000).

Key among these recommendations is that prelicensure baccalaureate nursing students graduate with IL skills necessary for navigating vast amounts of patient information (Partnership for 21st Century Skills, 2008). Considered a vital competency for graduating nursing students, the American Association of Colleges of Nursing's ([AACN], 2008) *Essentials for Baccalaureate Education for Professional Nursing Practice* integrates IL into accreditation standards for baccalaureate nursing programs. The assimilation of IL into the nursing curriculum provides students with the basic knowledge to apply skills for evidence-based practice (EBP)

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<sup>1</sup> Sections of this chapter have been used in a previously published work. White, M. (2018, April). *Factors Influencing Information Literacy Self-Efficacy of Prelicensure Baccalaureate Nursing Students*. Poster session presented at Sigma Theta Tau International Nursing Education Research Conference, Washington, D.C.

that are required to improve the quality of care in complex nursing environments (AACN, 2008). The American Library Association ([ALA], 1989) defines IL as “the ability to recognize when information is needed and have the ability to locate, evaluate, and effectively use the needed information” (para 3). Fundamental to engagement in EBP, IL competencies ensure nurses have proper skills in the collection, analysis, evaluation, and utilization of data, information, and resources (Ball & Hannah, 2011; Dixon & Newlon, 2010; Koehn & Lehman, 2008). As the keystone of EBP, IL encompasses skills necessary for the discovery, analysis, and use of the best research evidence.

IL skills are threaded throughout the nursing process as the nurse must be able to determine what information is needed, find information based on the resources available, appraise the information while determining the validity of the source, apply the information to practice, and evaluate improvements from the application of information (Technology Informatics Guiding Education Reform [TIGER], 2012). Thus, IL competencies are fundamental to nursing and EBP. The components of IL also directly align with those of the literature review process, as research utilization requires the ability to retrieve and evaluate scholarly articles from a variety of sources. Both processes involve the ability to identify when information is needed, formulate a question or problem based on evidence from research or data collected, critique the validity and reliability of information sources, and synthesize information to generate knowledge or answers addressing the identified question(s) or problem(s) (ALA, 1989; Polit & Beck, 2012).

Despite the link between IL skills and EBP, a report from the National League for Nursing ([NLN], 2008a) indicated that only 40% of nursing programs surveyed had specific IL requirements for graduation. Although competency standards provide direction for the



development of information literate graduates, higher education continues to lag in incorporating IL competencies into nursing curricula. However, it is imperative that nursing students demonstrate the ability to apply published research effectively in their practice to assure the provision of quality, safe, patient-centered care as they transition into practice. Therefore, IL education in nursing programs must focus on the ability to identify pertinent publications from multiple sources of information, analyze the validity of the information, synthesize information from various sources to develop new knowledge, and transfer this knowledge into practice. Because IL skills play a vital role in EBP, nursing faculty must explore factors impacting students' abilities to learn and apply IL skills.

The following chapter provides an overview of this study investigating the relationship between IL self-efficacy of prelicensure baccalaureate senior nursing students and demographic and educational influences. The background and problem statement sections discuss IL in the context of nursing education and research and provide a rationale for the study. Additionally, this chapter includes the study's research questions, definition of pertinent terms, conceptual framework, assumptions, and significance.

## **Background**

First described in 1989, IL is a relatively new concept in education. Identified by the Association of Colleges and Research Libraries (ACRL), a subdivision of the ALA, the document *Information Literacy Competency Standards for Higher Education* (hereafter "ACRL Standards") details five competency standards for IL skills of college students. Based on these standards, an information literate individual demonstrates competency in a five-step process: (1) determine the extent of information needed; (2) access information effectively and efficiently; (3) evaluate information and its sources critically; (4) use information effectively to accomplish a

specific purpose; and (5) understand the economic, legal, and social issues surrounding information use (ACRL, 2000). Since its conception, IL has been defined as an essential skill to ensure readiness for nursing practice through the discovery, examination, and evaluation of information sources (NLN, 2008b). As nurses must demonstrate effective research utilization in the provision of evidence-based nursing care, it follows that nursing students should acquire basic IL skills through undergraduate coursework.

Collaborative reports from nursing professionals, experts, and educators, such as the consortium led by the TIGER Initiative, have helped to define basic computer, IL, and informatics competencies for practicing nurses (Dulong & Ball, 2008). Additionally, accrediting agencies have integrated IL competencies into the curricular elements and frameworks with the expectation that baccalaureate nursing students will display basic competency in IL prior to graduation. Similar to the TIGER Initiative, the autonomous accreditation division of the NLN, the Accreditation Commission for Education in Nursing ([ACEN], 2017), adopted the ALA's definition of IL in the glossary for their baccalaureate standards. Furthermore, the AACN (2008) recommends content that nursing programs should provide as part of nursing education. They suggest including the skills of inquiry, analysis, and IL in two of the nine *Essentials of Baccalaureate Education for Professional Nursing Practice*. Although the AACN has not adopted the ALA's definition of IL, the integration of IL into curricular essentials attests to the importance of IL in nursing education.

Despite established competency standards for integrating IL into nursing practice and higher education, the published literature fails to explore educational factors impacting the development of IL competency of baccalaureate nursing students. Nursing literature focuses instead on computer literacy, technology competency, or demographic factors effecting the

development of IL self-efficacy of prelicensure baccalaureate students. Studies on computer literacy reveal that specific barriers such as lack of an informatics course in program curricula (Ball & Hannah, 2011) and misconceptions related to informatics (Brettle, Hulme & Ormandy, 2007) negatively impact nursing students' abilities to develop skills in information technology. Similar factors may also exist as barriers to the development of IL competency; however, the process of IL skill development warrants further exploration as IL is described as a more distinct and a broader area of competence than information technology (ACRL, 2000).

A limited number of empirical studies have examined IL educational strategies but with small sample sizes, other health disciplines, associate-degree students, or with a focus on EBP as a whole rather than IL competency. Furthermore, the majority of studies concerning IL and EBP pedagogies are weakened by the use of subjective or non-validated instruments. Only two scholarly works, a study by Stokes and Urquhart (2011) and dissertation by Wendekier (2015), utilized the Information Literacy Self-Efficacy Scale (ILSES) when examining competencies of prelicensure baccalaureate nursing students. However, the ILSES, a valid and reliable 28-item tool, has been used in several studies across disciplines of higher education to operationalize tasks of the ACRL Standards. Developed by Kurbanoglu, Akkoyunlu, and Umay (2006), the ILSES is the only self-efficacy measure of IL competency to adopt the ALA's definition and ACRL Standards, as evidenced in the structure and content of the survey.

### **Statement of the Problem**

The provision of quality and safe patient care requires nurses be proficient in IL skills to ensure the competence necessary for use of EBP. Nursing practice at all levels requires a nurse to use EBP to improve the quality of patient care. IL drives the use of EBP among nursing professionals that will ultimately improve the quality and safety of care for the betterment of

society. Registered nurses need IL skills to practice evidence-based nursing; therefore, all nursing students must be information literate upon graduation. However, few publications have explored factors that influence skills specific to IL knowledge, competency, or proficiency levels of prelicensure baccalaureate nursing students. Thus, the science of nursing education needs empirical research to examine IL skills of baccalaureate students and inform the development of pedagogies to promote competency development (NLN, 2008a; Fetter, 2008).

Faculty must utilize evidence based IL teaching strategies to prepare graduating nurses to practice in an increasingly technological, data-rich health care system. However, despite the fact that it has been established that students need to become more competent in IL, there is a dearth of information on how to accomplish such gains (Morgan, Fogel, Hicks, Wright, & Tyler, 2007). In addition, educators are challenged with how best to incorporate IL competencies and skills into an already burgeoning curriculum.

Authors have only begun to explore the complexities of influencing factors, such as educational techniques or pedagogical strategies, employed by nursing programs for the purpose of developing IL competencies among students. Small studies with homogenous samples from single sites or sites of the same geographical area have provided a foundation for the exploration of IL competency among prelicensure baccalaureate nursing students. An important research opportunity exists to enhance IL skills of nursing students to help them develop a repertoire of IL skills, enhance the quality of teaching and learning, and foster the needed skills for EBP and lifelong learning.

### **Purpose**

The purpose of this study with prelicensure baccalaureate nursing students was three-fold, to: 1) describe prelicensure baccalaureate senior nursing students' IL self-efficacy levels

utilizing the valid and reliable ILSES tool; 2) analyze the relationship between demographic factors, educational strategies, and IL self-efficacy; 3) provide a description of educational strategies employed by nursing programs across the United States aimed at achieving IL competency. Mixed methodology was appropriate for the purpose of this study which aimed to expand upon previous quantitative research studies regarding student factors influence IL self-efficacy while also exploring lesser known IL educational strategies employed by prelicensure baccalaureate programs through qualitative analysis.

### **Research Questions**

This mixed method study used quantitative analysis with descriptive and correlational statistics, as well as qualitative data from faculty interviews, to answer the following research questions:

Research Question #1: What are the IL self-efficacy levels of prelicensure baccalaureate senior nursing students as measured by the ILSES?

Research Question #2: What student factors and educational strategies influence IL self-efficacy levels of prelicensure baccalaureate senior nursing students?

Research Question #3: How do administrators, faculty, and deans of nursing programs describe educational strategies utilized in the development of IL competencies of prelicensure baccalaureate nursing students?

### **Definition of Terms**

This study uses the following terms.

Information literacy is defined as “the ability to recognize when information is needed and to locate, evaluate, and effectively use the needed information” (ALA, 1989, para. 3). For the purposes of this study, the concept of IL is defined by the ACRL’s (2000) five specific

competencies: (1) to identify and determine the extent of information needed; (2) to access the needed information effectively and efficiently; (3) to evaluate the information sources critically; (4) to apply the information to accomplish a specific purpose; and (5) to understand the economic, legal and social issues in using information in any context.

Information literacy self-efficacy is defined as a person's belief in his or her ability to employ skills in the process of recognizing the need for information and subsequent location, evaluation, and use of information within the context of a question or problem (ALA, 1989; Bandura, 1986, 1997). For the purposes of this research study, information literacy self-efficacy is operationally defined by total scores on the valid and reliable ILSES tool item tool. The ILSES, developed by Kurbanoglu et al. (2006) is the only self-efficacy measure of IL competency to adopt the ALA's definition and competency standards, as evidenced in the structure and content of the survey. The tool contains 28-items requiring participants to rate confidence and competence in conducting IL tasks with higher scores indicating increased perception of IL self-efficacy.

Student factors are defined as personal characteristics or habits of nursing students. For the purposes of this study, student factors are operationally defined by a self-report of age, gender, primary language, race and ethnicity, participation in a college library course, information resources used, and online searching preference.

Educational strategies are defined as teaching interventions or pedagogies aimed at the development of IL competencies of prelicensure baccalaureate nursing students. For the purposes of this study, educational strategies are operationally defined as faculty's self-reported curricular inclusion of an undergraduate course in nursing informatics, a course or lesson with review of library and information sciences resources, a capstone course or professional practice

immersion, an evidence-based practice project, educational technologies for clinical teaching, and mobile device technologies. In addition, semi-structured interviews with nursing faculty, deans, or administrators will further describe educational strategies and interventions used by nursing programs to develop IL skills of prelicensure baccalaureate nursing students.

Prelicensure baccalaureate nursing student is a prelicensure nursing student who is preparing to become a registered nurse in a baccalaureate granting institution. For the purpose of this study, this definition excludes second-degree accelerated, RN-to-BSN, associate-degree, or diploma students.

### **Conceptual Framework**

This study utilized Rogers's diffusion of innovation (DOI) theory. First described in 1962 by Everett Rogers in his work "Diffusion of Innovations", the DOI model has become one of the most studied theories in social science. Now in its fifth revision, Rogers's DOI theory has been used in over 6,000 research studies (Robinson, 2009) and has been used in recent years to study the adoption of healthcare information technologies and evidence-based practice innovations (Greenhalgh et al., 2008). In the DOI model, Rogers (2003) defines innovation of an idea or object that is new to the user and diffusion as, "the process in which an innovation is communicated through certain channels over time among members of a social system" (p. 5). Innovations may be new objects, ideas, or behaviors and diffusion occurs when these innovations are communicated through certain channels over time among members of a social network (Rogers, 2003). According to Rogers (2003), it is not relevant how long the idea or concept has been in existence; it is the attitude and reaction to its "newness" that facilitates diffusion. This definition highlights the four necessary components of DOI: innovation, communication channels, time, and social systems (Rogers, 2003).

Concepts of Rogers's theory (2003) include reinvention, peer-peer networks, understanding needs of user segments, and diffusion versus adoption. The concept of reinvention indicates the adaptation and refinement of an innovation to meet the needs of more demanding and risk-averse adopters. The theory views communication channels or social systems with peer-peer networks as a method to spread information. Rogers (2003) identifies social systems as any formal or informal group that joins together in a common goal. Additionally, the idea of understanding the needs of different user segments requires the identification of group personality characteristics as each group adapts to change based on its own strengths and limitations (Rogers, 2003). Finally, Rogers's (2003) DOI theory is based on the concept that diffusion of an innovation does not necessarily ensure its adoption. Rogers (2003) asserts that the innovation-decision process varies in length of time and consists of steps encompassing the time in which the individual first learns of the innovation until the innovation is adopted or rejected. The speed of adoption will depend on five user-perceived qualities: relative advantage, compatibility, complexity, trialability, and observability (Berwick, 2003; Rogers, 2003). For example, observability is defined as the extent to which the benefits of an innovation are visible to the potential adopters and an innovation will be adopted only when the results are perceived as beneficial (Rogers, 2003).

Rogers (2003) categorizes individuals or groups based on their speed of adoption and innovativeness into five "adopter" categories: innovators, early adopters, early majority, late majority, and laggards. Innovators, the first to adopt, are generally younger and are often described as very social, adventurous, risk-takers, and understanding of complex ideas (Rogers, 2003). Early adopters are considered change agents who tip the critical mass for adoption of innovation as they garner respect from the majority of individuals, serve as role models, and are



more locally integrated with opinion leaders (Rogers, 2003). The early majority is described as deliberate adopters who will adopt just before the average group (Rogers, 2003); whereas the late majority approach innovation with caution and skepticism, adopting only after risks are mitigated or with pressure from their peers (Rogers, 2003). Finally, the laggards are characterized as traditionalists who prefer to avoid change (Rogers, 2003).

### **Application of Framework**

Recent studies have demonstrated that Rogers's (2003) DOI theory is useful for the conceptualization of adoption of innovation within the context of nursing. Nursing leaders who want to foster implementation of innovative pedagogies or educational strategies aimed at IL development will need to recruit the opinion leaders and demonstrate the relative advantage of adoption. Therefore, the DOI theory provided the theoretical framework to explore the impact of demographic factors and educational strategies on student self-efficacy levels related to IL skills and competencies. Rogers's theory (2003) provided context for exploring why students, faculty, and schools of nursing have adopted and pursued relatively new competencies of IL and what characteristics were similar among them. The actions of schools of nursing whose students report high IL self-efficacy levels may demonstrate characteristics of innovators or early adopters of this degree and analysis of their responses may provide insight into the value of pedagogies aimed at IL competency development. In addition, insight was gained into how educators cultivate evidence-based teaching practice to further prepare students for patient care in an increasingly complex environment.

### **Assumptions**

The researcher assumed that schools of nursing recognize the importance of IL for nursing practice, acknowledge the relationship between IL and EBP, and accept the ALA's

definition and competencies of IL. This study also assumed schools of nursing are actively integrating IL competencies into their baccalaureate curricula and have threaded objectives related to IL competency throughout their classroom and clinical courses. The assumption that nursing directors and faculty have identified and employed specific pedagogies aimed at helping students develop IL skills necessary for practice was made by the investigator. This study expected senior baccalaureate nursing students to be familiar with concepts of IL and exposed to varying educational strategies aimed at development of IL competency. The underlying assumption of this study was that by identifying the major factors affecting prelicensure student nurses' development of IL self-efficacy, related pedagogies and nursing programs could be better designed to assist in the process of developing IL competency.

The final assumptions centered on the study participants including nursing educators and prelicensure baccalaureate students. The researcher assumed deans, directors, and nursing faculty would accurately report current educational practices of their nursing programs regarding IL competencies. Likewise, the assumption was made that nursing students would honestly answer questions in the data collection tool and demographic survey.

### **Significance**

Specific exemplars of how IL skills may be integrated into a nursing curriculum are relatively sparse. A study conducted by Courey, Bensons-Soros, Deemer, and Zeller (2006) investigating the impact of IL prelicensure baccalaureate students' use of and attitude toward EBP found that an IL educational program had "a positive effect on students' literacy skills and a negative effect on their attitudes towards the need for using these skills in nursing practice" (p. 320). These findings highlight the complexity of the challenge facing nursing faculty who wish to develop IL skills of nursing students. The body of current literature, comprised of small

studies with homogenous samples from single sites or sites of the same geographical area, provide a foundation for the continued exploration and identification of contributing factors associated with IL self-efficacy of prelicensure nursing students. Additionally, the published literature on IL skills of nursing students fails to incorporate the accepted ALA definition, ACRL standards, and competencies for IL in higher education (Carlock & Anderson, 2007; Schutt & Hightower, 2009; Smith-Strom & Norvedt, 2008). Without specific competencies or frameworks guiding this research, existing studies have failed to build on a broader understanding of IL in nursing education.

However, nurse researchers are only now beginning to focus on factors effecting IL competency. Nursing scientists have yet to investigate teaching methods and curricular strategies employed by faculty across the United States in preparation of information literate graduates. Research is particularly lacking in areas related to IL education, as minimal information is available specific to the IL learning experiences of prelicensure baccalaureate nursing students. Moreover, faculty cannot expect IL competent graduates without first ensuring that students have educationally enriching experiences to develop IL skills necessary for practice. Future development of evidence-based IL teaching strategies will require a basic understanding of current learning experiences of nursing students.

Therefore, there is a need to examine IL in nursing and investigate how nursing programs can best prepare graduates with appropriate IL skills and knowledge for practice. Knowledge of demographic factors and educational strategies associated with higher IL levels would enable faculty to identify students at risk for having low IL skills and to direct resources toward curricular improvements. For example, examining IL and its relationship to educational, program, and curricular factors would inform faculty as they adopt educational technologies such

as academic electronic health records (AEHRs). In this case, consideration must be given to integration of AEHRs under the context of millennial students' proficiency in the rote learning of software and hardware associated with "computer literacy" but lack of skills necessary for analyzing and evaluating patient data. As millennial students cite high levels of computer literacy and competence in the use of IT (Bussert, 2011; Folley, 2010), nurse educators must shift their focus from pedagogies aimed at developing basic technology and computer proficiencies to IL competency. Understanding IL processes of nursing students would assist educators in preparing them for practice with proper skills to collect, analyze, evaluate, and utilize data, information, and resources.

A considerable gap exists in understanding how schools of nursing are preparing students with IL skills necessary for practice. Within the nursing discipline, the concept of IL takes on additional importance as a prerequisite for EBP by providing the skills necessary for finding, evaluating, and incorporating research evidence into the professional decision-making process. The delivery of safe, effective nursing care requires the use of an evidenced-based approach to practice, whereby nurses have suitable access to data and capabilities to synthesize sources of evidence (Shorten, Wallace, & Crookes, 2001). IL and EBP have in common the need to find information; therefore, teaching student nurses where and how to find and evaluate information is a critical part of the nursing curriculum. Teaching students to hone information-searching abilities throughout their undergraduate years helps to instill the value of IL as a skill refined over time, ultimately nurturing students' abilities and desires to become lifelong learners. Development of IL not only facilitates engagement in clinical reasoning, problem solving, and research processes, but it also enables practicing nurses to take responsibility for continued

learning and professional development by ensuring they have developed the skills necessary to search, appraise, summarize, and synthesize credible sources of evidence.

Despite the impact of IL competency on nursing practice and ultimately on patient outcomes, a gap in the literature exists as past research has focused on computer literacy and few studies exist which explore higher levels of IL competency of prelicensure baccalaureate nursing students. Little work has been undertaken specific to IL knowledge, competency, or proficiency levels of nursing students. To date, large scale nursing educational studies lack measurement of IL skills using the validated ILSES tool. While expert opinion abounds concerning IL in general, more research is needed concerning the IL knowledge and learning experiences of students in undergraduate nursing education. Describing the development of IL competency is imperative to its wider acceptance in nursing education and assurance of student success, readiness for practice, and ultimately patient safety and care outcomes.

### **Chapter Summary**

Information literacy self-efficacy may directly relate to nursing students' abilities to appreciate and apply IL knowledge to inform evidence-based nursing practice. Nursing faculty must first develop educational interventions to promote positive IL perceptions among baccalaureate students and subsequent understanding of the relationship between IL and EBP. However, a paucity of educational research related to IL in nursing education has inhibited the development of evidence-based teaching strategies. Investigation of the relationship between IL self-efficacy levels, student demographic factors, and educational strategies may help nursing faculty tailor their pedagogical interventions to improve IL self-efficacy.

This study examined quantitative data from both faculty and senior prelicensure baccalaureate students from nursing programs across the United States to determine if a

relationship exists between IL self-efficacy, student demographic factors, and educational strategies. Additionally, qualitative analysis of faculty interviews was used to explore the study's third research question, which aimed to describe the current state of nursing education science regarding educational strategies for ensuring IL competency of prelicensure baccalaureate nursing students. The Diffusion of Innovation theory by Rogers (2003) served as the theoretical framework for this investigation. This mixed method study may generate future research projects to help nursing students understand how IL proficiency facilitates competent, evidence-based nursing practice.

## CHAPTER TWO

### LITERATURE REVIEW<sup>2</sup>

Information literacy (IL) provides a foundation for evidence-based practice (American Association of Colleges of Nursing [AACN], 2008). This chapter reviews published literature related to IL self-efficacy, examining IL in the context of EBP and nursing education. The analysis of current literature helped identify the basis for IL measurement, factors influencing its development, and its relationship to the educational processes and outcomes of nursing students. In addition, this review analyzed and synthesized existing knowledge related to IL self-efficacy of prelicensure baccalaureate nursing students to identify gaps in current literature and build the case for further research.

This review utilized empirical studies from Academic Search Complete, the Cumulated Index to Nursing and Allied Health Literature CINAHL® Complete, ERIC, Health Source, Library & Information Science Source, and PsycINFO. The literature search used the key words of IL, computer technology, undergraduate nursing students, and nursing education and initially included only articles published in the past six years. Due to a lack of publications specific to IL and nursing education, the review was modified to use additional key words such as IL, higher education, nursing students, baccalaureate nursing, pedagogy, and teaching to retrieve information regarding the instruction of IL within the postsecondary educational setting. Additionally the researcher expanded the literature review to include any pertinent articles published after 2000. References dating prior to 2000 were included only if they contained essential information helping the reader understand the importance of IL in nursing education.

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<sup>2</sup> Sections of this chapter have been used in a previously published work. White, M. (2018, April). *Factors Influencing Information Literacy Self-Efficacy of Prelicensure Baccalaureate Nursing Students*. Poster session presented at Sigma Theta Tau International Nursing Education Research Conference, Washington, D.C.

The concept of IL was first defined by Paul Zurkowski in 1974 and was studied by librarians, communication experts, and educators until 1985. An ALA report released in 1989 was an important step in the development of IL as it described the need for establishing official instructions for the development of undergraduate student competency. With the release of the ACRL Standards in 2000, a flurry of literature emerged that applied competency guidelines to a variety of disciplines in higher education. Many of the articles or empirical studies of IL competency were published in late 1990s or early 2000s.

This chapter begins by discussing IL education in relation to the technology revolution and current practice setting of professional nurses. The advent of information technology (IT) and rapid proliferation of information and communication technologies (ICTs) has created an increased need for students to employ IL skills proficiently. The discussion examines published studies on IL, using undergraduate nursing students and traditional undergraduate populations, and instruments for data collection related to IL self-efficacy and knowledge. In addition, this chapter explores literature related to educational strategies for IL competency development in prelicensure baccalaureate nursing programs. This chapter concludes by further discussing the theoretical framework of Diffusion of Innovation in the context of nursing education.

### **Technology Revolution Related to Information Literacy**

Initial reports written by the American Library Association ([ALA], 1989) identified IL as vital for individuals, consumers, and businesses. Although the concept and ALA competencies are relatively new to nursing education, researching and identifying information is a mainstay of IL and a key element of EBP. As nurses regularly engage in EBP, parallels can be drawn between IL and nursing processes. Table 1 provides an overview of similarities between steps in the EBP model, IL competencies, and the nursing process. As discussed in Chapter 1, IL



is the keystone of EBP as it entails the use of the best research evidence to guide professional nursing practice (IOM, 2001).

Table 1

*Crosswalk of Evidence-Based Practice (EBP), Information Literacy (IL), and Nursing Practice*

<b>Steps in EBP</b>	<b>IL competencies</b>	<b>Relationship to Nursing</b>
Ask the clinical question.	I. Determine the extent of information needed.	Recognize when to validate existing practices or investigate the use of new practices in nursing care—create a clinical question.
Research for the best evidence.	II. Access information effectively and efficiently through varying sources.	Understand how research utilization relates to systematic improvement in the provision of patient care.
Critically appraise evidence.	III. Evaluate information and its sources critically.	Recognize what constitutes a robust study and how it relates to the clinical question.
Address the sufficiency of the evidence for implementation into practice.	IV. Use information effectively to accomplish a specific purpose.	Learn when and how to use empirical evidence to improve personal practice and institutional policies.
Evaluate the outcome of evidence implementation.	V. Understand the economic, legal, and social issues surrounding information use.	Acknowledge resources that support the new practice or protocol and evaluate the effects of the new practice or protocol within the standards of practice.

*Note.* Adapted from *Information Literacy Competency Standards for Higher Education* by Association of College and Research Libraries, 2000, Chicago, IL: American Library Association. Retrieved from <http://www.ala.org/acrl/sites/ala.org.acrl/files/content/standards/standards.pdf> and “Transforming health care from the inside out: Advancing evidence-based practice in the 21st Century” by E. Fineout-Overholt and B. M. Melnyk, 2005, *Journal of Professional Nursing*, 21(6), 335–343.

Recommendations written by groups such as the Technology Informatics Guiding Education Reform (TIGER) Initiative provide action plans to help nursing faculty and students keep pace with the IT revolution and explosion of electronic sources (Hebda & Calderone, 2010). The TIGER Initiative (2012) report was created after the 2006 summit where informatics experts from the nursing profession met to outline a shared vision for improving nursing practice, education, and the delivery of patient care through the use of health IT. The TIGER Informatics Competencies Model (2012) consisted of three parts including basic computer skills, information literacy, and information management. However, nurse scientists have not produced any studies using the TIGER informatics competency model or agenda for faculty and

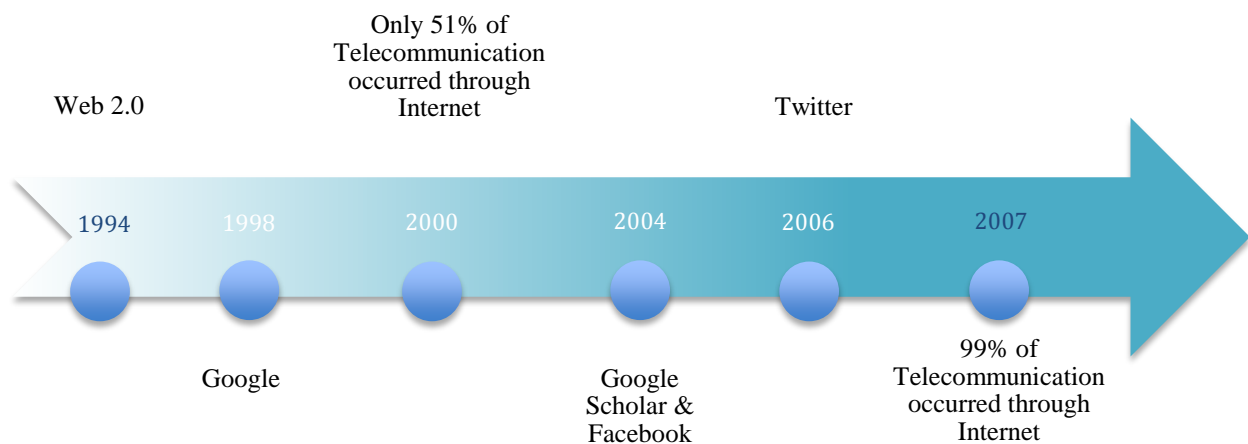
curriculum development since the release of the 2012 reports. Although the model included IL under its large umbrella of IT skills, the report focused more broadly on the development of computer literacy through the integration of informatics competencies in nursing education. The TIGER framework focused largely on developing informatics competencies, making it unclear how the model builds upon the existing research-based ALA IL framework and definition. Consequently little research has been done to advance the state of nursing education science related to information literacy.

While such reports have helped nursing faculty and students to improve their use of technology to retrieve published research, students remain confused about the nature of reliable scholarly information (Henderson, Nunez-Rodriguez & Casari, 2011; Salisbury & Karasmanis, 2011). Bombarded by an abundance of information available through computer, Internet, and mobile technologies, nursing students often lack the skills necessary for evaluating digital information sources. However, utilization of research for EBP requires the ability to retrieve and evaluate scholarly evidence from a variety of sources.

### **Rapid Development of Information and Computer Technologies**

ICT have revolutionized the process of information access, retrieval, utilization, and dissemination. Digital storage, coupled with instant online access through a variety of mobile or hand-held devices, has created a wealth of information previously unavailable to students. With the 1994 introduction of Web 2.0, students were able to harness information from multiple websites through search engines such as Google (O'Reilly, 2005). At the same time, students' use of ICT and social media platforms have grown exponentially. The remarkable growth of ICT in the last decade has affected the instruction and application of IL competencies. Prior to the Internet era, students would go to the library to perform information searches and scholarly

queries. Under the guidance and physical presence of librarians, students would search through information in academic sources that were easily differentiated from non-scholarly publications. However, today's students frequently access electronic sources of information through the Internet and these sources fail to clearly differentiate between scholarly and non-scholarly publications. The ICT revolution has transformed IL competencies related to the retrieval and communication of information. Figure 1 illustrates the introduction of ICT and social media platforms that many now consider common information and communication tools.



*Figure 1.* Timeline depicting development of ICT and social media platforms. Adapted from Allen, 2016; Facebook Inc., 2012; Google Company, n.d.; Hilbert & López, 2011; O'Reilly, 2005.

### Information Overload Among Millennial Students

Digital literacy, connectivity, and immediacy are all phrases used to describe today's undergraduate cohort deemed the "Net Generation" (Tapscott, 1998), "Digital Natives" (Prenkys, 2001), or the "Millennials" (Howe & Strauss, 2000). A previous review of literature found that the millennial cohort has distinguishing characteristics that set them apart from past generations. Born between 1981 and 1996, millennials comprise America's most ethnically and racially diverse cohort. As Taylor and Keeter (2010) report, 18.5% of millennials identify as Hispanic, 14.2% as Black, 4.3% as Asian, 3.2% as Mixed Race, and 59.8% as Caucasian.

With 78% of all undergraduates holding at least part-time employment, larger numbers of millennials are choosing to attend college part-time rather than full-time (Pew Research Center, 2014). According to a survey by the *National College Health Assessment* ([NCHA], 2015) of over 93,000 undergraduate students, 13.9% reported work had negatively impacted their academic performance, 30% reported similar effects from stress, and 23.6% felt overwhelming anxiety in the last two weeks. Moreover, 42.8% of millennial students rated their level of stress as ‘more than average’ and an alarming 10.7% perceived tremendous or insurmountable stress in their lives (NCHA, 2015). The book *Generation on a Tightrope* creates a snapshot of today’s “protected yet pressured” millennial students (Levine & Dean, 2012). From interviews with undergraduate students, faculty, and administrators, the authors provide a rich description of millennial students whose upbringing has been affected by local, national, and global events such as the launch of the World Wide Web, growth of digital technologies, attacks and aftermath of September 11th, and worldwide recession.

While it is clear that today’s undergraduates are more technologically inclined than previous cohorts, authors have gone further to suggest millennials demand immediacy as they have a deep immersion in technology that has made them accustomed to receiving information quickly (Lowery, 2004; Oblinger & Oblinger, 2005; Prensky, 2001). Early work asserts that the digital literacy of millennials enables them to receive information at a rapid pace as they prefer graphics to text and embrace gaming experiences over static or linear work (Prensky, 2001). Active in social networking and highly connected with their peer group, the current generation of undergraduates are said to be constantly connected relying heavily on ICT for access to information (Howe & Strauss, 2000; Jones & Madden, 2002).

In contrast, findings from more current studies of undergraduate students suggest that while there is a considerable portion of millennials who are highly adept with technology and rely on it to communicate, the generation is far from homogenous with great diversity in access to technology and frequency of technology use (Kennedy, Judd, Dalgarnot & Waycott, 2010). A key finding from Kennedy et al.'s (2010) quantitative study noted that the majority of students sampled (45%) indicated they were rudimentary or basic technology users. Additionally, Caruso and Kvavik (2005) found that although undergraduate students spend a large amount of time online (11-15 hours/week on average), mostly they used ICT applications for recreation and social connection. Researchers found that millennials employ technology skills widely, indicating comfort with only a core set of technologies while lacking abilities to use more specialized searching applications (Caruso & Kvavik, 2005). A 2007 study of international business managers points to information overload as another barrier to the development of IL skills. Klausegger, Sinkovics and Zou's (2007) study found that participants skimmed information, used only what they perceived was important, and discarded what they considered irrelevant. The researchers concluded that the overabundance of information in the workplace may lead to an increased risk of missing accurate and vital information, data points, or articles.

As Klausegger et al.'s (2007) study was conducted using data collected in 1996, faculty may question the relevance of information overload to IL and ICT skills of today's millennial nursing students. However, the tremendous growth of ICT in the past decades has exponentially increased the volume of data students can retrieve in a matter of seconds. Although undergraduate students may be frequent technology users, rudimentary ICT skills may create a barrier to their abilities to narrow irrelevant information found from the Internet and to their efficient use of technology for information searching. The ICT revolution drastically heightens

the importance of IL education for baccalaureate nursing students as information overload most definitely contributes to students' literature search confusions and misjudgment.

### **ICT Confidence and Competence Related to Information Literacy**

There is no doubt that today's undergraduate students interact with information differently than students did 10 years ago. Technological advancements have brought more information to current undergraduates than any past generation. All professionals must face the escalating complexities of information made readily accessible through a variety of technology sources. In addressing this problem for undergraduate students, the ACRL Standards (2000) describe information literacy in the following way: "[It] forms the basis for lifelong learning. It is common to all disciplines, to all learning environments, and to all levels of education. It enables learners to master content and extend their investigations, become more self-directed, and assume greater control over their own learning" (p. 2). Witek and Grettano (2012) assert that, based on the ACRL description of IL, the construct is not anchored to a particular time; rather, learners accomplish IL goals based on their information environment. Student perceptions and interactions with ICT require exploration as they may impact development of IL skills.

In relation to how students interact with information in their daily lives, Witek and Grettano (2012) explored the connection between social media and IL behaviors and practices of undergraduate students. In their conceptual paper, the author's analyzed undergraduate students at the University of Scranton to explore how their use of Facebook related to ACRL Standards. Anecdotal findings highlighted an alignment between ACRL Standards and common Facebook behaviors that help educators to better understand student processes of conducting research for academic assignments. For example, the authors associate student use of Facebook tools

including the 'News Feed' and 'Timeline' to IL behaviors in ACRL Standards that enable and facilitate students' abilities to access and sort information (Witek & Grettano, 2012). Students develop IL skills through the use of such tools, and those skills may be applied to researching online databases. In particular, Witek and Grettano (2012) discussed the application of Facebook skills to analyzing the results page of an online database search. Conceptual findings from this non-scientific observational article highlight the intersection between technology, specifically social media, and information management behaviors and skills of undergraduate students.

However, questions arise related to the transferability of computer, technology, and social media skills to academic environments and research settings. Do all undergraduate students possess the same levels of confidence and competence in relation to technology use and information searching abilities? Moreover, how do IL competencies relate to the computer or technology skills of undergraduate students? The following two sections provide a review of literature focusing on ICT confidence and competence related to IL skills of undergraduate students, as well as their information retrieval behaviors and preferences. Thirteen empirical studies, consisting of three qualitative, eight quantitative, and two mixed-method articles, were included as the researchers examine technology and social media behaviors and skills of undergraduate students. Most explore this relationship within the context of undergraduate nursing education; however, some articles were included that explore IL and information seeking behaviors among students enrolled in biological sciences (Ferguson, Neely, & Sullivan, 2006; Henderson et al., 2011), health sciences (Salisbury & Karasmanis, 2011), and communication (Biddix, Chung, & Park, 2011) if the studies provided insight on IL education within undergraduate nursing programs.

## ICT Self-Efficacy

Upon release of the ACRL (2000) Standards, preliminary empirical evidence began to support the existence of a connection between technology, computer self-efficacy and IL competency (Cole & Kelsey, 2004). Findings from a descriptive quantitative study of undergraduate nursing students ( $N = 432$ ) at a large university in Turkey led Özkul and Kaya (2009) to conclude that computer literacy was a prerequisite for development of IL skills. Using the Information Literacy Scale (Cronbach's  $\alpha = 0.89$ ) Özkul and Kaya (2009) found statistically significant differences in mean IL scores with higher scores correlating to student reports of “adequate” computer skills and increased frequency of use ( $F = 4.462, p = 0.002$ ). Additionally, the study produced unexpected results, as only 43.8% ( $n = 161$ ) of the sample identified as ‘sufficient’ or ‘very sufficient’ computer users (Özkul & Kaya, 2009). Maag (2006) found consistent findings in a large-scale study of baccalaureate nursing students ( $N = 743$ ) in the United States using the Technology Attitude Scale (TAS). Despite TAS items indicating a positive student attitude toward technology (5.11 on scale of 6), response items overall portrayed participants’ lack of self-efficacy in technology use. Overall, the participants’ mean scores for factors relating to technology self-efficacy had the widest standard deviations ( $SD = 0.77$ ) indicating a broad range of responses to comfort with technological tools (Maag, 2006).

Other studies conducted in Australia (Levett-Jones et al., 2009) and the United Kingdom (Bond, 2004) supported low levels of computer, technology, and Internet confidence among baccalaureate nursing students. Bond’s (2004) descriptive quantitative study of first year nursing students ( $N = 317$ ) investigated student perceptions of computer tasks, research skills, Internet abilities, and use of online search engines to find information. Computer ownership among participants in Bond’s single-site study was high, with 83.9% ( $n = 266$ ) of participants reporting



having year-round computer access and with 90% of those participants reporting ( $n = 235$ ) Internet access. Bond (2004) reported that 14.5% of the sample stated they had never used the World Wide Web and only half of the sample (56.6%,  $n = 150$ ) rated their Internet skills as “adequate.” Levett-Jones et al. (2009) described similar findings from a multi-site mixed method study ( $N = 971$ ) that used focus groups to explore ICT experiences of nursing students. The theme of anxiety emerged from data analysis, as students felt unequipped with ICT skills necessary for care in the clinical setting with statements such as, “I just felt overwhelmed, panicked...I thought, I can’t do this...I don’t even know how to log onto the computer” (Levett-Jones et al., 2009, p. 614). The study’s quantitative data confirmed low levels of ICT self-efficacy, as only 50% of students felt “very confident” using a computer, and only 69% identified as “very confident” using Internet search engines (Levett-Jones et al., 2009). Computer access was also a barrier reported by Levett-Jones et al. (2009) with 20% of the sample indicating they did not own or have easy access to a computer off-campus. Findings from these initial studies of IL must be cautiously examined and applied in the context of today’s undergraduate student, given that rates of computer ownership and use were lower during the time in which these studies were conducted.

This evidence suggests issues of low ICT self-confidence and perceptions of poor computer self-efficacy may adversely affect students’ IL abilities and behaviors. These studies build on earlier articles describing relatively low self-confidence among nursing students in their ability to locate information in the university library, online indexes, and computer databases (Fox, Richter, & White, 1989). Contrary to opinions of millennial students as digital natives the majority of students in these studies indicated low levels of ICT self-efficacy. Findings from these empirical studies suggest that low ICT self-efficacy creates a barrier to conducting

successful scholarly searches as undergraduate students may lack skills necessary for utilizing computer and Internet technologies for information searching. Moreover, evidence shows the tasks of collecting and processing information through IL skills are now intricately tied to ICT skills. Related to Bandura's (1997) definition of self-efficacy, a person's belief or confidence in their ability to be successful for any given behavior or task has a direct influence on their performance, persistence, and behavioral choices. Findings from these early studies imply that computer literacy increased IL self-efficacy as students' beliefs in their abilities to engage in IL activities improved based on their ICT confidence and competence.

However, findings related to ICT self-efficacy should be examined carefully. In contrast to studies reporting low levels of ICT confidence and competence among baccalaureate nursing students, two international studies described participants' perceptions of adequate ICT self-efficacy. In a grounded theory study conducted in Canada, Duncan and Holtslander (2012) interviewed 11 undergraduate students to find that all described themselves as "moderately skilled" or "expert" Internet users. Similarly, findings from the previously discussed study by Özkul and Kaya (2009) indicated that 43.8% ( $n = 161$ ) of Turkish nursing students sampled found themselves "sufficient" to "very sufficient" at computer utilization. Moreover, evidence suggests self-reported skills do not always correlate with competency in IL tasks. A longitudinal descriptive study conducted in Australia by Hossain, Perrin and Cumming (2012) found significant increases in baccalaureate nursing students (T1  $N = 113$ ; T2  $N = 115$ ) IL skills and confidence over time despite a decrease in problem solving skills from semester one (4.14 average rating) to semester two (4.02 average rating). Despite reporting increased confidence in their skills, students demonstrated a decreased frequency of information access from semester one to two (Hossain et al., 2012). As in studies discussed prior, data analysis using a Tukey test

uncovered that student ability to access information was strongest among those that had ready access to a computer with Internet at home ( $F = 5.005$ ,  $\alpha = .05$ ). The authors reported that access was a barrier for some students as 14% ( $n = 32$ ) indicated they had no computer or Internet access at home.

Similar results from Bond's (2004) study conducted in the United Kingdom indicate that self-reported skill levels did not consistently correspond to the tasks that nursing students could carry out competently. For example, 14.7% ( $n = 15$ ) of students who rated their Internet skill levels as "excellent" or "good" and 40% ( $n = 60$ ) of those who considered their skills to be "basic" indicated that they could not perform simple online tasks without problems. Although these results come from small samples, they show a proportion of students who thought their ICT skills were adequate but stated they could not carry out related IT tasks without problems. Research demonstrates that students may overestimate their levels of computer literacy or have a false sense of confidence in their ICT abilities. Findings from these empirical studies raise the question as to how undergraduate students evaluate their skill level and what compounding factors may affect their IL self-efficacy.

### **Demographic Factors Impacting ICT Self-Efficacy**

Discrepancies between studies included in the literature review were also identified among findings relating to ICT self-efficacy and student demographic factors of age. For example, Bond's (2004) descriptive study of first year nursing students ( $N = 317$ ) in the United Kingdom found no statistically significant difference in student perceptions of ICT abilities in relation to age, whereas findings from studies by Hossain et al. (2012) and Maag (2006) indicated differences between age groups in relation to computer and technology confidence. Contradicting Bond's (2004) findings, Hossain et al.'s (2012) previously described study of

Australian students found significant differences in ICT self-efficacy between students aged 16-18 years and those 31 years and above. Younger students reported lower levels of confidence in response to information access, specifically related to locating information using library databases ( $F = 3.762, \alpha = .05$ ) and locating information using computer search engines ( $F = 2.542, \alpha = .05$ ) (Hossain et al., 2012). Similarly, Maag's (2006) national study of U.S. nursing students ( $N = 743$ ) discussed previously found that younger students demonstrated a lower mean TAS score ( $n = 348, M = 4.99, SD = 0.81$ ) than those in the older group ( $n = 387, M = 5.21, SD = 0.74$ ). More specifically, the younger group demonstrated a lower mean confidence level in their ability to learn about technology when compared with the older cohort of students ( $F(1,733) = 11.87, p = .001$ ) (Maag, 2006). Contrary to commonly held beliefs about millennial undergraduates, younger student participants in these two studies displayed lower confidence levels related to ICT abilities. Data from these studies help refute the assumption that younger students, who have been exposed to technology throughout primary and secondary school, have more positive views and higher self-efficacy levels in regards to learning with technology.

Lastly, results from these studies indicated a relationship between gender and ICT confidence and competence. Data from the above quantitative study by Hossain et al. (2012) showed females to be slightly more robust in confidence in their ability to access information than male students. In addition, female participants in the sample demonstrated significantly higher mean ratings in awareness of information abilities than male students ( $T = -2.63, \alpha = .05$ ). Comparatively, results from Maag's (2006) study used a one-way ANOVA to determine if gender had an effect on students' attitude toward technology. A statistically significant relationship existed as male student participants reported a higher confidence level in their ability to learn about technology when compared with the female student participants ( $p = .010$ ) (Maag,

2006). Research using samples of undergraduate students from a wider range of disciplines helps validate a possible relationship between gender and ICT self-efficacy. Previous studies have found that male students are more comfortable using ICT systems and have higher ratings of frequency of technology use (Caruso & Kvavik, 2005; Kennedy et al., 2010). Results related to gender and ICT confidence and information seeking abilities may be significant in nursing education, as women are a majority in the nursing profession. Although female students may be more confident in their IL abilities, they may avoid useful computer technologies vital to efficient information access and retrieval.

### **Perceptions of ICT Relevance to IL, EBP, and Nursing Practice**

While undergraduates have reported varying levels of proficiency in their ICT skills, a common finding from the reviewed literature suggested that students fail to recognize connections between ICT, IL, EBP, and nursing practice (Courey et al., 2006; Hossain et al., 2012; Levett-Jones et al., 2009). Courey et al. (2006) were surprised by findings from their quasi-experimental study design that explored the effects of a one-day interventional IL program on first-semester associate degree nursing students ( $n = 19$  treatment group,  $n = 39$  control group). Using an internally developed 22-item questionnaire (Cronbach's  $\alpha = 0.798$  to  $0.886$ ), researchers evaluated the intervention program's effect on student learning with a four-point Likert scale from agree (4) to disagree (1) rating self-perceptions of skill and attitude toward accessing information (Courey et al., 2006). Although the intervention group demonstrated improvement in measures of information access, an unexpected finding related to changes in attitude occurred. Students who participated in the IL program demonstrated a decrease in positive attitude from pre to post intervention surveys (Wilks' Lambda =  $F(1, 58) = 20.140$ ,  $p = .000$ ) and a significant between-group difference was found from comparing control to

intervention students (Wilks' Lambda =  $F(1, 58) = 9.521, p = .003$ ). Based on these results, the authors concluded that participation in the IL program resulted in nursing students having a less positive attitude toward their need to stay abreast of current literature (Courey et al., 2006).

Likewise, in the longitudinal quantitative study conducted in Australia by Hossain et al. (2012) the authors found a decreased mean rating on measures of problem-solving skills of first-year nursing students from semester one to two. Similar to the above findings, Hossain et al.'s longitudinal study (2012) found students' attitudes toward information searching had not improved as evidenced by insignificant findings regarding information awareness ( $T = -1.28, p = .50$ ). Similarly, Levett-Jones et al.'s (2009) mixed-method Australian study indicated that undergraduate nursing students failed to recognize the relevance of ICT to clinical practice. Students were critical of what they perceived to be an over-reliance on ICT in focus group interviews stating, "I can't see the point in all this IT and online learning...I wanted to do nursing...not computer studies" (Levett-Jones et al., 2009, p. 614). Quantitative data supported this finding as 26% ( $n = 251$ ) of the total sample ( $N = 971$ ) stated they were unclear about the relevance of ICT to clinical nursing practice (Levett-Jones et al., 2009). The researchers concluded that few students considered ICT competence to be advantageous to their professional journey, and none were aware of how ICT skills impact the delivery of quality patient care (Levett-Jones et al., 2009).

Sampled participants viewed ICT, IL, and EBP as distinct entities and failed to recognize how ICT skills could affect the delivery of nursing care (Levett-Jones et al., 2009). Findings from these studies directly contradict IOM (2003, 2008) recommendations that nurses employ ICT to deliver safe, quality, patient-centered care. Moreover, the IOM (2011a) asserts that, "Virtually everything done clinically—from gathering a history and a physical, to working

through differential diagnoses, managing preventive measures, and, most importantly, accessing the wealth of extant medical knowledge—involves information” (pp. 85-86). The report emphasizes that clinicians access information through a variety of electronic health information systems and ICT portals (IOM, 2011a). The magnitude of information related to the provision of care in today’s ‘big data’ environment necessitate that nurses master ICT and IL skills essential to ‘data-driven decision-making’ (Englebright & Caspers, 2016). Patient care management in today’s complex healthcare environment requires IL competent nurses equipped with skills to manage various EHR systems.

Findings related to student perceptions of ICT relevance to practice also represent a challenge for nurse educators. Initial results from these studies indicated that novice students are often motivated to learn ICT and IL skills based on their perceptions of relevance to professional practice (Courey et al., 2006). For this reason, it is essential that nursing faculty explicitly link ICT and IL skills developed during nursing school to those used in practice.

### **Gaps in Literature Relating to ICT Confidence, Competence and IL**

After the advent of the Internet and search engines, such as Google, students could easily and instantly access worldwide information. Research indicates that computer literacy increased students’ beliefs in their ability to engage in IL activities. Although easy access to information helped students retrieve information in a more efficient manner, students still reported that they obtained too much irrelevant information from the Internet. The overabundance of information could cause students to misappropriate or use inaccurate articles (Klausegger et al., 2007). Initial results from studies indicate that students’ motivation to engage in online learning is influenced by their level of ICT confidence and competence, their perception of relevance of ICT to their future careers, and their access to ICT resources.

Demographic factors such as computer self-efficacy, computer and Internet access, frequency of ICT use, student age, and gender all may impact IL abilities of nursing students. While the published research provides valuable information on IL and ICT self-efficacy, results from these studies should be interpreted cautiously. Findings from the body of literature reviewed may not be generalizable to nursing students in the United States as most samples were drawn from populations outside of the United States. Cultural, geographical, and socioeconomic factors in studies conducted in Turkey, Australia, and the United Kingdom may impact student perceptions and experiences with ICT. Additionally, findings related to ICT experiences of students should be examined prudently as all of the studies reviewed are over five years old. Furthermore, using the rating system for the hierarchy of evidence provided by Polit and Beck (2012), almost all quantitative studies reviewed used descriptive statistics and fell into the second lowest research category. Based on this research appraisal system, evidence from descriptive studies using small convenience samples or participants from a single site should be carefully evaluated for sampling errors or bias. For example, the directionality of relationships between student factors and IL skills had not been replicated between studies examined in this body of literature.

A possible explanation for conflicting findings may be related to variances among academic level and geographic location of study participants. The three large-scale study samples varied significantly as Levett-Jones et al. (2009) examined first year nursing students across the geographically diverse country of Australia; Maag (2006) sampled undergraduate and graduate nursing students across the United States; and Özkul and Kaya (2009) studied freshman, sophomore, junior, and senior nursing students in Turkey. Participant age also varied significantly across samples with Özkul and Kaya's (2009) study reporting a mean age of 20.75,



whereas in Duncan and Holtslander's (2012) study participants were aged 20-46, in Bond's (2004) study 40.7% of the sample identified as over 26 years old, and in Levett-Jones et al.'s (2009) study 42% of the sample was described as 23 years and above. Moreover, survey tools were mostly investigator-designed instruments measuring aspects of ICT competency or information access. Instruments met only minimal reliability criteria, or researchers failed to provide reliability data altogether, and did not build upon IL Competency Standard definitions.

### **Information Searching Abilities and Preferences of Undergraduate Students**

Students utilize a diverse range of sources to conduct information searches for academic assignments including online tools such as Wikipedia and Google, course management systems (CMS) such as Blackboard, and library databases such as CINAHL. However, research has indicated that adults, both college-aged and post-college, now depend on the web-based searches as their primary investigatory source of information (Jones & Fox, 2009; Estabrook, Witt, & Rainie, 2007). An early study by the Pew Research Center in 2002 analyzed findings from a national survey of 27 universities ( $N = 2,054$  respondents) to determine student use of Internet and online resources. Researchers found that 73% of college students used the Internet for research whereas only 9% preferred information searching in the college or university library (Pew Research Center, 2002). A more recent study by Jones, Johnson-Yale, Millermaier and Pérez (2008) was conducted to determine if student preferences or Internet use had changed. The national study across 40 campuses ( $N = 7,421$ ) found that "overall Internet use for academic purposes has increased and students report generally positive opinions about the Internet's utility for academic work" (Jones et al., p. 165).

However, the use of ICT allows nursing students to access a glut of data through online information sources. Information from the Internet may appear scholarly to nursing students as

private websites often use medical terminology to describe conditions and diagnoses without validating information through peer-reviewed references. Due to the immediacy of “Googling,” students often settle for non-scholarly sources in place of empirical evidence. The overabundance of information available to students can hinder their procurement and evaluation of scholarly information to inform academic development and nursing practice. The following section discusses studies describing how undergraduate students utilize the Internet as an information source and research investigating their information searching behaviors.

### **Information Searching Preferences**

Almost all studies reviewed on IL and ICT skills reported findings related to information searching preferences of undergraduate students. The consensus among these research studies was that undergraduate students turned to Internet sources such as Wikipedia (Biddix et al., 2011; Özkul & Kaya, 2009; Salisbury & Karasmanis, 2011), or even search engines before utilizing library databases or resources (Ferguson et al., 2006). Biddix et al.’s (2011) qualitative study of undergraduate students in an introductory communication class ( $N = 282$ ) used semantic analysis of questionnaire responses to examine research behaviors. The researchers found an overwhelming preference for Internet searching tied to efficiency, ease of access, and the intuitive nature of website designs (Biddix et al., 2011). Similarly, in Ferguson et al.’s (2006) descriptive study of first-year biology students ( $N = 151$ ) reviewed previously, the authors found an overwhelming student response indicating they were most comfortable seeking information from an Internet search engine such as Google (90%,  $n = 129$ ) whereas only 63% ( $n = 90$ ) felt comfortable seeking information from a library web page. The preference for information searches through Google for research or assignments over search engines, libraries, and textbooks was replicated in other studies as well (Henderson et al., 2011; Özkul & Kaya, 2009;

Salisbury & Karasmanis, 2011). Biddix et al. (2011) noted that their interviews revealed students were willing to trade convenience for credibility and prized dependable, easily available information over less user-friendly campus-based resources. Students reported that accessing library resources took much more time and that Internet searching produced faster, although possibly less reliable or credible information (Biddix et al., 2011).

Difficulty navigating library resources was a common finding among students sampled in these studies. For example, Ferguson et al. (2006) found that only 25% ( $n = 35$ ) of participants surveyed indicated, “Whenever I use the library, I find what I want,” (p. 69) whereas 62% ( $n = 88$ ) selected, “I can usually find what I want but there are frustrations” (p. 69). Findings from Duncan and Holtslander’s (2012) grounded theory study also validated student frustration with library queries. Using grounded theory, the researchers examined information-seeking behaviors of nine Canadian nursing students to explore barriers to development of IL competency. Students in the study expressed a desire for more training in electronic databases, CINAHL in particular, to help improve success with library queries (Duncan & Holtslander, 2012). Low library use by undergraduate nursing students was also found by Özkul and Kaya (2009) as only 48.4% ( $n = 178$ ) of Turkish students sampled stated they used the library once or twice a week. Findings consistently indicated that students chose Internet searches over the campus library as they valued ease of access, navigation, convenience, and the ability to use natural language for information searches.

Early literature emphasizes library utilization and electronic library catalogues as integral to the development of IL skills (ALA, 1989). Findings from Dee and Stanley’s (2005) study of graduate nursing students’ ( $N = 25$ ) use of health resources and libraries indicated that although 96% of students sampled used online databases such as CINAHL for information searching,

many reported that they “lacked the technological skills to search electronic databases” (p. 218). More often than utilization of library databases, students reported a reliance on Internet search engines and employed keyword searching to find information sources (Dee & Stanley, 2005). Based on the evidence reviewed, nursing students must improve their information searching habits to make full use of resources available to them. Assisting undergraduates to develop proper library and database-searching abilities requires collaborative efforts of faculty, librarians, and administrators (ACRL, 2000). Additionally, library websites posed a challenge to students who reported the platforms as difficult to navigate and use. Faculty and librarians may also consider altering library sites to integrate more user-friendly designs.

### **Information Searching Behaviors**

Commonalities in information searching behaviors and processes of undergraduates were also identified from both of the reviewed qualitative studies. Researchers found that although participants gave preference to sources such as Google Scholar for information searches, they used online sources in a particular manner and had a particular motive for combing the Internet (Biddix et al., 2011; Duncan & Holtslander, 2012). Participants in both studies began information queries with Internet sites to formulate a list of potential research sources (Biddix et al., 2011) and to identify key words or phrases for later use in search engines or library catalogues (Duncan & Holtslander, 2012). Duncan and Holtslander (2012) described a complex searching process whereby students “tested the waters” by inputting key phrases into Google Scholar, Wikipedia, or online library search engines to identify available information sources. Students would then use these results to help narrow parameters for database searching and select terms to query other databases (Duncan & Holtslander, 2012). Researchers found that the subprocess of selecting search terms represented the biggest challenge for students as revealed

through interview data such as, “I can kind of waste a lot of time, oh try this term no that doesn’t get me anywhere, try this term, you know, no that doesn’t get me anywhere you know. That’s kind of frustrating sometimes” (Duncan & Holtslander, 2012, p. 24).

Evidence from other studies (Biddix et al., 2011; Ferguson et al., 2006; Özkul & Kaya, 2009) confirmed the unique but convoluted searching processes whereby undergraduate students use Internet searches to help brainstorm their research concept and narrow keywords for use in online library databases. Moreover, research indicated that students were unsure of how to determine needs for information searches and lacked skills for broadening or narrowing their queries (Ferguson et al., 2006; Özkul & Kaya, 2009). Findings indicated that undergraduate nursing students may lack IL skills necessary to meet ACRL Competency Standard I (2000), which states that the “information literate student determines the nature and extent of information needed” (p. 8). Understanding the unique searching process and information preferences of undergraduate students will help faculty to direct educational efforts to the beginning steps of information searching.

Convenience, in terms of access to resources and ease of use, has a significant influence on where people seek information (Connaway, Dickey, & Radford, 2011). Undergraduate students are no exception to the rules of convenience and often have difficulty navigating arduous library systems to solve their information needs. Furthermore, students often have difficulty evaluating the glut of information available and cope by utilizing quick but questionable sources like Dictionary.com or Wikipedia (Russell, 2009). With a dizzying array of information interfaces and search methods, undergraduate students easily abandon academic information systems available through their universities in favor of more intuitive sources but less scholarly sources (Russell, 2009). As many students lack an understanding of quality

scholarly sources, overutilization of Internet sources may result in a blind acceptance of online information. In light of these concerns, findings related to information searching preferences and behaviors of undergraduate students were explored and a common thread to locating credible information reported in most of the literature reviewed was convenience.

### **Weaknesses in Student Abilities**

Most of the studies explored in this section of literature identified significant issues with information seeking abilities of undergraduate students. Researchers found that despite rating themselves as skilled in Internet use for research (Ferguson et al., 2006; Salisbury & Karasmanis, 2011), students still reported substantial frustration with the searching process (Biddix et al., 2011; Bond, 2004; Duncan & Holtslander, 2012). Bond (2004) found that nearly one quarter (23.4%, n= 59) of participants who assessed their skills as “good” or “expert” agreed with the statement: “I end up with far too much irrelevant information when I try to find things on the WWW” (p. 172). Findings from other studies help to confirm that students overstate their comfort developing successful search strategies despite gaps in their information seeking abilities (Ferguson et al., 2006). The growing disparity between perceived and actual IL and ICT skills has led to obvious distress and frustration among undergraduates.

Likewise, in Duncan and Holtslander (2012) qualitative study, the word “frustration” was used by all participants when identifying key phrases to query a database, navigating database interfaces, narrowing results to information sources pertinent to their topic, and locating full text scholarly articles. Although students in the study described experiencing many issues with information searching procedures, a main theme emerged regarding struggles to identify prolific search terms that produced relevant database results (Duncan & Holtslander, 2012). Interviews from a second qualitative study by Biddix et al. (2011) revealed that students avoid library

databases, as they often require specialized search strings to locate information whereas Internet sources allow for familiarity of using “natural language” for information searching. Data from other studies confirm that students were unfamiliar with basic search concepts such as Boolean operators, truncation, and controlled vocabulary (Ferguson et al., 2006; Biddix et al., 2011; Salisbury & Karasmanis, 2011). Interestingly, only 38.6% of students sampled in Salisbury and Karasmanis’s (2011) multisite descriptive study of first-year health science students ( $N = 1,000$ ) in Australia understood the use of the Boolean operator “AND” to limit search results.

The reviewed literature builds upon earlier studies identifying areas for improvement in information seeking abilities of undergraduate students. Students in these studies did not have a strong understanding of the difference between searching using keywords or subject headings. Former studies reported the most common struggles of students while gathering research were related to accessing materials and knowing how to narrow them down (Head, 2007). Findings were supported in a later multi-institutional research study which found that no matter student demographics, undergraduates were “challenged, confused, and frustrated by the research process, despite convenience, relative ease, or ubiquity of the Internet” (Head & Eisenberg, 2009, p.13). ACRL (2000) Standard II encompasses the students’ selection of appropriate research methods and includes use of investigative retrieval systems such as databases and catalogs, the construction and implementation of effective search strategies, and the retrieval of information in multiple formats. However, based on research findings, undergraduate students require educational intervention to achieve competency related to efficient and effective information searching.

**Problems evaluating sources of credible evidence.** Although undergraduate students struggle significantly with beginning the search process, information retrieval is only half the

battle. The next step, narrowing down search results to a pool of credible and useful information sources, seems to be just as problematic for undergraduates. Credibility with respect to online information has two major components: trustworthiness, related to the author authority or reputation, and expertise, or how useful the content is compared to others (Park, Barnett, & Nam, 2002). However, in today's information overloaded world, convenience and ease are common threats to credibility. Students may be tempted to utilize the first few sources located on their topic if unequipped with skills to triage and sort information sources based on standards of credibility. This leads to the question of whether today's undergraduate students are equipped with IL and ICT skills necessary to analyze, critically appraise, and narrow down information from a variety of sources.

Researchers have reported that undergraduates recognize the importance of using credible information but often lack the skills to critically appraise a potential scholarly source (Currie, Devlin, Emde, & Graves, 2010). Three of the studies reviewed detailed a gap in students' abilities to evaluate reliability, credibility, and usefulness of information sources (Biddix et al., 2011; Ferguson et al., 2006; Salisbury & Karasmanis, 2011). Both Ferguson et al. (2006) and Salisbury and Karasmanis (2011) found that students had poor knowledge of scholarly characteristics used to evaluate the quality of Internet sites or information sources. In studies of first-year biology students (Ferguson et al., 2006) and health science students (Salisbury & Karasmanis, 2011) researchers found that the majority of participants could not identify a journal article citation in a bibliography or a reading list. Ferguson et al. (2006) reported only 43% of their sample (N= 151) were able to perform this task whereas Salisbury and Karasmanis (2011) reported only a mere 23% of their sample (N= 1,000) were able to identify journal articles from a list of sources. Moreover, students were unaware of what qualified a source as "scholarly" with



the highest percentage (45.2%) of respondents answering, “I don’t know” to a question asking them to identify elements specific to peer-reviewed journals (Salisbury & Karasmanis, 2011). These findings indicate that undergraduate students lack threshold information searching skills such as assessing the relevance of citations and knowing how to find them.

Interestingly, only 14% ( $n = 20$ ) of students sampled in Ferguson et al.’s (2006) study gave a rating of “most useful” to information published in a “refereed journal” whereas information “published in a textbook” received the highest ranking by 47% ( $n = 66$ ) of participants. The researchers were not surprised to find that 81% ( $n = 114$ ) of participants considered sources found on the Internet to be reliable; however, an unexpected 17% ( $n = 24$ ) stated they always considered sources found on the Internet to be reliable (Ferguson et al., 2006). Likewise, Salisbury and Karasmanis (2011) found that only 23.8% of their respondents were able to identify characteristics used to evaluate the quality of an Internet site. Despite indicating moderate to high levels of comfort evaluating information, students rated less scholarly Internet resources as more useful for information searching than several key forms of quality research such as theses, dissertations, and peer-reviewed journals (Ferguson et al., 2006). Finally, through qualitative analysis of questionnaire responses from students in an undergraduate communication class, Biddix et al. (2011) outlined processes by which students determined credibility of a source. The researchers found that students used Google or Wikipedia to find articles from .edu sites because they were viewed as accurate sources of academic information (Biddix et al., 2011). Additionally, students would communicate with peers to ask how they conducted a search; they would also ask teachers, mentors, tutors, classmates, or librarians how to conduct search engine queries as they were viewed as trustworthy with expertise coming from prior information searching experience (Biddix et al., 2011).

Understanding the nature of scholarly literature and how to find it presents students with an unfamiliar and challenging predicament. When surveying students about determining the credibility of a website, Salisbury and Karasmanis (2011) found that 27% of respondents included accessibility as a quality element. From the student perspective, accessibility appears to be just as important as other considerations when determining the credibility of a source. Findings indicate that in general, undergraduate students need to build a better understanding of the nature of scholarly information and the importance of identifying and using credible resources. ACRL Competency Standard III primarily focuses on the student's ability to evaluate information and resources. In addressing this standard, faculty can help students succeed not only in the academic environment, but also in their workplaces and personal lives as well (ACRL, 2000). Although entry-level students have only some of the skills outlined in the foundation level of the ACRL Competencies, they are well placed to start building IL skills in areas where they are less competent once gaps in information searching abilities have been identified.

### **Gaps in Literature Related to Information Searching**

Gaps in existing literature warrant further exploration into the relationship between student factors, ICT self-efficacy levels, and IL behaviors and skills of undergraduate nursing students. The information overload experienced by students may contribute to their inability to see the connections between communication technology, IL, and EBP; however, most of the existing literature exploring IL competency of undergraduate students is outdated. Although findings from the reviewed literature help to describe the relationship between technology confidence, competence, and IL skill development among undergraduate nursing students, subsequent studies are warranted as dated research may not have considered preferences and

behaviors of current students developed in response to constant technology and social media exposure. Today's undergraduate students may report new preferences for information searching related to technological innovations unavailable to college students in past years, which may impact their development of IL skills and competency development.

The literature reviewed also identified gaps in students' IL abilities related to preferences for convenient and easy access to larger volumes of information via Internet and Google searches. The majority of studies found that undergraduate students value ease of use over source credibility, resulting in an overreliance on Internet and online database searches and aversion toward more traditional research settings such as university libraries (Biddix et al., 2011; Özkul & Kaya, 2009; Salisbury & Karasmanis, 2011). Students also attributed their preference for Internet searching to frustrations with navigating complex library sites and lack of experience using database tools to refine and limit large searches (Duncan & Holtslander, 2012; Ferguson et al., 2006; Özkul & Kaya, 2009; Salisbury & Karasmanis, 2011). Further research is needed to better understand the undergraduate nursing students' experience using both in-person and online library resources so that these tools may be better designed to meet student needs and abilities.

Consequently, movement away from researching under the guidance of faculty or librarians may have negatively impacted students' development of IL competency as authors found that students lack the ICT and IL skills and understanding necessary to describe what constitutes quality scholarly information or develop a sophisticated search strategy (Biddix et al., 2011; Duncan & Holtslander, 2012; Ferguson et al., 2006; Russell, 2009; Salisbury & Karasmanis, 2011). The difficulty in finding relevant, scholarly information may constitute a primary reason students avoid engaging in IL activities unless required to do so. The reviewed

literature found students lacked skills necessary to control search results and were unfamiliar with basic search concepts such as Boolean operators; however, little detail was provided regarding IL courses, curricular structure, or learning experiences of students to provide context for findings of IL competency. An important opportunity exists for researchers to address this gap through qualitative faculty interviews aimed at developing an understanding of the state of nursing educational interventions related to IL skill development. Studying student demographic factors and educational strategies simultaneously would allow researchers to better describe the current state of nursing education science related to IL competency development. Helping students master ACRL's (2000) second and third IL competencies may assist them to develop a wider-range of skills necessary to retrieve appropriate, accurate information in a timelier manner.

A dearth of literature on IL self-efficacy using more sophisticated sampling methods of baccalaureate nursing students across the United States exists. In addition, potential causes of negative student attitudes toward ICT and IL must be investigated so that targeted educational interventions can be incorporated into nursing curricula. Possible factors negatively influencing student IL perceptions may include lack of awareness related to the importance of EBP in nursing, inadequate experiences with evidence-based clinical practice, and inconsistent role modeling of EBP by practicing registered nurses. Targeted IL learning experiences may help nursing students overcome these negative perceptions and commence their lifetime journey of evidence-based professional nursing practice. However, nurse researchers must first identify the evident misconceptions between IL and evidence-based nursing so that faculty may later develop evidence-based teaching strategies.

The following section addresses IL literature related to nursing education. The relationship between educational strategies and information literacy will be explored as they pertain specifically to prelicensure baccalaureate nursing students.

### **Information Literacy in Nursing Education**

Numerous disciplines embraced the concept of IL, incorporating skills and competencies into their curricula, following its introduction in higher education by the ALA in 1989. Nursing education was no exception as Fox and colleagues published on the design of IL pathways for an undergraduate nursing program the same year as the initial ALA report was released (Fox, Richter, & White, 1989). However, progress of integrating IL into nursing education slowed as an update issued nine years later detailed challenges in higher education including: 1) the incorporation of IL in accreditation criteria had not been achieved, and 2) there remained a critical need to create a research agenda targeting IL benchmarks and best-practices (ALA, 1998).

Researchers contend that delayed diffusion of IL into nursing education has occurred in part due to lack of common understanding of the terms information technology and information literacy and their frequent misuse as interchangeable concepts (Argüelles, 2012). McNeil, Elfrink, Beyea, Pierce, and Bickford (2006) noted similar issues including ambiguous thoughts among nursing faculty about what constituted informatics content, confusion and lack of a clear understanding of computer literacy and IL, and uncertainty about how to integrate this content into nursing curricula. Similar issues are still evident in review of today's nursing education literature. For example, a recent article by Flood, Gasiewicz, and Delpier (2010) included in the review below labels IL a "vital component of nursing informatics" (p. 101) and offers a review of studies detailing the current state of informatics in nursing education that combines studies of

ICT and IL in its review. Additionally, the lack of research generated from the 2012 release of the TIGER Initiative informatics model indicates a failure of nursing education science to adopt and incorporate specific IL competencies, such as those developed by the ACRL, toward the development of evidence-based teaching strategies.

ICT competencies may be currently emphasized over IL in nursing education as enhancements such as electronic health records are more visible in the hospital environment (Argüelles, 2012). A need to revisit the concept of IL in nursing education becomes more evident as the health care delivery system becomes flooded with information sources due to advancements in informatics and as schools of nursing incorporate more technology tools into their curricula (Skiba, 2005). Nurse educators need to ensure that opportunities for developing IL skills are built into the curriculum to prepare graduating nurses for practice in the increasingly technological, data-rich health care environment. At the same time, faculty are also confronted with how best to incorporate IL into an already crowded curriculum. However, nurse researchers are still in the beginning stages of identifying effective teaching strategies aimed at IL competency as evident by the lack of literature published for review on the integration of IL into nursing education.

The following section provides a review of six articles discovered through a database search using terms specific to IL education of undergraduate prelicensure nursing students. Seven studies from this search were excluded from review as their authors described educational interventions with samples other than prelicensure students including diploma nursing (Brettle & Raynor, 2013), associate degree nursing (Beck, Blake-Campbell, & McKay, 2012), postlicensure RN-to-BSN (Ku, Sheu, & Kuo, 2007; McCulley & Jones, 2014; Tarrant, Dodgson, & Law, 2008), and general biology undergraduates (Freeman & Lynd-Balta, 2010; Henderson, Nunez-

Rodriguez, & Casari, 2011). Articles meeting inclusion criteria consisted of a literature review (Barnard, Nash, & O'Brien, 2005), two manuscripts detailing implementations of innovative pedagogical techniques (Flood et al., 2010; Janke, Pesut, & Erbacker, 2012), and three empirical studies including a mixed method study (Dee & Stanley, 2005) and two quantitative studies examining differences among prelicensure nursing students after IL interventions using pre- and post-test design (Hossain et al., 2012; Verhey, 1999). Themes emerging from this review included variations in integration of IL into nursing curricula, use of collaborative partnerships, and issues in the evaluation of learning outcomes.

### **Variations in Integration of IL Into Nursing Curricula**

As discussed previously, IL and EBP have in common the need to locate quality information; therefore, teaching prelicensure students how and where evidence is an important part of the nursing curriculum. Although there have been some documented attempts to integrate IL into prelicensure nursing education, there has been minimal discussion of the educational principles involved in implementing such a program. For example, Hossain et al.'s (2012) longitudinal descriptive study of baccalaureate nursing students discussed in a previous section failed to describe IL teaching strategies of their program. Although the researchers identified differences in confidence levels between students who had attended library classes and those who had not, no specific details were provided as to the types of teaching activities, courses, or specific IL competency threads within their nursing curricula. This was a common finding among other studies excluded from review, as authors rarely provided detail regarding specific IL teaching innovations employed by nursing faculty in their programs.

Four of the six articles reviewed provided some detail regarding the process of integrating IL skills into their curricula; however, implementation techniques varied

significantly. Nursing literature either describes a complete review of curricula and general overview of the new thread related to IL competency or discusses integration of a specific IL course or assignment.

**IL integration through a single course or assignment.** Two of the reviewed articles (Dee & Stanley, 2005; Janke et al., 2012) described a specific course or learning project designed in collaboration between nursing and library science faculty. In Dee and Stanley's (2005) mixed method study conducted to provide insights into nursing students' use of health resources and library services, students who worked in health care facilities (n= 25) were surveyed, interviewed, and observed after receiving a two-hour instruction by a hospital-librarian. The educational intervention was designed to focus on searching the National Library of Medicine (NLM) databases as researchers noted students required significant training to adapt their existing computer skills to sophisticated search-engines (Dee & Stanley, 2005). However, the study found even after the intensive training session students required additional education on how to narrow searches using database functions to find relevant research articles. Despite having on-campus and remote access to electronic library databases and resources, students stated they felt unfamiliar with libraries, lacked knowledge about the capabilities of the librarian, and expressed interest in additional individual educational sessions to learn the more complicated search features of the database (Dee & Stanley, 2005).

Similarly in their manuscript, Janke, Pesut and Erbacker (2012) described implementation of a single service-learning project offered in a third year nursing research course designed to enhance IL skills of undergraduate students. The project was designed so that students worked in groups to conduct a literature review and presentation on a topic generated by practicing clinicians on a unit in their hospital rotation (Janke et al., 2012). The student



participants had received an online tutorial and in-class library instruction session required by their English classes and an introduction to searching the CINAHL index in their first year of studies. However, the researchers noted that no formal library instruction occurs in the second year of the program and as a result students' abilities to search for and assess information declines in their third year (Janke et al., 2012). To assist with the service-learning project and as part of the research course, a librarian provided a hands-on 75-minute "IL class" focused on searching for and retrieving research articles and using Boolean operators to narrow, broaden or refine their search. As discovered in Dee and Stanley's (2005) research, Janke et al. (2012) noted that future implementations would require greater integration of library sessions throughout the course to successfully teach and reinforce IL skills as the single session likely covered too much material. These findings are not surprising, as other studies have illustrated that students rarely gain the necessary skills and confidence in research abilities from a single orientation (Carlock & Anderson, 2007; Leasure, Delise, Clifton, & Pascucci, 2009).

It should be noted that both the research investigator and manuscript author received resource support in the development of their IL learning experiences. Dee and Stanley (2005) received grant funding by the National Institutes of Health to provide their training session and assistance from hospital-based health science librarians; Janke et al. (2012) noted their project was designed in partnership with a research coordinator employed by a local hospital where students practiced and from librarians within the university. Institutional support and resources received in these studies may have assisted faculty in their development, implementation, and evaluation of IL teaching strategies. As described by Shellenbarger (2017), organizational culture may help or hinder nursing faculty's "utilization and translation of evidence into teaching practice" (p. 106). However, both individual and organizational barriers and facilitators of

evidence-based teaching practice (EBPT) require further exploration, especially in regards to the emerging concept of IL and innovative applications of ALA competencies to prelicensure student preparation.

**IL integration throughout the curriculum.** Contrary to the previous IL implementation examples, two articles (Flood et al., 2010; Verhey, 1999) described the process of developing and integrating a comprehensive IL curriculum in their school of nursing. Verhey's (1999) exploratory inquiry, a seminal study in nursing education, describes the development, implementation and evaluation of a comprehensive IL curriculum for baccalaureate nursing students. Faculty began developing the program by conducting a comprehensive assessment of students and faculty to evaluate learning needs, perceptions of IL, and to serve as baseline data for later evaluation of the new curricular strand. Using results from the gap analysis and process framework developed by the ACRL, the researchers described a variety of teaching strategies and learning experiences focusing on key IL concepts. Outlined in a comprehensive table, the IL strand was integrated over six semesters into theory, clinical, and practicum courses and used hands-on instruction to teach IL competency lessons such as electronic database searching.

Likewise, Flood et al. (2010) described development of a specific IL curricular thread that stretched over five semesters. Conceptually, the clinical assignments met program and course IL objectives and were developed for novice, intermediate, and advanced students who had personal computer access through a university-wide laptop program (Flood et al., 2010). The authors outlined a comprehensive program including early database instruction and orientation to the library website, intermediate coursework focusing on implementation of information through oral and written clinical assignments, and advanced externships designed to focus on IL application through role development. Experts have argued that achieving

competence in IL requires that this cluster of abilities be woven into nursing curriculum content, structure, and sequence (Barnard et al., 2005; Orr, Appleton, & Wallin, 2001), as was evident in these articles. IL skills are complex, involve varying levels of proficiency, and need to develop over time (Society of College, National and University Libraries [SCONUL], 2004).

### **Collaborations and Partnerships in IL Nursing Education**

A second theme evident in four of the studies and manuscripts (Dee & Stanley, 2005; Hossain et al., 2012; Janke et al., 2012; Verhey, 1999) involved collaborative efforts and partnerships formed to deliver IL programs in nursing education. Although authors formed partnerships outside of the university, as described by Dee and Stanley (2005) and Janke et al. (2012), most involved internal collaborations between the department of nursing, health science librarians, and information and communication technology (ICT) divisions. A unique aspect of Verhey's (1999) implementation of IL related to library sciences involved the developer and coordinator of the curricular strand, a librarian and registered nurse, who provided guest lectures and consultation to faculty. Most authors emphasized that a need exists to restructure the relationship between nurse educators and librarians, encouraging collaboration between disciplines to identify unique expertise in development of strategic and successful IL learning experiences for prelicensure students (Barnard et al., 2005; Brettle & Raynor, 2013; Janke et al., 2012). Dee and Stanley (2005) noted that health science librarians are trained to provide information about libraries and library services that meet many of the clinical and education needs of nursing students.

### **Evaluation of Learning Outcomes**

Despite inconsistent and varied findings between studies, most articles explored the evaluation of learning outcomes related to IL educational implementations. Janke et al. (2012)

described improvements in learning after an IL intervention as students reported increased confidence in database searching, APA formatting, ability to read and evaluate scholarly articles, and their application of research to practice. Students attributed success to the support given to them by their professor and librarian and also detailed their increased appreciation for EBP and newfound abilities to bring knowledge into practice (Janke et al., 2012). In contrast, students reported challenges encountered from the service-learning project related to the group work assignment and intimidation from working alongside potential future employers as a critical aspect of the assignment involved working collaboratively with practitioners from within the students' clinical learning environment (Janke et al., 2012).

Likewise, Verhey (1999) detailed mixed findings from the integration of their IL curricular strand. Results of the evaluation indicated statistically significant increases in the 1996 students' ( $N = 145$ ) use of the CINAHL electronic database ( $p < .000$ ), their use of a health and biosciences research library located nearby ( $p < .05$ ), and their level of comfort in using the journal literature ( $p < .05$ ). However, the post-implementation cohort of students expressed a significantly greater lack of knowledge regarding use of information resources and faculty assessment of student abilities to evaluate sources of credible evidence did not change between pre- and post-implementation groups (Verhey, 1999). Finally, findings from Hossain et al.'s (2012) quantitative study comparing IL skills of first-year undergraduate nursing students from their first semester to second semester (T1  $N = 113$ ; T2  $N = 115$ ) demonstrated no significant differences in overall confidence in ability to access electronic information between students who had attended an IL class and those who had not. However, some positive results were found as students who attended the class demonstrated significantly higher scores in the area of 'awareness in relation to being responsible for self-learning' ( $F = 3.703$ ,  $\alpha = .05$ ).

The mixed results from these studies reflect other findings demonstrating IL teaching interventions did not substantially assist undergraduate students to increase general IL skills (Beck et al., 2012; McCulley & Jones, 2014). Researchers noted possible causes of paradoxical findings including student realization of extensive gaps in knowledge related to information searching post-instruction (Verhey, 1999). Despite incorporation of IL throughout the undergraduate curriculum, Verhey (1999) identified the percentage of faculty incorporating IL content into the design of their courses increased by only 8.9% in four years. These results indicate that other extraneous student, faculty, and program factors may impact success of IL education in nursing unidentified from the literature reviewed. For example, none of the studies explored the effects of delivery modality, either face-to-face training or online tutorials, on IL sessions as was recently studied in diploma nursing students by Brettle and Raynor (2013). Additionally, with the emergence of new educational technologies such as AEHR programs and integration of mobile-devices and PDAs in prelicensure education, results from these studies dated between 1999 and 2012 may no longer be applicable to today's nursing programs.

### **Gaps in Literature Related to IL in Nursing Education**

Articles about IL in nursing education were explored and educational strategies designed to help prelicensure students gain competencies necessary for lifelong skills in accessing, retrieving, and analyzing information were reviewed in this section. Despite association of some positive learning outcomes with the incorporation of IL teaching activities, specific examples of how these skills and competencies have been successfully integrated into nursing curricula are relatively sparse. Additionally, the majority of reviewed articles on IL implementations detailed extensive support received by nursing faculty through grant funding (Dee & Stanley, 2005), partnerships with hospital research department staff and health science librarians (Janke et al.,

2012), and teaching assistance from library science faculty within their university (Dee & Stanley, 2005; Hossain et al., 2012; Janke et al., 2012; Verhey, 1999). Positive student learning outcomes may not be replicated in nursing programs with less optimal conditions where faculty may lack extensive resource support or assistance from collaborative teaching practices.

Because the majority of authors provided very little detail regarding the role of library science faculty in curriculum design, lesson planning, or teaching, it is unclear how their expertise and collaborative partnership may be best applied in the design of IL learning experiences. Literature findings indicate that faculty adoption of IL teaching strategies across the undergraduate nursing curriculum were low and most authors described limited educational sessions or assignments in a single class, some of which were described as lasting only a few hours. Further research is needed to explore the nursing educator's experience adopting an innovative concept such as IL into the curriculum so that implementation barriers specific to IL competency development may be identified. Moreover, the authors recommended greater integration of library and database searching sessions occur in future IL implementations to reinforce skill and promote confidence among students. These early recommendations by faculty post-intervention indicate that educational design factors such as timing, repetition throughout the curriculum, and inclusion of lessons focusing on library services may impact success of IL teaching sessions and student learning.

Additionally, the majority of evidence drawn from these articles evaluating student learning outcomes focused on ability or comfort accessing information (Dee & Stanley, 2005; Hossain et al., 2012; Verhey, 1999). However, IL competency and skills encompass more than accessing information, as nursing students must be able to summarize, synthesize, and apply information effectively to engage in EBP. Tools measuring IL competency or self-efficacy

based on the ALA's framework must be applied to nursing education studies to further assess knowledge of student learning experiences and outcomes. Even with limited measures of learning, authors noted inconsistencies in student outcomes, as some reported either no change or decreases in student confidence post IL intervention (Hossain et al., 2012; Janke et al., 2012; Verhey, 1999). Authors questioned if mixed results may have been related to the short length of learning sessions and perceived lack of support with information searches post intervention; however, further exploration is necessary to better describe the state of nursing education science related to IL teaching and to identify potential factors impacting student learning.

The challenge for nursing educators is how to introduce and integrate IL across the curriculum, especially as the literature is unclear on the most appropriate methods for improving skills or providing rigorous methods of evaluating them (Brettell et al., 2007). Development of IL skills in prelicensure nursing programs was often addressed unsystematically in the articles reviewed as authors failed to incorporate existing IL models or frameworks. Moreover, little attention has been given to the integration of comprehensive IL programs that go beyond collaborating with librarians. Although the preferred and optimal methodology for teaching IL in nursing education appears to be in collaboration with librarians, literature calling for nursing and library science disciplines to overcome silos suggests that partnerships can be difficult. Moreover, none of the articles examined resources and supports necessary for development of a comprehensive IL curriculum, barriers to nursing faculty implementation, or the impact of intervention timing on student self-confidence and competence.

This discussion highlights the need for better integration of IL across nursing curricula and investigation into educational strategies that best prepare graduates with appropriate skills and knowledge. An important opportunity exists to enhance IL education, as researchers are

only now beginning to focus on this content as a primary area for development of critical nursing skills and future EBP practice. However, development of evidence-based IL teaching strategies first requires building a body of evidence examining both student demographic factors and educational strategies effecting competency. As such, further study of factors influencing IL competency development is imperative to nursing education science.

### **Information Literacy Assessment Tools**

Faculty can shape student behaviors and foster positive attitudes toward IL and the ability to use IL skills and knowledge through targeted educational experiences and motivators associated with self-efficacy (Bandura, 1997; Krathwohl, Bloom, & Masia, 1964). However, development of pedagogical interventions aimed at improving IL skills and preventing self-doubt in prelicensure nursing students requires tools capable of measuring and evaluating IL self-efficacy. Nurse researchers must investigate the application of new assessment tools specific to IL self-efficacy as no measurement exists specific to nursing education. The following section reviews tools used to measure IL self-efficacy and provides rationale for this study's use of the ILSES (Kurbanoğlu et al., 2006) to operationalize IL self-efficacy of prelicensure senior nursing students.

### **Information Literacy Self-Efficacy Tools**

Only three published data collection tools measuring IL self-efficacy were developed for use in higher education in the countries of Spain (Pinto, 2010), Nigeria (Adetoro, Simisaye, & Oyefuga, 2010), and Turkey (Kurbanoğlu et al., 2006). Although each tool is designed to assess self-efficacy within the context of IL, the instruments vary significantly in design, validity, and utilization. The ILSES, created by Kurbanoğlu et al. (2006), has been used extensively in studies to compile and analyze IL self-efficacy data of student-teachers (Demiralay & Karadeniz, 2010;



Erdem, 2007; Tuncer, 2013; Yilmaz, 2008), students enrolled in a variety of disciplines in postsecondary institutions (Akkoyunlu & Yılmaz, 2011; Demiralay & Karadeniz, 2010; Erdem, 2007; Geçer, 2012; Kiliç-Çakmak, 2010; Tuncer, 2013; Yilmaz, 2008), and in two studies specific to the undergraduate nursing student population (Stokes & Urquhart, 2011; Wendekier, 2015). Contrary to the ILSES, Pinto's (2010, 2011) and Adetoro et al.'s (2010) tools were used solely in their own research projects.

Moreover, each researcher operationalized IL self-efficacy differently in design of their tools. For example, Adetoro et al. (2010) applied the theoretical framework of Bandura's (1997) theory of self-efficacy in the creation of their 31-item Self-Efficacy and Information Literacy Questionnaire (SILQ). Although the researchers utilized an expert psychologist and librarian to establish content validity of their tool, the article insufficiently described specific items on the SILQ and lacked critical information regarding tool development (Adetoro et al., 2010). It was evident from review of the article that the survey was not based on ACRL's (2000) IL competency standards and that IL skills or proficiencies defined by the ALA (1989) were not incorporated. The survey created by Adetoro et al. (2010) appears to conceptualize IL self-efficacy as generic tasks and abilities related to completion of school work as the SILQ asks respondents to rate their ability to perform tasks such as independent problem solving, management and completion of school assignments, sharing new ideas, and leading groups. In contrast, Pinto's (2010) 26-item instrument listed IL competencies and abilities instructing participants to use a rating scale to report level of self-efficacy; however, the tool failed to provide a basic definition of self-efficacy in its directions. Participants may have interpreted IL self-efficacy in a variety of ways because the instructions lacked a formally operationalized

concept of measure. Using Pinto's (2010) questionnaire without this context may lead to inconsistent findings, particularly in samples from varying cultures.

Unlike Pinto (2010) and colleagues, Kurbanoglu et al. (2006) thoroughly described development of their survey ILSES by providing detailed item discrimination indices and principal component analysis to validate their tool. In addition, the researchers provide their completed tool in both 28- and 17-item versions so that face validity of the questionnaires could be confirmed in comparison to the ACRL (2000) IL competency standards. The structure and content of the ILSES affirm researchers' use of the ACRL competency standards, the ALA's definition of IL, and Bandura's definition of self-efficacy. The ILSES instructs respondents to rate confidence in completing IL-related tasks as items are categorized and designed in a simple way for users to interpret its questions (Kurbanoglu et al., 2006).

**Validity and reliability of the ILSES.** All three instruments professed to collect valid information on students' perceptions of IL self-efficacy; however, the lack of research using Pinto (2010) and Adetoro et al.'s (2010) tools severely limits the comparison of reliability statistics for their tools. With regard to reliability, Cronbach's alpha demonstrates how well the set of questionnaire items measures the construct of IL (Polit & Beck, 2012). The internal consistency of Pinto's (2010) and Adetoro et al.'s (2010) tools within their single study applications were 0.936 and 0.75, respectively. In contrast, the ILSES has been utilized in many studies referenced above with high measures of internal consistency verifying its ability to measure the same trait among varying samples (Polit & Beck, 2012). Kurbanoglu et al. (2006) initially reported a Cronbach alpha level of 0.91 for the 28-item English version of the tool. Research conducted by Geçer (2012), Tuncer (2013), and Wendekier (2015) using the same 28-item version resulted in Cronbach's alpha levels of 0.87, 0.861, and 0.93, respectively. As

Cronbach's alpha values above 0.80 are preferred (Pallant, 2010), the ILSES demonstrates excellent internal consistency in the studies reviewed. Kurbanoglu et al. (2006) also demonstrated that both the ILSES 28-item English scale ( $r = .91$ ) and 17-item English scale ( $r = 0.81$ ) performed consistently. None of the research using the ILSES reported any test-retest reliability data as they were cross-sectional studies by design; therefore, the literature review could not establish the ability of the ILSES to perform consistently over time (Polit & Beck, 2012).

Finally, items from the tools developed in Spain (Pinto, 2010) and Nigeria (Adetoro et al., 2010) did not reflect IL education in the United States. For example, items on Pinto's (2011) instrument assessed the ability of respondents to install and use computer programs and statistical software, and, in the United States, these tasks relate to information rather than IL. These differences raised questions concerning the ability of the surveys to capture robust data that would enhance IL education of this study's sample of prelicensure nursing students in the United States. Because Kurbanoglu et al.'s (2006) tool was designed using the ACRL framework of IL competency and was translated into English and applied in studies using samples of students from the United States, it was the only instrument relating to IL education appropriate for use in this research study.

### **Information Literacy Knowledge Surveys**

This section briefly discusses surveys used to assess student IL knowledge and reviews standardized surveys and IL questionnaires created for specific research projects. The literature review revealed two standardized IL knowledge-assessment tests used in higher education and five tests created for use in specific research projects. Researchers at James Madison University (JMU) developed the Information Literacy Test (ILT) and researchers at Kent State University

developed the Standardized Assessment of Information Literacy Skills (SAILS). Both standardized IL assessments can be delivered electronically using a multiple-choice format (Kent State University, 2014a; Madison Assessment, 2013a). However, both tests require significant investment of resources in time for student completion and finances for administration fees. Institutions must pay \$8.00 per student per test for the ILT (Madison Assessment, 2013b) and \$6.00 per student per test for the SAILS (Kent State University, 2014b) in administration fees. Additionally, the 65-item ILT requires approximately 75 minutes to complete (Wise, Cameron, Yang, & Davis, 2009) and according to Kent State University's web site (2014a) the 55-item individual SAILS test requires approximately 45 minutes to complete. Resource requirements of the ILT and SAILS made both of these assessments impractical for use in this research project.

In addition, five IL tests created for use in specific research projects were found during this literature review. Each of these single-study instruments assessed only a few specific aspects of IL skills or measured comfort with particular IL activities (Courey et al., 2006; Jacobsen & Andenæs, 2011; Ku et al., 2007; Trail, Gutierrez, & Lechner, 2006) and so none of these instrument will be used for this research.

In summary, the overall findings of this section on IL self-efficacy instruments support the validity and reliability of the ILSES survey for measuring IL self-efficacy in this research study. The literature review examined three tools measuring IL self-efficacy and seven measuring IL knowledge or skill. Of these, only one, the ILSES, correlated with the ACRL's (2000) competency standards, demonstrated consistent reliability over several studies, and was used with a sample of prelicensure senior nursing students. Therefore, this study used the ILSES to operationalize IL self-efficacy.

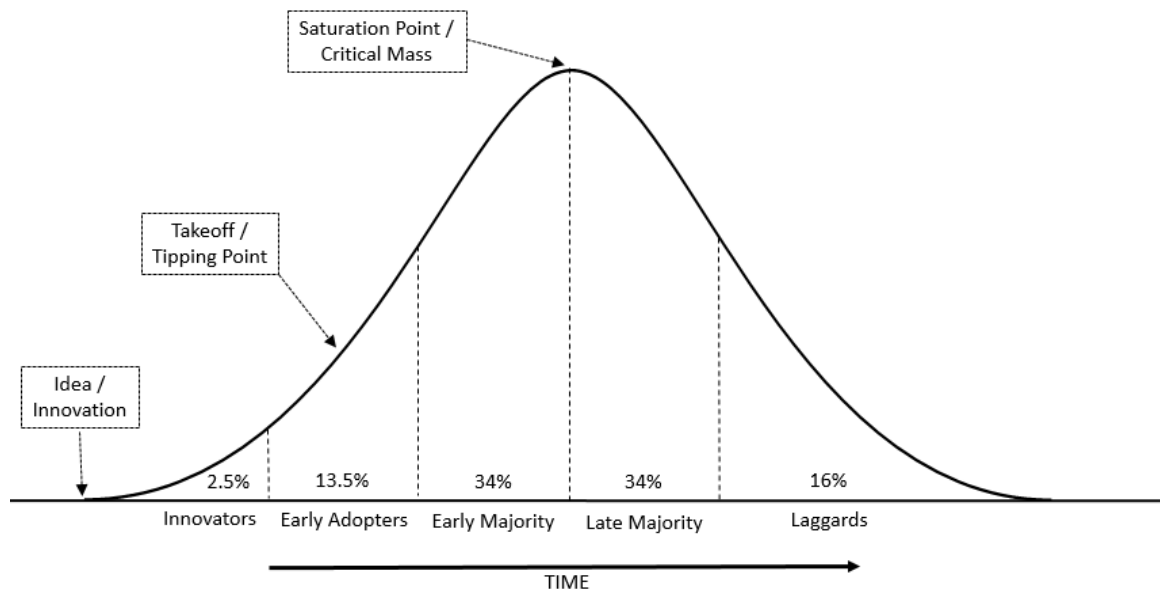
## **Conceptual Framework**

The Diffusion of Innovation (DOI) theory, popularized by Everett Rogers in 1995, is often recognized as a valuable change model for guiding technological innovation. However, the model has been used beyond the realm of technology as Rogers (1995) broadly defines innovation as any idea product, practice, philosophy, concept, or objective perceived as new by an individual, group, or organization. Diffusion then refers to the spread of the idea from one individual to another and was conceptualized by Rogers to be a process by which an innovation is communicated through certain channels (mass media or interpersonal) over time among members of a social system. Each of the four components of DOI theory innovation, communication channels, time, and social systems can influence an individual's decision to accept or reject the proposed change. Time refers to the five-stage process through which innovations pass. Rogers (1995) conceptualized these stages as: (a) Knowledge/Awareness: Exposure to the innovation; despite lacking complete information, individual forms an attitude toward the idea based on his/her perception of its characteristics; (b) Persuasion/Interest: Individual becomes interested in the new idea and seeks additional information; (c) Evaluation/Decision: Mental application of innovation to present and anticipated future situations; Individual decides whether or not to try it; (d) Implementation/Trial: Individual makes full use of innovation; and (e) Confirmation/Adoption: Individual decides whether to continue full use and adopt the innovation.

Based on their rate of adoption, the DOI theory classifies individuals into one of five categories: innovators, early adopters, early majority, late majority, and laggards. Rogers (1995) theorizes that a small group of innovators embrace a new idea first before it diffuses through other adopter categories and spreads to the majority. The goal is not to move individuals from

one group to another but rather to streamline the innovation so that it meets the needs of individuals in all five categories. Motivated by the idea of being change agents, innovators are often technology enthusiasts and venturesome risk takers. Innovators act as gatekeepers for the next group, early adopters, who are viewed as opinion leaders and role models within the social system. Early adopters are well respected by their peer group and directly influence the third adopter group, the early majority. This group is known for their aversion to risk as they desire proven applications and reliable outcomes over new ideas. The fourth category of adopter, the late majority, is known for greater skepticism. Although they will respond to peer pressure, the late majority usually adopts only bulletproof innovations. The final category of adopter, the laggards, are suspicious of innovation and view technology as a hindrance. Laggards are often isolated from innovators and opinion leaders as they desire to maintain status quo.

Figure 2 depicts the five adopter categories in a bell-shaped curve based on Rogers' estimated percentage of individuals in each grouping. Peer networks are important in DOI as they are used by innovators and early adopters who serve as opinion leaders to achieve the critical mass that sparks the initial take off or "tipping point" in the innovation adoption process.



*Figure 2.* Diffusion of Innovation adopter categories described in the context of the innovation adoption process. Adapted from Kaminski, 2011; Rogers, 1995.

Finally, DOI theory examines why some innovations successfully navigate through the process of diffusion to adoption while others fail to assimilate. According to Rogers (1995) the perceived attributes, called innovations characteristics, make it more or less appealing and contribute to its adoption or rejection. In their decision, individuals weigh innovation characteristics defined as follows:

- a) relative advantage: the degree to which an innovation is perceived to be superior to the current practice or idea - the greater the perceived relative advantage of an innovation, the more rapid its rate of adoption;
- b) compatibility: the degree to which the innovation is perceived to be consistent with an individual's existing sociocultural values, beliefs, previous ideas, and/or perceived needs;
- c) complexity: the degree to which an innovation is perceived as difficult to use or understand - the simplicity of an innovation;

d) trialability: the degree to which the innovation can be altered or implemented on a small scale; and

e) observability: “the degree to which the results of an innovation are visible to others - innovations whose outcomes are easily observed are more readily adopted than those with understated outcomes” (Rogers, 1995, p. 208).

According to the Rogers (1995), these characteristics account for 49–87% of adoption variation seen across all categories of adopters, with relative advantage and compatibility being particularly important in explaining the rate of adoption.

Numerous studies have applied the relative advantage, compatibility, complexity, trialability, and observability of an innovation to understand the spread, acceptance, or rejection of an idea (Rogers, 2003). Initial studies specific to clinical nursing applied Rogers’s model to change management in clinical settings in the exploration of nurses’ perceptions toward research-based practice (Pearcey & Draper, 1996), the implementation of new practice standards (Landrum, 1998; Lekan-Rutledge, 2000), the examination of nursing documentation (Zerwekh, Thibodeaux, & Plesko, 2000), and in the exploration of nurses attitudes toward adopting new EHR technology (Lee, 2004). These early studies indicated that Rogers’s model appropriately described nurses’ perceptions toward innovation as DOI theory provided a framework for exploring the diffusion of new ideas through practice. Acceptance or failure of an innovation was linked with the presence or absence of a unique DOI concept or attribute. For example, Lee (2004) noted that communication channels influenced nurses’ adoption of EHR innovation as nurse respondents indicated failure to convince colleagues of the relative merit of electronic care planning may have prevented full adoption on certain units. Applying the model to research in



nursing practice helped to examine the perceived attributes of an innovation, providing an opportunity to modify the innovation and strengthen its likelihood of adoption (Landrum, 1998).

### **Diffusion of Innovation Theory in Nursing Education**

An initial search of studies examining IL under the context of DOI theory yielded no results. The search was broadened to examine publications describing the use of Rogers's theory in nursing education and resulted in seven articles meeting criteria for review. The lack of manuscripts and research studies applying DOI theory to nursing education indicates a gap in literature and opportunity for further study.

Articles ranged from 2008 to 2016 in publication date and when grouped by study methodology the group included three manuscripts, two literature reviews, and two research studies using components of Rogers's DOI theory as a framework to analyze an educational innovation in nursing. Authors applied Rogers's theory to innovations in nursing education including development of a simulation program (Starkweather & Kardong-Edgren, 2008), in collaborative adoption and diffusion of virtual learning communities across undergraduate and graduate programs (Giddens & Walsh, 2010), and to trace the history of the doctorate of nursing practice (DNP) diffusion into nursing practice and education (Terhaar, Taylor, & Sylvia, 2016). Authors also used DOI theory in an integrative literature review describing facilitators and barriers to integration of genomics into undergraduate nursing programs (Quevedo Garcia, Greco, & Loescher, 2011) and in a literature review of mobile device use in nursing education (Doyle, Garret & Currie, 2014). Finally, researchers applied Rogers's theory to a quantitative study of academic EHR (AEHR) implementation (Herbert & Connors, 2016) and in a mixed method pilot study examining faculty intent to adopt innovative teaching strategies in clinical nursing education (Phillips & Vinten, 2010).

**Communication channels, social systems, and adopter groups.** The process of diffusing an innovation throughout a social network relies heavily on human capital. Rogers (1995) asserts that an innovation must be widely adopted and achieve critical mass in order to self-sustain. In their manuscript on simulation implementation, Starkweather and Kardong-Edgren (2008) described difficulties of reaching critical mass as securing faculty buy-in, acceptance, and adoption of a new practice or technological innovation into a nursing curriculum requires overcoming a myriad of complex barriers. The majority of articles specific to nursing education indicated communication channels and social systems were vital to the transfer of information and eventual establishment of faculty buy-in to the proposed change (Doyle et al., 2014; Giddens & Walsh, 2010; Herbert & Connors, 2016; Starkweather & Kardong-Edgren, 2008). DOI theory outlines several strategies related to social communication that help an innovation reach this pivotal stage. Buy-in can be achieved by injecting an innovation into a group of individuals who will readily use it and provide positive reactions to other adopter groups. Targeted efforts by nursing faculty used a variety of communication networks and types of social systems to bring the late majority on board. Articles detailed informal team meetings (Giddens & Walsh, 2010), designation of faculty champions (Herbert & Connors, 2016), and hosting special events such as a faculty retreat to plan support through implementation (Starkweather & Kardong-Edgren, 2008).

Research on DOI theory has demonstrated that adoption and endorsement by a highly respected individual with a social network can help to create an instinctive desire for a specific innovation (Rogers, 2003). Similarly, successful adoption of an innovation requires the support of key individuals in leadership who have organizational influence and power in their school of nursing. Herbert and Connors (2016) identified program administrators as essential to strategic

planning of AEHR integration and Doyle et al. (2014) identified the need for leadership from deans, directors, and chairpersons during complex adoption of technological innovations such as mobile devices in undergraduate nursing programs. Authors also applied the popular adopter categories of DOI theory to describe how a very small group of innovators had a profound effect on adoption behaviors of their peers. For example, findings from Herbert and Connors' (2016) descriptive study of nursing program directors ( $N = 157$ ) indicated that only 49% of faculty were in the first innovation adoption phase of knowledge/awareness despite 100% of programs reporting utilization of an AEHR. A heavy burden fell on the 9% of faculty who were the innovators and early adopters that had fully integrated AEHR into their classrooms. Likewise, Giddens and Walsh (2010) detailed their experiences leading adoption of virtual learning communities in their nursing programs. As change agents, this innovator group was willing to adopt the new pedagogy based on theoretical linkages, personal assumptions, and limited findings from early studies (Giddens & Walsh, 2010).

However, the power of imitation is fundamental to DOI theory; hence, lack of adoption by one social group may lead to lack of adoption by others who regard themselves as similar. Authors discussed how critics of the innovation, the late majority, would adopt or partially adopt the innovation only after specific guidance or learning activities were provided by others. Giddens and Walsh (2010) found that resisting faculty were similar to one another and shared communication networks that isolated them from peer groups. Moreover, Phillips and Vinten (2010) also found faculty to have homophilous group characteristics; in essence, individuals within a specific adopter category are similar to each other with localized communication networks (Rogers, 2003). A unique finding of this mixed method study of clinical faculty ( $N = 71$ ) indicated that gender and race may provide insight into faculty adoption patterns of

innovative teaching strategies as male and Asian participants rated Rogers's perceived characteristics of innovation significantly higher than others in the study ( $p = .0285$  and  $p = .0303$ , respectively). Through the application of DOI theory, authors of the reviewed literature were able to predict faculty members who were skeptical of the innovation and help them to explore their perceptions before immediately rejecting the change.

**Innovation attributes.** Although the reviewed literature applied DOI theory to a variety of innovations in nursing education, each article described the role of innovation attributes in explaining the adoption intention of faculty. In an integrative literature review of strategies used to teach genomics in academic nursing programs, Quevedo Garcia et al. (2011) found the attribute of relative advantage explained barriers to inclusion of genomics in nursing curricula, the perceived unimportance of the specialty among nursing faculty. In a descriptive study discussed earlier, Herbert and Connors (2016) used innovation attributes to identify organizational barriers of AEHR implementation including access issues and lack of funding for faculty training or release time. Similarly, in their review of literature on mobile device integration, Doyle et al. (2014) found implementation projects fail in part due to insufficient funds and/or human resources including technological support for faculty. When nurse educators assess relative advantage of an innovation, their decision to adopt or reject may be negatively influenced by these barriers.

Compatibility, another attribute of innovation, was found in two of the reviewed articles as faculty examined personal fit of the new idea, product, or concept. For example, Giddens and Walsh (2010) noted that resistance to adopting virtual communities came from nurse practitioner faculty who did not perceive the innovation to have value to the type of students they taught. Likewise Giddens and Walsh (2010) discussed that individuals with low ownership, those who

did not contribute to idea selection, or individuals who found the technology or pedagogical approach to be incompatible with their own traditional approaches to teaching, were more likely to criticize or reject the change. Observability of the innovation also impacts faculty intent to adopt as discussed by Terhaar, Taylor and Sylvia's (2016) recent use of DOI to trace the history of the DNP degree. The authors noted that a growing number of nurses have earned DNPs from programs which vary considerably in rigor, asserting that it is time to shift from potential of the degree to outcomes and impact of the DNP. Outcomes from the DNP, the innovation in this case, need to be more visible to better inform adoption decisions of nurse educators and faculty.

Finally, Quevedo Garcia et al.'s (2011) literature review found a lack of evaluation methods for genomics teaching strategies which impedes trialability of the innovation as it pertains to evaluation of its effectiveness to further adoption. In context of DOI theory, these findings indicate that innovative teaching strategies must be tested and evaluated to demonstrate trialability to potential users if they are to be widely adopted across nursing programs.

The limited application of DOI to nursing education makes it difficult to draw significant conclusions. However, preliminary findings from these articles demonstrate that Rogers's innovation-decision process can be used to further study the adoption of innovative teaching strategies in nursing education.

### **Gaps in Literature Related to Nursing Education and DOI Theory**

A discussion regarding DOI was presented in this section as Rogers's theory will serve as the conceptual framework for this research study. Characteristics of adopter categories, innovation attributes, and stages of adoption were defined. Literature regarding the application of DOI theory to nursing education was presented and critiqued. The significance of social networks and communication channels in innovation diffusion among nurse educators was

presented. Database searches yielded few results and the limited application of Rogers's framework to nursing education was identified. Additional research that explores how innovative ideas, practices, and concepts spread throughout nursing programs is warranted. Nursing education lacks empirical research addressing the diffusion of IL as no studies were found specific to this topic.

This study used Rogers's DOI theory as a framework to examine faculty experiences in the adoption of IL competencies within baccalaureate nursing programs. DOI theory helped to identify and examine significant factors that influence faculty intent to adopt innovative concepts, ideas, and teaching strategies in nursing education. This study examined the applicability of Rogers's model for analyzing nurse educators' perceptions toward IL and how they are adopting this new concept into nursing education. DOI theory was applied to provide context for IL diffusion within baccalaureate nursing education and helped to identify current challenges and success strategies of effective IL integration into nursing curricula.

### **Chapter Summary**

The review of literature identified interesting trends in IL education and helped to build the case for further research studying the concept in relation to prelicensure nursing education. Gaps were identified relating to current literature on technology, undergraduate students, IL, and nursing education as current research focuses on ICT competencies. A dearth of literature was found specific to IL teaching and learning in nursing education. No studies have explored the intersection between IL competency development, demographic student factors, and educational strategies employed by faculty in prelicensure nursing programs. Moreover, existing empirical studies had significant limitations including data collection from single-sites, small sample sizes, study designs or evaluation tools lacking methodological rigor, and failure to evaluate or report

on validated measures of student learning. These weaknesses limit transferability and generalizability of findings from studies specific to nursing education and ultimately impair EBTP of nursing faculty.

This study explored the influence of demographic student factors on IL self-efficacy through a more rigorous multi-site design. Demographic factors identified in this review of literature, such as gender, age, and searching preferences, were explored to determine their relationship to IL self-efficacy of prelicensure senior nursing students. Moreover, previously unstudied educational strategies, such as inclusion of EBP projects and library courses in the curriculum, were included to examine their influence on IL self-efficacy levels. Kurbanoglu et al.'s (2006) ILSES tool, the only valid and reliable survey based on the ACRL Standards (2000), was used to operationalize IL self-efficacy in quantitative data collection.

However, further exploration was also needed to understand the experiences of faculty developing and implementing innovative IL teaching strategies. Despite the conduction of a rigorous quantitative study, little would remain known about current IL pedagogies employed by nursing programs across the United States without the simultaneous collection of qualitative data from nursing faculty. Using a mixed method approach, the investigator conducted faculty interviews at each nursing program to examine the integration of IL into teaching practice. Rogers (2003) Diffusions of Innovation, the conceptual framework for this study, was utilized during qualitative data analysis to identify barriers, facilitators, and adopter characteristics of faculty in various stages of IL adoption. Exploring the development of teaching and learning strategies relating to IL self-efficacy helped to identify areas for improvement in curriculum development, program assessment, and evaluation.

## CHAPTER THREE

### METHODOLOGY<sup>3</sup>

This chapter describes the methods that guided this research study. The discussion begins with a description of study design including review of the setting, sample, and data collection tools. This chapter concludes with an outline of study procedures and discussion of data analysis.

#### **Design**

As previously discussed, this study used a mixed method design to (a) describe prelicensure baccalaureate senior nursing students' IL self-efficacy levels utilizing the valid and reliable ILSES tool; (b) analyze the relationship between demographic factors, educational strategies, and IL self-efficacy; and (c) provide a description of educational strategies employed by nursing programs across the United States aimed at achieving IL competency. A concurrent embedded quantitative dominant mixed method approach was used on a sample of senior prelicensure baccalaureate nursing student participants, as well as faculty subjects. Investigators may use this approach to address different research questions within the same study, as in the case of this nested mixed method design, so that data may be collected simultaneously (Bergman, 2008; Creswell, 2009). Nested mixed method designs also allow for simultaneous comparison of two data sources or for their side-by-side evaluation as “two different pictures that provide an overall composite assessment of problem” (Creswell, 2009, p. 214). This methodology enabled the exploration of student factors and educational strategies through multiple vantage points from undergraduate senior nursing students, administrators, and faculty.

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<sup>3</sup> Sections of this chapter have been used in a previously published work. White, M. (2018, April). *Factors Influencing Information Literacy Self-Efficacy of Prelicensure Baccalaureate Nursing Students*. Poster session presented at Sigma Theta Tau International Nursing Education Research Conference, Washington, D.C.



Mixed methodology has been used in an ever-increasing number of research projects (Bryman, 2012) including the investigation of IL self-efficacy among baccalaureate nursing students (Stokes & Urquhart, 2011). By using both quantitative and qualitative methods, a deeper, richer understanding of the IL educational process can be attained. Therefore, the investigator employed both correlational quantitative and qualitative content analysis designs to answer the proposed research questions in this concurrent embedded mixed method study. The quantitative correlational approach was useful for exploring and observing the relationships among variables (Polit & Beck, 2012) and qualitative content analysis helped provide “knowledge and understanding of the phenomenon under study” (Downe-Wamboldt, 1992, p. 314). A directed approach to content analysis was used. This approach was appropriate as current theory and prior research exists about the phenomenon of IL that is incomplete and would benefit from further description (Hsieh & Shannon, 2005).

Rigorous sampling procedures were applied to improve upon existing nursing education studies. Limitations of existing studies, common to scientific inquiries in nursing education (Shellenbarger, 2017), include single-site data collection, inadequate sample sizes, and use of invalidated survey measures. Securing a representative sample of prelicensure students and faculty helped to improve transferability and generalizability of study findings so that diffusion of IL may continue into nursing education. The mixed method design ensured that factors impacting the development of IL self-efficacy of nursing students were examined through a variety of lenses. Correlational research using a representative sample of prelicensure nursing students explored the relationship of demographic factors and educational strategies to IL self-efficacy, while qualitative content analysis of interviews with nursing school faculty and

administrators allowed for new insights to emerge regarding the integration of IL competencies into undergraduate curricula.

### **Study Setting and Sample**

This study setting included prelicensure baccalaureate nursing programs from across the United States. Criteria for site selection included prelicensure baccalaureate nursing programs in the United States accredited by either of the two national accreditation bodies, the Accreditation Commission for Education in Nursing (ACEN) and/or the Commission on Collegiate Nursing Education (CCNE). The researcher used university, ACEN and CCNE websites to identify programs meeting accreditation inclusion criteria. A list of personal and professional contacts or references was created to identify nursing programs that met inclusion criteria in development of the study's sampling frame.

The researcher then classified potential nursing program sites into one of four geographic areas or strata; thus, a type of quota sampling plan was used to select and identify participating sites by geographic region. A quota sampling plan was chosen to divide the setting population into subgroups based on region as members in each of the formed stratum often have developed similar attributes and characteristics (Grove, Burns, & Gray, 2012). Geographic regions used for stratification were based on the U.S. Census Bureau Regions and Divisions with state codes. Nursing program locations were identified as either northeast, midwestern, southern, or western regions of the United States. The advantages and disadvantages of quota sampling are outlined below.

The aim of a quota sampling method is to reduce the potential for human bias in the selection of sample cases, which results in a stratified sample that is highly representative of the population being studied (Grove et al., 2012). Selection of participating programs from regional

strata helps to improve the representation of particular small minority groups within the population, as well as ensure that each strata is not over-represented in the sample (Grove et al., 2012). Stratifying the settings by geographical location also aided in highlighting differences in nursing programs, students, and curricula by region and helped to identify new demographic or educational factors impacting IL self-efficacy as a more representative sample was obtained.

The quota technique chosen for this study represents a type of non-probability sampling because convenience methods were used to identify participating programs sites. Although non-random sample selection may produce bias results, the stratified random sampling method presents challenges for nurse researchers as it can only be fully applied if a complete list of the population and its characteristics is available. Attaining a complete list of prelicensure nursing programs by region and securing detailed information about the percent of nursing programs in each strata was not feasible for this study. As a result, the researcher applied the quota sampling approach described by first identifying a convenience selection of nursing programs sites and then recruiting a minimum of one program from each regional stratum to participate in the study. This plan helped ensure that participating sites in the study represent nursing programs across the United States.

Qualifying nursing programs were recruited from each of the four regional strata. If a nursing program from a selected region chose not to participate, another was selected from within the same region for invitation. The researcher continued with recruitment to meet the quota until one nursing program meeting inclusion criteria from at least three of the four regional strata agreed to participate. Eight nursing programs from the northeast, southern, and western regions of the United States met inclusion criteria and agreed to participate in the study. None of the nursing programs contacted from the midwestern regional strata agreed to participate in the

study. The settings selected for this study included three nursing program sites in the northeast region located in Connecticut and Pennsylvania; four sites in the southern region located in Georgia, Louisiana, Maryland, and Texas; and one site in the western region located in Arizona.

### **Quantitative Student Sample and Survey Setting**

A convenience sample of prelicensure senior baccalaureate nursing students were recruited from the selected academic institutions and invited to participate in the quantitative portion of the study. The quantitative study sample was comprised of only senior nursing students as they have foundational knowledge and educational experiences necessary to complete the survey related to IL and nursing practice. Inclusion criteria for student participants consisted of full- or part-time enrollment in the prelicensure baccalaureate program with senior-level academic class standing and language proficiency in English. In accordance with the sampling procedures outlined below, all students who met inclusion criteria were invited to participate in the study through a recruitment email (Appendix C) sent by participating faculty subjects at their respective study site. Faculty participants from each nursing program distributed the recruitment email, which explained the study's purpose and contained the electronic survey link, to maintain privacy of student contact information. Students who chose to complete the quantitative survey accessed the electronic Qualtrics questionnaire through a link in the email.

Because none of the study questions aim to compare differences among groups of prelicensure students and proportions of regional strata in relation to the overall population could not be determined, the researcher did not need to maintain a proportionate stratification of students from each study site. Proportionate stratification would require the researcher to ensure that the sample size of each regional stratum was appropriate to its representation in the overall nursing student population size. Disproportionate stratification occurred in this study as the

research questions did not require the sample size of each stratum to be proportionate to the overall population.

A power analysis was completed to estimate the sample size required for this correlational study using a multiple regression model. The literature review identified only a few relevant studies focusing on IL self-efficacy of prelicensure nursing students. Because of the lack of evidence specific to the study population, Polit and Beck's (2012) recommendations were followed and a conventional medium effect ( $f^2 = .35$ ) was used to conduct a power analysis for the multiple regression model. This study used other conventional standards, a 5% level of significance and power of .8, which are commonly used to determine sample size in nursing education research (Cohen, 1992; Polit & Beck, 2012). In addition, the multiple regression model contained seven demographic predictors: age, gender, primary language, race/ethnicity, participation in a college library course, information resources used, and online searching preference; and six educational predictors: inclusion of a nursing informatics course, a course or lesson with formal review of library and information science resources, capstone course or professional practice immersion, completion of an evidence-based practice project, use educational technologies for clinical teaching, and integration of mobile device technologies. Demographic factors and educational strategies were chosen based on their emergence from the review of literature or their inclusion in other studies.

Using an online *a priori* sample size calculator for multiple regression analysis (Soper, 2013), the investigator determined that a minimum of 63 students were needed for the quantitative study participation to detect a medium effect size ( $f^2 = .35$ ) with high probability (power = .80) and a 5% level of significance (Polit & Beck, 2012). The researcher aimed to recruit 100 student participants to help ensure the minimum of 63 complete datasets were

obtained. A total of 593 students met the inclusion criteria and were eligible to participate in this study. The final sample size consisted of 260 participants.

### **Qualitative Faculty Sample and Interview Setting**

To complete the qualitative portion of the study, one faculty member, administrator, director, or dean was recruited from each participating nursing program to complete the Information Literacy Curriculum Survey (Appendix D) and participate in a semi-structured qualitative interview (Appendix E). The researcher identified potential faculty subjects through personal and professional contacts or references and/or through selection by the nursing program administrator. Inclusion criteria for the qualitative subject were comprised of full-time employment as a faculty or administrator within the baccalaureate nursing program, didactic teaching responsibilities including instruction of at least one class per week, five or more years of experience in their current faculty role, and current knowledge of the nursing program and curriculum.

The initial email or cover letter to institutions (Appendix F) was sent to nursing programs that met site inclusion criteria. The cover letter instructed contacts or administrators at each site to identify a faculty member who met inclusion criteria for participation in the qualitative interview and who would also coordinate quantitative student data collection. The email requested a response from the recipient that included an agreement of participation and personal contact information for the potential faculty subject. Using the contact information provided in the return response, the researcher emailed potential faculty subjects to determine interest in participating in the study. A meeting was scheduled to conduct prescreening and determine eligibility of faculty subjects.

Initial communications with potential faculty subjects occurred by phone or email and served to provide an invitation to participate in the study. During these meetings the researcher recruited and screened potential subjects by sharing the aim, purpose, and inclusion criteria of the study. In the instance that the identified faculty were ineligible or chose not to participate, identification of subsequent subjects occurred through face-to-face, phone, or email correspondences with colleagues, acquaintances, and administrators from participating nursing programs. A minimum of one faculty subject per site was recruited and a total of eight interviews were conducted as saturation of themes was reached.

The semi-structured faculty interview was scheduled at a mutually agreed upon time and location. The format of the interview was chosen with preference given to electronic video chat applications such as Skype, Zoom, and Facetime for feasibility of interviewing subjects across the U.S. All interviews were conducted at a private location, such as an office or meeting room, and were audio recorded for transcription. Qualitative data collection methods are further described below.

### **Data Collection Tools**

The following sections begin with a discussion of data collection tools used with nursing faculty and administrators and conclude with a review of the quantitative survey of prelicensure senior nursing students. The Information Literacy Curriculum Survey (Appendix D) and Faculty Interview Guide (Appendix E) developed for this study will be reviewed and an overview of Kurbanoglu et al.'s (2006) ILSES tool will be provided.

#### **The Information Literacy Self-Efficacy Scale**

As previously discussed, this study used the Information Literacy Self-Efficacy Scale (ILSES) in its entirety as a measure of IL skills of prelicensure senior baccalaureate nursing

students. This 28-item tool is a self-reported questionnaire designed to assess students' perceptions of IL skills under the ACRL Standards framework. Two versions of the ILSES have been tested in educational research, the longer 28-item tool that will be used in this study and a shorter 17-item version. Although one published research study had been found using the shorter version of the ILSES with samples of nursing students in the United Kingdom (Stokes & Urquhart, 2011), Wendekier (2015) found the longer 28-item version to account for more variance in IL knowledge and self-efficacy of prelicensure undergraduate students in the United States. In her dissertation study, the researcher noted that "the improved predictability coupled with higher reliability ( $r = .778$ ,  $N = 18$ ,  $p < .0005$ ) and Cronbach's Alpha levels consistently greater than .93, make the use of the ILSES 28-item scale preferable for measuring IL self-efficacy" (Wendekier, 2015, pg. 126). Additionally, the longer 28-item version was used in this study as it takes less than 10 minutes for students to complete.

The ILSES requires participants to report confidence and competence in conducting IL tasks with higher scores indicating increased perception of IL self-efficacy (Kurbanoğlu et al., 2006). The ILSES is the only self-efficacy measure of IL competency to adopt the ALA's definition and ACRL competency standards, as evidenced by face validity of the structure and content of the tool. In addition, the authors based the tool on Bandura's (1997) definition of self-efficacy, believing that students' tendencies to use IL skills are contingent upon belief in their abilities rather than on their knowledge or competency levels (Kurbanoğlu et al., 2006).

IL skills assessed on this scale include defining needed information, determining where to find information, using library resources, using the Internet, evaluating Internet sites, making citations, and preparing a bibliography. The authors categorized the 28 items according to the following subscales: (a) Define the need for information; (b) Initiating the search strategy; (c)



Locating and accessing the resources; (d) Accessing and comprehending information; interpreting; (e) Synthesizing and using information; (f) Communicating information; and (g) Evaluating the product and process (Kurbanoğlu et al., 2006). Appendix A contains the complete ILSES and Appendix B provides a letter of approval from the tool developers for use in this study.

The ILSES has been subjected to various statistical and psychometric analyses. Kurbanoğlu et al. (2006) validated the instrument over several waves of data collection with final psychometric testing revealing a Cronbach's alpha coefficient of .91. Both versions of ILSES have continued to show excellent internal consistency values in subsequent research studies with repeated high measures of Cronbach's alpha coefficients similar to those originally reported by the authors of the tool (Akkoyunlu & Yılmaz, 2011; Demiralay & Karadeniz, 2010; Erdem, 2007; Geçer, 2012; Kiliç-Çakmak, 2010; Stokes & Urquhart, 2011; Tuncer, 2013; Yilmaz, 2008). Most recently, Wendekier (2015) utilized the tool in a study of prelicensure senior nursing students ( $N=90$ ) reporting excellent internal consistency of the ILSES with a Cronbach's alpha of .93.

The ILSES has been utilized repeatedly in other disciplines of higher education, with undergraduate student teachers (Demiralay & Karadeniz, 2010; Erdem, 2007; Tuncer, 2013; Yilmaz, 2008) and has established reliability and validity when used with prelicensure nursing students (Stokes & Urquhart, 2011; Wendekier, 2015). Since the ILSES has been used with prelicensure nursing students to operationalize tasks of the ALA's competency standards, the tool was feasible for the purpose of the study and aligns with aims to better inform nurse educators of the specific competency needs of prelicensure nursing students. Analysis of results from the ILSES helped to identify specific areas of student need.

**Creation of the ILSES.** The scale, originally developed in Turkish and translated into English, was developed in a rigorous five-step process with repeated psychometric testing. The following subsection provides a synopsis of these phases and illustrates the development and evolution of the ILSES tool.

**Phase one.** During the first phase, Kurbanoglu et al. (2006) developed and tested 40 Likert-scale questions from IL standards created by the ACRL (2000), the SCONUL (2004), and the Australian and New Zealand Institute for Information Literacy (2004). The researchers tested scale items with public and private school teachers ( $N= 374$ ) and calculated a Cronbach's alpha at 0.84 (Kurbanoglu et al., 2006).

**Phase two.** The second phase of tool development encompassed an item analysis where Kurbanoglu et al. (2006) calculated item discrimination indices for each of the 40 ILSES questions. From this analysis, 12 items that had indices lower than 0.20 were eliminated. After the deletion of these items, the Cronbach's alpha rose from 0.84 to 0.92 and the item validity for the remaining 28 items increased to 0.48 (Kurbanoglu et al., 2006).

**Phase three.** In the third phase of tool development, the researchers conducted a principal component factor analysis along with a Varimax rotation on the 28-item scale. Kurbanoglu et al. (2006) found that items with eigenvalues over 1.5 revealed three main item clusters, or components, that accounted for the majority of variation. Component 1 centered on items related to defining, selecting, interpreting, and communicating information and learning from experiences (Kurbanoglu et al., 2006). The researchers labeled skills associated with component 1 as *Intermediate IL Skills* (Kurbanoglu et al., 2006). Component 2, *Basic IL Skills*, focused on finding and using information (Kurbanoglu et al., 2006). Finally, Component 3,

*Advanced IL Skills*, addressed synthesis and evaluation of information in the problem-solving process (Kurbanoğlu et al., 2006).

**Phases four and five.** In the final two phases, the researchers ran final psychometric tests, translated the ILSES, and tested the tool with undergraduate students. Kurbanoğlu et al. (2006) ran discriminant validity statistics to determine if each questionnaire subscale measured unrelated concepts. The 28-item tool obtained discriminant validity for the aforementioned subscales with  $r$  values ranging from 0.43 to 0.61. According to Pallant (2010),  $r$  values for correlation between .30 to .49 may be interpreted as medium strength and .50 to 1.0 as large. Based on preliminary psychometric testing, Kurbanoğlu et al. (2006) stated that the final version of the 28-item scale adequately assessed IL self-efficacy. The researchers then translated the ILSES to English and conducted reliability tests comparing the Turkish and English versions of the scale. Students ( $N= 47$ ) from the Department of English Translation and Interpretation participated in the reliability study, which demonstrated an overall Cronbach's alpha coefficient of 0.91 for the 28-item ILSES scale. The researchers also reported it took students approximately five minutes to complete the ILSES.

**Scoring the ILSES.** The ILSES contains 28 items that required participants to rate their confidence and competence in conducting IL tasks. The ILSES contains IL competency statements and a 7-point Likert Scale (1 = almost never true, 7 = almost always true) asking participants to report their confidence in performing IL skills. All items in the ILSES tool are positively worded. While a rating of one represents very little confidence, a score of seven represents extreme confidence in performing IL activities. Numerical values for each response are totaled to determine a composite IL self-efficacy score. Therefore, scores could range from 28 to 196 for the 28-item scale, with higher scores indicating greater levels of IL self-efficacy

(Kurbanoğlu et al., 2006). As described previously, IL skills assessed on this scale align with competencies outlined by ALA.

### **Demographic and Student Factor Questionnaire Items**

After completion of the ILSES, student participants were prompted to answer seven demographic questions created by the researcher. Demographic survey items consisted of open-ended and multiple-choice questions. Prelicensure senior nursing students were asked to provide information related to their age, gender, race/ethnicity, primary language, participation in a library course, information source use, online searching preferences, and institution of enrollment. Data generated from these survey items was used to describe the sample in relation to the overall population of prelicensure baccalaureate nursing students. In addition, student demographic factors were examined for their influence on IL self-efficacy in the multiple regression analysis.

### **Faculty Information Literacy Curriculum Survey**

Faculty participants from each nursing program were required to complete the IL Curriculum Survey in Appendix D. The investigator created the short twelve-item tool to collect information on educational strategies used to develop IL competency. The curriculum survey was developed based on literature review findings and reviewed by nursing faculty and IL experts. Faculty participants were instructed to complete and return the electronic curriculum survey prior to conduction of the qualitative interview. The first six items of the tool provided the researcher with general knowledge of the university and nursing program, whereas the later six items were specific to the nursing curriculum. These survey items required faculty to answer dichotomous (yes/no) questions regarding program use of educational strategies specific to curriculum design, learning activities, library and information science courses, and educational

technology and mobile device use. Responses to the last six questions were used in the multiple regression model for analysis of educational strategies or factors impacting IL self-efficacy of prelicensure nursing students. In addition, if faculty chose “yes”, indicating the presence of a specific educational strategy, the survey prompted for further description of teaching practices. Detailed information from the IL Curriculum Survey provided a more robust description of teaching strategies used across the United States and was used to build an understanding of the current state of nursing education science related to IL.

### **Faculty Interview Guide**

After completing the IL Curriculum Survey, faculty subjects participated in an interview using the open-ended guide in Appendix E. The qualitative faculty interview guide was developed by the author and validated by expert opinions of educational and library science faculty. Interview questions were derived from the literature review and developed in order to better understand teaching strategies used to develop IL skills and competencies of prelicensure nursing students. Open-ended interview questions were validated by two experts in the field of nursing education and one in the field of library and information sciences. The seven interview questions in Appendix E were broadly structured around the process and outcomes of integrating IL competencies into a nursing program. Questions and follow-up prompts were used to explore obstacles and barriers faced by faculty in the adoption and diffusion of curricular innovation.

### **Study Methodology**

The following sections present methods used for participant recruitment, data collection, and data analysis in this research study. After approval from the Institutional Review Board (IRB) at Indiana University of Pennsylvania (IUP) was obtained, identification of potential nursing programs meeting inclusion criteria occurred through personal/professional contacts or

references. The researcher also obtained IRB approval at each of the individual program sites if required before conducting faculty and student recruitment or data collection. As previously described, a list of nursing programs was created from discussions with contacts that stratified potential sites meeting inclusion criteria by regional location. Sites were selected and recruited from the list until the sampling quota was reached.

### **Quantitative Data Collection**

To maintain privacy of students, the faculty participant was instructed to forward the recruitment email, which explains the study purpose and design, to all senior prelicensure nursing students within the program. Students who chose to complete the survey accessed the Qualtrics questionnaire through a link in the email. The Qualtrics questionnaire began with the informed consent (Appendix G) followed by the ILSES and demographic items. The researcher designed the consent question to elicit a forced response ensuring that students who did not provide informed consent were not be able to proceed to the actual survey or participate in the study. Students were not required to provide any personally identifying information on the electronic survey, as the study was cross-sectional and had only one data-collection point. Participants were asked to identify the name of the institution where they matriculated so that the investigator could track response rates. The researcher was not able to correlate survey responses to student email addresses as Qualtrics de-identifies survey submissions so that individual responses cannot be linked to student emails. The software program assigned a numeric identifier to each survey submission that cannot be traced to any student email address or Internet Protocol (IP) addresses. As such, student participation remained anonymous as neither the researcher nor nursing faculty members could identify who chose to participate in the study.

Any student who submitted a completed survey had the option to enter a drawing for two \$50 Visa gift cards. Once study participants completed the survey, they were prompted to choose whether to participate in the drawing. Those who chose to enter were redirected to a separate Qualtrics survey web address where they entered their name, email address, and mailing address into the drawing. By separating the Qualtrics survey from the drawing, there was no way to link the information students submitted for the Visa gift card drawing to survey responses. Once data collection was completed, the researcher downloaded the entries for the gift cards to an Excel spreadsheet and stored it on her computer's hard drive. The researcher then used a formula that picks two random cells to identify the gift card winners and notify them via email. Winners were asked to respond to the email and confirm a mailing address for the researcher to send the gift card. Gift cards were mailed to the winners using the USPS via certified priority flat rate mail. The winner was instructed that they must reply to the researchers email within two weeks. Instructions stated if the winner did not respond to email notification within two weeks of the sent date, the researcher would populate another student contact from the Excel spreadsheet to notify and mail the gift card using the processes described. This selection and contact process continued until two winners accepted the gift cards. Once the gift cards were mailed, the researcher deleted the Excel spreadsheet with student contact information.

A similar process was followed for faculty subjects who also had the option to enter a drawing for two \$50 Visa gift cards. Faculty participants who desired entry into the drawing were asked to provide their email and mailing addresses for inclusion on an Excel spreadsheet after completion of the interview. The same selection processes for selection of student winners were followed for faculty and once gift cards were mailed, the researcher deleted the Excel spreadsheet with faculty information. The researcher used a formula to randomly select the two

gift card winners and notified those selected by email. Winners confirmed their mailing addresses and gift cards were mailed by USPS certified priority flat rate shipping to faculty.

### **Qualitative Data Collection**

Faculty subjects were identified at each site through the researcher's personal/professional contacts or through selection by the nursing program administrator. Recruitment procedures began with an email invitation or cover letter to institutions (Appendix F) sent to the personal contact and/or administrator at each nursing program. The cover letter asked personal contacts or program administrators to reply with the contact information of a faculty member who met inclusion criteria for participation from their site. Inclusion criteria for faculty subjects included full-time employment as a faculty or administrator within the baccalaureate nursing program, didactic teaching responsibilities including instruction of at least one class per week, five or more years of experience in their current faculty role, and knowledge of the nursing program and curriculum.

Using contact information collected from responses to the cover letter, the researcher emailed potential faculty subjects to share the study's purpose and procedures and conduct prescreening for eligibility. Once faculty expressed interest in participating, the researcher scheduled a telephone meeting to further explain the study methodology. During initial telephone meetings, the investigator described completion of the IL Curriculum Survey, participation in the semi-structured qualitative interview, and quantitative sampling plan including faculty distribution of the student recruitment email in Appendix C. Next, the researcher reviewed the informed consent (Appendix H) with the faculty participant after establishing eligibility requirements were met and the subject had an interest and willingness to participate in the study. Faculty subjects were given the opportunity to ask questions and were



informed of their right to withdraw from the study at any point in time by stopping participation in the interview or by contacting the researcher. Finally the researcher reviewed the IL Curriculum Survey, discussed its completion, and returned it via email prior to the conduction of the semi-structured interview.

After review of the informed consent and curricular survey, the qualitative interview time, place, and format was chosen and scheduled. The researcher reiterated that the interview would be audio recorded and that a potential follow-up interview may be needed to further clarify the participant's responses. The interview was scheduled at a mutually agreed upon time and location and the format of the interview was chosen with options given of face-to-face, phone, or video chat. Electronic video chat applications such as Skype, iChat, or Zoom were used to enhance feasibility of interviewing subjects across the U.S. All interviews were conducted at a private location such as an office or meeting room and were audio-recorded for transcription. If phone or video chat interviews were chosen, the participant was asked to return an electronic copy of the signed informed consent to the researcher prior to the scheduled interview. If the interview was scheduled face-to-face, informed consent was collected on that date prior to the beginning of the interview. All faculty subjects were provided with an electronic or paper copy of the signed informed consent.

Data collection began after signed consent was received with the faculty subject's completion of the curricular survey. Following survey completion, the scheduled audio-taped interview commenced using the semi-structured interview guide in Appendix D. A set of interviewing prompts are included in Appendix D that were used by the researcher to gather data, probe for additional information, or clarify key points. Finally, the informed consent covered permission to conduct a second interview with the subject. Follow-up interviews were

conducted electronically, by phone, or in person and were used to clarify items described by the subject in the first interview, expand upon ideas, and/or confirm emerging themes from the content analysis of data provided by the subject. If needed, the second interview was audiotaped with a digital recorder and transcribed using the same methods as above.

Specific strategies outlined by Lincoln and Guba (1985) were implemented to maintain overall rigor of qualitative data collection and analysis. Transcription of each audio recording occurred after the interview and the researcher documented field notes or direct observations of subjects during the interview process to help maintain an audit trail. Credibility was maintained through triangulation of data to confirm findings and through the researchers' confirmation of the accuracy of interview transcriptions. Confirmation occurred during qualitative data analysis through the comparison of data gathered over multiple sources, with sufficient time spent reviewing findings until saturation was achieved (Casey & Murphy, 2009). Dependability and confirmability were maintained through an audit trail including comprehensive research notes, peer checking by having the quality of extracted themes evaluated by various experts, and member-checking with subjects to confirm study findings. Expert research supervisors, professors, and specialists in the field of nursing and IL education reviewed the investigator's interpretation of data analysis to achieve trustworthiness of findings. Finally, a rich and dynamic presentation of the findings with appropriate quotations enhanced transferability of the study's qualitative data (Polit & Beck, 2012). Qualitative data analysis procedures are described below and focus on the researcher's use of directed content analysis.

### **Protection of Human Subjects**

Students are considered protected subjects when asked to participate in a research study. The principal investigator for the study ensured protection of human subjects by fully disclosing

the study's purpose and obtaining participants' informed consent without coercion. Students were provided with the researcher's contact information and an explanation of the research study in the recruitment email (Appendix C). Informed consent (Appendix G) was obtained prior to data collection. No personal contact was made with student subjects as a faculty member at the institution distributed the survey link to students. If a student decided to withdraw from study participation, they were able to exit the Qualtrics survey at any time prior to clicking on the submission page. Conditions for withdrawing from the study were explained in the informed consent and data from incomplete surveys was not included in analysis. Moreover, student participants were not obligated to complete every item on the IL survey. If a subject chose not to answer a question on the quantitative data collection tool, he or she was able to leave the answer blank.

This study entailed no known risk for students completing the ILSES survey or to faculty and administrators who participated in qualitative interviews. Completion of the student and curriculum surveys did not impose any risk greater than those encountered in the daily lives of a nursing students and faculty. The quantitative data collected in this study targeted prelicensure, baccalaureate, nursing students. No questions were asked specific to vulnerable populations, such as pregnant women, and no students under the age of 18 were included for study. The researcher also completed training by the Collaborative Institutional Training Initiative (CITI) to ensure protection of human subjects (Appendix I). All student data obtained during the study remained anonymous.

The researcher also ensured protection of qualitative subjects. Faculty and administrator participation in the study remained strictly voluntary through review and signature of the informed consent (Appendix H). Subjects were informed of the right to withdraw from the study

at any point in time by notifying the researcher in person, by phone, or via email. The researcher discussed procedures for withdrawing from the study with subjects and informed potential subjects that if a participant withdrew from the study, his or her data would be destroyed. Names of qualitative research participants were not shared or written on transcriptions of audio-recordings and pseudonyms were used for data analysis to maintain confidentiality of faculty and administrator data.

All transcriptions, subsequent interviews, field notes, and study data will be maintained electronically for three years on a computer file which is password protected and/or in a research study binder maintained in a secure, confidential, and locked location. Password protected storage devices containing study information will only be accessible to the researcher and dissertation committee members. Finally, research data has been reported in aggregate form only.

### **Data Analysis**

Data analysis procedures used for each research question are described below. Consultation from a statistician occurred which included review of procedures for properly transmitting quantitative data from SPSS® to Qualtrics, cleaning of the dataset, conducting tests of assumptions, and recommendations on procedures for inferential statistical tests. This consultation helped ensure proper statistical procedures were followed and integrity of data was maintained.

Data from the student questionnaire was downloaded from Qualtrics into the Statistical Package for Social Science ® (SPSS) version 23 software for analysis. As the Qualtrics surveying system was available to the researcher at no charge, this added to feasibility for data collection. The researcher imported student data into SPSS® directly from Qualtrics, and prior

to analysis, the data was screened for entry errors or missing information. Student surveys with missing data points on the 28-item ILSES tool were not included in the analysis as the researcher determined completed surveys were necessary for determining the relationship between demographic factors, educational strategies, and IL self-efficacy. Additionally, the researcher input data regarding educational strategies used by each nursing program collected from the IL Curriculum Survey.

Data analysis began by calculating frequency distributions for all demographic variables. Scores were calculated for the ILSES by totaling Likert-scale responses for the 28-item scale. Data analysis also entailed the calculation of the Cronbach's alpha coefficient to determine the internal consistency of the items within the ILSES. Finally, the researcher assessed data for violation of normality including Skewness and Kurtosis values, as well as Kolmogorov-Smirnov and Shapiro-Wilk results. Q-Q plots and scatter plots were also used to test for the linearity and homoscedasticity of the data, respectively.

**Student demographic data.** Descriptive statistics were used to organize and report demographic data of student participants in the quantitative portion of the study. Frequencies were computed for survey items including gender, ethnicity/race, primary language, institution of enrollment, and completion of a college-level library course. Means, standard deviations, and ranges were computed for survey items regarding age, information sources used, and online searching preferences.

**Research question one.** The first quantitative research question stated the following: What are the IL self-efficacy levels of prelicensure baccalaureate senior nursing students as measured by the Information Literacy Self-Efficacy Scale (ILSES)? Univariate or descriptive analysis were used to examine and describe each study variable, including frequency

distributions, measures of central tendency, and calculated variability with data collected from the ILSES. The student sample was described using descriptive statistics and analysis of ILSES results occurred through calculating mean scores and standard deviations on the overall scale and question items.

**Research question two.** The second quantitative research question stated the following: What student factors and educational strategies influence IL self-efficacy levels of prelicensure baccalaureate senior nursing students? Multiple linear regression was used to assess the ability of each independent variable to act as a predictor of IL self-efficacy as measured by scores on the ILSES tool. This test was appropriate as multiple regression is used to predict a continuous dependent variable (DV) given two or more independent variables (IV) and can be used to help determine how much the independent predictor variables can explain the variation of the DV (Pallant, 2010). Categorical IVs representing student factors included these items: gender, race/ethnicity, primary language, completion of a college-level library course, information resources used, and online searching preferences. Dichotomous categorical IVs representing educational strategies were comprised of: inclusion of a nursing informatics course, completion of a class with formal review of library and information science resources, participation in a capstone course or professional practice immersion, completion of an evidence-based practice project, AEHR use, and integration of mobile technologies into the curriculum. Additionally, the study included one continuous IV student factor of participant age.

**Research question three.** The third qualitative research question stated the following: How do administrators, faculty, and deans of nursing programs describe educational strategies utilized in regard to development of IL competencies of prelicensure baccalaureate nursing students? Qualitative data from faculty interviews helped provide a description of the state of

nursing education science related to IL educational interventions across nursing programs in the U.S. The researcher analyzed qualitative data using directed content analysis strategies outlined by Hickey and Kipping (1996), Mayring (2000), and Potter and Levine-Donnerstein (1999).

Content analysis is a research method that has come into wide use in current health studies.

Through either an inductive or deductive approach, content analysis provides knowledge and new insight by using qualitative or quantitative data to develop concepts, categories, or themes (Elo & Kyngäs, 2008). The aim is to produce a condensed and broad description of an experience or phenomenon that helps to build a model, conceptual system, or themes.

Three distinct approaches to content analysis exist: conventional, summative, or directive; the latter, directive content analysis, was used in this study. Directed content analysis provides a deductive method to validate or extend a theoretical framework or theory (Hsieh & Shannon, 2005) that is useful when the general aim of the study is to test a previous theory in a different situation or when the researcher desires to retest categories or concepts within a new context (Elo & Kyngäs, 2008). Therefore, the deductive approach of directed content analysis was used for this study that explored the application of Rogers's Diffusions of Innovation (DOI) theory to innovations in nursing education.

A categorization matrix was developed as the first step in directive content analysis to review and code data for correspondence according to its identified categories. The researcher developed initial coding categories to form the categorization matrix by following steps outlined by Potter and Levine-Donnerstein (1999). Data coding categories were developed by applying existing DOI theory to nursing education and by reviewing associated literature. The categorization matrix (Appendix J) developed for this study was structured using concepts from

the framework of Rogers's DOI theory and was reviewed and approved by members of the investigator's research committee.

Next, the researcher developed operational definitions for each coding category that were derived from DOI theory and/or previous study findings. Directed content analysis procedures continued with the coding qualitative interview data using the predetermined matrix categories and corresponding definitions. Data that could not be coded into a category was identified and analyzed later to determine if, when grouped together, they comprised a new coding category or subcategory within an existing code. Used in this way, the categorization matrix also helped to identify themes that may emerge outside of the categorization matrix that do not fit within the defined codes based on DOI theory. Aspects that do not fit the categorization frame can be used to create their own concepts, based on the principles of inductive content analysis (Elo & Kyngäs, 2008).

Finally, the researcher reported the process of analyzing with the categorization matrix and results or themes developed from content analysis of qualitative interview data with nursing faculty. Findings are presented in Chapter 4 and identify qualitative categories or themes with exemplars and descriptive evidence (Elo & Kyngäs, 2008). Review and confirmation of coded themes from interview findings also occurred by the investigator's research committee of expert nursing and library science faculty. In summary, the directed approach to content analysis was used to support and extend existing research (Hsieh & Shannon, 2005) on IL educational interventions under the framework of Rogers's DOI theory.

### **Chapter Summary**

The purpose of this study was to expand the body of knowledge regarding demographic and educational factors that influence IL self-efficacy of senior-level prelicensure baccalaureate



nursing students. This chapter reviewed the quantitative and qualitative methodologies used for this study. Rationales for the mixed method study using quantitative descriptive correlational data and qualitative content analysis were provided. The setting and sample for this research were identified, and the background of the ILSES and application to this study was discussed. This chapter concluded with an overview of the statistical methods used to analyze quantitative and qualitative data.

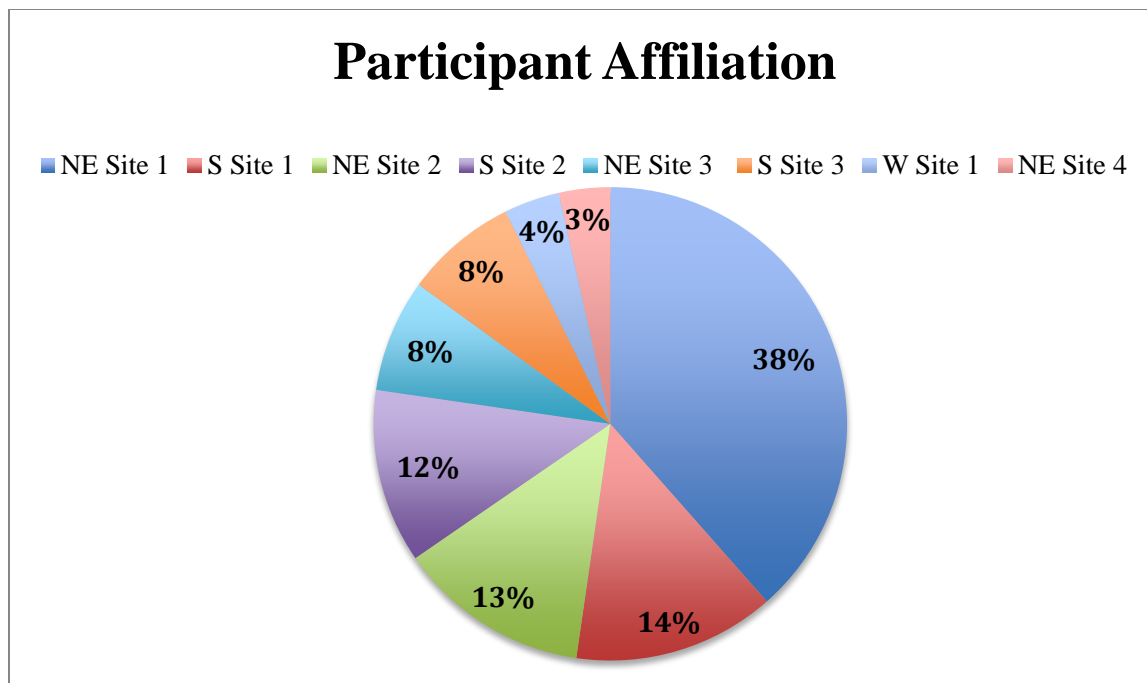
## CHAPTER FOUR

### RESULTS

This chapter presents the results of the statistical analysis of this study's quantitative student data set, as well as findings from the directed content analysis of qualitative faculty interview data. This chapter begins with a description of the student sample from this multisite study of nursing programs from across the United States. Descriptive statistics summarizing student factors of gender, age, ethnicity/race, primary language, institution of enrollment, completion of a college-level library course, information sources used, and online searching behaviors of the sample are reviewed. A detailed description of educational strategies employed by each nursing program is provided including nursing informatics courses, lessons with review of library resources, capstone senior learning experiences, evidence-based practice projects, AEHR use, and curricular integration of mobile devices. Chapter 4 concludes by presenting data analysis pertaining to each research question. First, the IL self-efficacy score of the sample is identified. Next the relationship between student factors, educational strategies, and self-efficacy is examined. Lastly, nursing faculty descriptions of educational strategies utilized in the development of IL competencies are explored through the lens of DOI Theory and directed content analysis.

#### **Study Setting and Sample Descriptions**

Faculty and students were recruited to participate from across the United States. The multisite study was comprised of eight nursing programs from geographic regions including one western (W), three northeastern (NE), and four southern (S) sites. Figure 3 segments the study's student quantitative sample according to institution affiliation and geographic region.



*Figure 3.* Student participant affiliation by university.

#### University/College Characteristics

Table 2 provides a summary of information collected from the IL Curriculum Survey on university and college type, geographic location, Carnegie classification, nursing program size, graduation credit requirements, and clinical hours. The majority of university/college sites were in the southern and northeastern regions of the United States, public institutions, located in suburban or urban geographic locations, and currently hold a Carnegie Classifications of Master's M3 or M1. Program sizes from prelicensure BSN students ranged from 188 to 650 ( $M = 261$ ,  $\bar{x} = 341$ ) and the total number of required clinical hours ranged from 470 to 1,110 ( $M = 651$ ,  $\bar{x} = 676$ ).

Table 2

*Participating University/College Characteristics*

	NE Site 1	NE Site 2	NE Site 3	NE Site 4	S Site 1	S Site 2	S Site 3	W Site 1
U.S. Region	NE	NE	NE	S	S	S	S	W
University Type	Private	Private	Public	Public	Public	Public	Public	Public
Geographic Location	Suburban	Suburban	Suburban	Rural	Urban	Suburban	Urban	Urban
Carnegie Classification	M1, Master's	M3, Master's	R3, Doctoral	M3, Master's	R1, Doctoral	M3, Master's	M1, Master's	R1, Doctoral
Numb. of Students								
# Prelicensure BSN	650	188	282	240	510	421	223	216
# Senior Standing	104	38	64	60	130	73	70	54
Total # Credits	120	127	128	120	103	120	120	126
Total # Clinical Hrs.	550	716	1,110	470	166	585	796	1,012

*Note.* Carnegie Classification (2018) defines doctoral universities as “institutions that awarded at least 20 research/scholarship doctoral degrees” with R1 Doctoral Universities as having the highest research activity and R3 Doctoral Universities as having moderate research activity. Similarly, Carnegie Classification (2018) defines master’s colleges and universities as “institutions that awarded at least 50 master's degrees and fewer than 20 doctoral degrees” with M1 Master’s Colleges having larger programs and M3 Master’s Colleges as having smaller programs. The Carnegie Classification of Institutions of Higher Education (2018). *Basic Classification Description*. Retrieved from [http://carnegieclassifications.iu.edu/classification\\_descriptions/basic.php](http://carnegieclassifications.iu.edu/classification_descriptions/basic.php)

## Description of Student Sample and Student Factors

The survey was administered to 593 students who met the inclusion criteria as discussed in Chapter 3. A total of 300 survey responses were received for a response rate of 50.6%; however, 40 responses had incomplete data and were not included in the analysis. Thus, the final sample size consisted of 260 students, generating a survey completion rate of 86.7%. For the purposes of this study, a survey completion rate was defined as the number of people who fully completed the survey divided by the number of people who participated in the survey.

Demographic independent variables (IV) representing student factors included: gender, race/ethnicity, primary language, completion of a college-level library course, information resources used, online searching preferences, and participant age. Demographic data describing the sample is presented in Table 3. Participant demographics had little variance in age, gender, race, and primary language. The majority of the study sample were less than 26 years old, female, and white, with English as their primary language. Participant ages ranged from 20 to 59 years ( $M = 22.8$ ,  $SD = 4.23$ ) with most (92.3%) between the ages of 20 and 25. Of the 260 participants, 96.2% were female and 3.8% were male. Minorities were minimally represented with the majority of the participants (85.8%) identifying as white. For the ethnicity/race, 1.5% of students identified themselves as non-white with four as American Indian or Alaskan Native ( $n = 37$ ), 4.2% as Asian ( $n = 11$ ), 3.8% as Black/African American ( $n = 10$ ), 3.1% as Hispanic ( $n = 8$ ), and 1.5% as 'other' ( $n = 4$ ). The majority of participants identified English as their primary language ( $n = 254$ , 97.7%).

Table 3

*Demographic Characteristics of Student Sample*

Variable	<i>n</i>	%
Age		
20-24	233	89.7
25-29	15	5.8
30-34	4	.16
35-39	4	.16
≤ 40	4	.16
Gender		
Female	250	96.2
Male	10	3.8
Race/Ethnicity		
American Indian or Alaskan Native	4	1.5
Asian	11	4.2
Black/African American	10	3.8
White	223	85.8
Other	12	4.6
English as Primary Language		
Yes	254	97.7
No	6	2.3

*Note.* N = 260

Minimal differences were noted when examining descriptive statistics for total ILSES scores by gender and age as shown in Table 4. Male participants ( $N = 10$ ) demonstrated a slightly higher total mean score and a narrower range of mean scores over female participants ( $N = 250$ ). Female participants demonstrated greater variability in mean score range with the lowest total ILSES score of 59 and the highest total score of 196. Similar results were found when collapsing age into two generational categories, millennial ( $N = 201$ ) and pre-millennial ( $N = 59$ ). Participants were classified as millennial based on the Pew Research Center classification of millennials as persons born between the years 1981 and 1996; and pre-millennials referring to generations born prior. Millennials had a lower total mean score with more variability as the lowest total ILSES score of the group was 59 and the highest total score was 196. Pre-millennial participants had a higher mean score, narrower range of scores, and close maximum mean score of 195.

Table 4

*Comparison of Total ILSES Scores by Gender and Age*

	N	Mean Score	Std. Deviation	Minimum	Maximum
Gender					
Male	10	162.2	15.04	140	190
Female	260	152.43	24.18	59	196
Age (Generation)					
Millennial	201	151.69	22.46	59	196
≤ 22 years					
Pre-Millennial	59	156.59	28.32	70	195
≥ 23 years					

Demographic characteristics of this study's sample were compared to those collected in the Biennial NLN Survey (2016) of baccalaureate nursing schools for the academic year 2015 – 2016. Characteristics of this study's sample resembled the national trends for ethnicity and age of prelicensure baccalaureate nursing programs as reported by the NLN (2016). No comparisons can be made for primary language, as this data is not collected nationally for nursing students. Similar to the participants' characteristics reported in this study, the NLN (2016) noted most students (84.7%) who were enrolled in prelicensure baccalaureate nursing programs were under 30 years of age and of Caucasian ethnicity (70.4%). Demographic characteristics for gender in this study showed a higher percentage of female participants (96.2%) over national trends reported by the NLN (2016) at 85%.

Table 5 provides a summary of additional demographic information collected from participants regarding library learning experiences, information source preferences, and use of online resources for conducting research. The majority of students ( $n = 214$ , 82.3%) indicated that they had been taught how to use the library in a college-level course. Survey participants were asked to indicate the information source they used most frequently when searching for an answer to a nursing question to better understand student preferences for finding answers for their assignments. Fifty two percent ( $n = 137$ ) of students responded that they most frequently

used the Internet to find answers to a nursing question while 21.2% ( $n = 55$ ) used a professional journal. Textbooks ( $n = 59$ ; 22.7%) and “other” ( $n = 9$ ; 3.5%) were the remaining responses for frequently used sources of information. Participants were also asked to identify their preferred online source to conduct research for a class assignment. Library websites, with access to databases such as CINAHL, were the preferred online source for research by 70.4% ( $n = 183$ ) of students. Twenty four percent ( $n = 63$ ) of students indicated Google as their preference for conducting online searches while the remaining responses were professional organization website at 3.5% ( $n = 9$ ), and other at 1.9% ( $n = 5$ ).

Table 5

*Additional Demographic Characteristics of Student Sample*

Variable	<i>n</i>	%
Completion of college library course	214	82.3
Yes	46	17.7
No		
Most used information source	137	52.7
Internet	59	22.7
Textbook	55	21.2
Professional Journal	9	3.5
Other		
Preferred online source for research		
Library Website/Databases	183	70.4
Google	63	24.2
Professional Organization Website	9	3.5
Other	5	1.9

*Note.*  $N = 260$

### **Description of Faculty Sample**

Minimal demographic information was collected from faculty participants during qualitative data collection. All faculty subjects met inclusion criteria indicating they held a full-time faculty or administration position within their nursing program; and had five or more years



experience in their current role with knowledge of their program and curricula. All subjects were female and only one subject identified her role as “nursing program administrator” although the participant later clarified that her position also required teaching undergraduate and graduate nursing courses.

### **Description of Educational Strategies**

For the purposes of this study, educational strategies were defined as teaching interventions or pedagogies aimed at the development of IL competencies of prelicensure baccalaureate nursing students. Operationally these variables were measured by faculty’s self-reported curricular inclusion on the IL Curriculum Survey (Appendix D) of: an undergraduate course in nursing informatics, a course or lesson with review of library and information sciences resources, a capstone course/professional practice immersion, an evidence-based practice project, AEHR use, and mobile device technologies. If faculty chose “yes”, indicating the presence of a specific educational strategy, the survey prompted for further description of teaching practices such as a detail regarding curricular placement of the course, number of credits, and information on learning objectives and assignments.

Table 6 provides an overview of faculty responses from each participating nursing program regarding inclusion of the six educational strategies. Only two of the eight faculty from participating nursing programs indicated that their curricula included a nursing informatics course. Both nursing informatics classes are 3 credits, one as a required blended/hybrid web course for students in their spring semester junior year and the other as a face-to-face course required of students in their sophomore year. All eight faculty stated their programs include a course or lesson that provides students with a review of the library and its resources. None of the programs offer a separate stand-alone library course in their curricula for students; however, all

indicated that a library review is integrated into one to two lessons in at least one of their nursing courses. Often these library lessons are integrated into freshman or junior classes. Seven out of the eight faculty stated their program includes a formal capstone experience or professional practice immersion. Most commonly this course is offered senior year, worth between 4 and 6 credits, and requires a range of 72-224 clinical practice hours ( $M = 115$ ,  $\bar{x} = 132$ ). All faculty stated EBP projects are integrated into their curricula in junior and senior courses, most commonly required as part of a nursing research class. Finally, six of the eight faculty stated their nursing curricula integrates an AEHR and five of the eight indicated use of mobile technologies. Integration of these technologies is further described below.

Table 6

*Educational Strategies: Summary of IL Curriculum Survey*

	NE Site 1	NE Site 2	NE Site 3	NE Site 4	S Site 1	S Site 2	S Site 3	W Site 1
Nursing Informatics Course	No	No	No	No	No	Yes	Yes	No
Curricular Placement	N/A	N/A	N/A	N/A	N/A	Sophomore Course, Fall	Hybrid Junior Course, Spring	N/A
<i>If separate course, number of credits</i>	N/A	N/A	N/A	N/A	N/A	3 Credits	3 Credits	N/A
Library Resource Review	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Curricular Placement	Freshman & Junior Courses	Freshman Nursing Course, Fall	Freshman Course; Junior Course (Nurs. Research)	Freshman Course (Interactive Communication)	Freshman Course, Fall	Freshman Course (Seminar); Senior Course	Freshman Course (Intro to Nursing); Junior Course (Nurs. Research)	Freshman Course, Spring
<i>If separate course, number of credits</i>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Capstone Experience / Practice Immersion	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Curricular Placement	Senior Course, Spring	Senior Course, Spring	Senior Course	Freshman & Junior Courses	Senior Course	Senior Course, Spring	Senior Course, Spring	Senior Course
Number of Credits/Practice Hrs.	4 Credits / 115 Hrs.	6 Credits / 80-90 Hrs.	6 Credits / 224 Hrs.	N/A	5 Credits / 72 Hrs.	4 Credits / 135 Hrs.	6 Credits / 96 Hrs.	6 Credits / 200 Hrs.
EBP Project	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Curricular Placement	Senior Course (Capstone), Ind. Project; Senior Course (Pub. Health), Grp. Project	Senior Course, Fall	Junior Course (Nurs. Research)	Junior Course (Nursing Research)	Junior Course	Senior Course, Spring (Nurs. Research)	Junior Course, Spring (Nurs. Research)	All Nursing Courses; Junior Course, Major Project
AEHR	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Mobile Technologies	Yes	Yes	No	No	Yes	Yes	No	Yes

A summary of open-ended IL Curriculum Survey items describing learning objectives and assignments of each educational strategy follows.

**Nursing informatics.** Only two participating programs, southern sites 2 and 3, offer a course in . One faculty described six main learning objectives of a hybrid course; however, only one objective closely related to IL as it indicated students would learn to use selected application software and the Internet to “communicate and present ideas, facts, and information”. Assignments in this course focused on use of computerized information systems, with a single written assignment of an ‘APA Informatics Paper’. Faculty from the other nursing program with an informatics class were not willing to share course objectives or assignments with the researcher.

**Library resource review.** None of the participating nursing programs offered a specific course that provides students with a review of the library and its resources. However, all faculty indicated their programs integrated one or two learning sessions taught by a librarian into an existing course. Some programs offered two individual library lessons offered in separate courses during students’ freshman and junior semesters. Early lessons in these programs focused on collaborative sessions with the librarian with learning objectives such as students demonstrating “use of electronic databases from the library to search and retrieve nursing journal/research articles” and “use the CINAHL nursing database to find and retrieve one nursing-related journal article published within the last five years.” Learning objectives for courses offered to junior students differed, with statements such as students demonstrating “critique of selected nursing research for application to clinical practice” and “critique nursing research to form judgments regarding the utilization of findings in practice.” Several faculty stated they offered only one classroom learning session relating to library use.

Most related assignments were described as group classroom exercises that occurred during these learning sessions where students applied learned strategies to conduct information searches under the guidance of nursing faculty and librarians. Only two survey responses described reinforcement of an IL skill learned during library teaching sessions to a later course assignment. These faculty explained their programs bolstered IL skills during research class assignments by evaluating students' abilities to perform a literature search and narrow search results in the development of PICO/PICOT questions. Students in both programs were required to perform a literature search as part of an EBP project and document their search strategy using keywords and MESH terms to narrow results.

**Capstone course/Professional practice immersion.** All faculty, except for the participant from northeastern site four, stated their programs had a capstone course and/or a professional practice immersion. The number of clinical hours required in each immersion varied significantly and can be found in Table 5 above. Practice immersions were required senior year, most often spring term, and the majority of programs indicated one course in their curricula served as both a capstone and practice immersion class. Only faculty at northeastern sites two and three stated the courses were separated with the capstone course objectives relating to teaching leadership skills and assignments to NCLEX preparation.

Faculty most frequently stated nurse managers at local partnering facilities were asked to identify, choose, or volunteer preceptors for practice immersion courses and no criteria were given for their selection. Only three faculty identified criteria for preceptors, with all reporting minimum preceptor requirements of a BSN degree and at least two years' experience. Of these three participants, two stated faculty course coordinators from their programs were responsible for ensuring preceptors meet this criterion as a requirement of their State Boards of Nursing.

Course coordinators at one site reported they must ensure preceptors meet more stringent criteria required by the Louisiana State Board of Nursing requirements including having an unencumbered and active RN license, BSN degree or higher, and two years clinical experience with at least one of those years occurring in the precepted clinical setting.

Faculty reported students were precepted by only one registered nurse at a partnering institution; however, surveys from three faculty stated 1-2 preceptors may be used per student, depending on unit assignments and number of students. Surveys from only two of the seven nursing programs with a practice immersion reported training preceptors. Training was accomplished through use of an information packet containing expectations of the partnership at the western site and a formal preceptor training module at the third southern site. Finally, one program reported a unique practicum option whereby students may complete immersion practice hours in international settings.

All practice immersion courses included learning objectives relating to IL competency and EBP. For example, students at the second southern site are informed one of their immersion course objectives is to “integrate research, clinical judgment, inter-professional perspectives, and patient preferences in planning evidence-based care.” Similarly learning objectives for a course at another site state students must “formulate individualized patient care-related clinical judgments that are based on knowledge and evidence and developed through the process of clinical reasoning.” All practice immersion courses required completion of a reflection journal. Faculty at northeastern sites one and two described unique learning assignments for their capstone/practice immersion courses whereby students are required to complete an EBP project with nurses and preceptors from their clinical agency sites.

**EBP project.** All faculty indicated their nursing curricula required students to complete a minimum of one EBP project. The majority of the faculty reported integration of a single EBP project into their nursing research course; through a written paper assignment at three programs and poster presentation in four. Another faculty stated an EBP project was integrated into their nursing research course but did not provide further detail or learning objectives. Most written assignments required students to conduct a literature review and written synthesis on a topic of their choice. Paper requirements varied greatly. For example, students in one program were required to further develop a research proposal on their topic using appropriate design and methodology; whereas an assignments at another site focused on identification of five varied articles meeting criteria regarding research design.

Students at one site presented findings from their literature search and synthesis in groups at an EBP poster session open to the public. Faculty, administrators, alumni, local nursing managers, nurses from practice, and local nurse educators were invited to attend. Likewise senior students from another program worked in groups of 3-5 students in collaboration with practicing RNs from their local hospitals to develop an EBP project and presentation for two university-based research symposiums. Faculty from a different northeastern site described a similar partnership and group EBP project in their public health course. Senior students were assigned to work with nurses from a local facility to identify a research need, conduct a literature review, and present a poster with synthesis of findings and practice recommendations to their unit. Lastly, students from the western site were required to develop a PICOT question, search for and appraise research articles, and develop a group poster presentation with classmates that included a cost analysis of practice recommendations.

Some nursing programs integrated more than one EBP project into their curricula. Apart from the collaborative poster presentation described above, students completed individual research projects in their senior capstone course. Faculty from the western site stated students were required to complete a research/EBP assignment every semester, with the major group poster presentation described above in third semester.

**AEHR.** Six of the eight faculty members surveyed stated that their nursing programs have integrated an AEHR into their curricula. Four schools integrated an AEHR into high-fidelity simulations (HFS) throughout all levels of their programs. Most of these programs oriented students to its use during their first simulation exposure; however, one faculty did not include information regarding training students on their AEHR. Faculty from this site reported using Lippincott's DocuCare and vSim® programs during HFS.

Contrarily, two nursing programs utilized AEHR products differently by integrating their use into one or more nursing classrooms. Faculty have integrated two Elsevier products, SimChart™ and SLS (Simulation Learning System), in simulations and clinical courses throughout their program to teach and evaluate EHR documentation skills. Clinical faculty required students to document care of assigned patients in the AEHR program after care experiences that “enables faculty to evaluate student documentation.” Similarly faculty at a southern site have integrated an AEHR program, DocuCare, into three assignments in their nursing informatics course where students were required to document patient assessments and care given during virtual patient scenarios.

**Mobile technologies.** The final item on the survey asked faculty to report if their program integrated mobile devices, PDAs, tablets, smartphones, or other mobile technologies into their curriculum. Faculty from three nursing programs indicated their programs had not



integrated mobile technologies into their curricula; whereas three other participants reported use of mobile phones had been adopted by faculty in many of their nursing courses. Mobile devices were used for participation in classroom surveys using PollEverywhere; another program allowed students to use mobile devices during simulation and/or clinical for researching purposes; while students from another program used smartphone applications, such as Taber's Medical Dictionary, as a resource for clinical learning. Only one faculty reported that their nursing students were required to purchase a mobile device with capabilities for downloading required smartphone applications.

Two faculty stated that students were expected to own laptop computers as all exams are administered electronically in both nursing programs. Both programs required students to purchase their own devices; however, one stated loaner laptops were available for exam purposes if a student is unable to bring their own computer. Additionally, students at this site were required to purchase "clickers" as faculty utilize this type of classroom response system across the university for content review and quiz purposes.

The following sections address data coding and analysis for each of this study's three research questions.

### **Research Question One**

Research question one asked, "What are the IL self-efficacy levels of prelicensure baccalaureate senior nursing students as measured by the ILSES?" The ILSES (Kurbanoglu et al., 2006) evaluates IL self-efficacy by asking study participants to self-rate their confidence and competence in conducting IL tasks on a seven-point Likert scale. Possible responses ranged from "1 - almost never true" to "7 - almost always true."

Composite scores were determined for IL self-efficacy levels by totaling responses for the 28-item scale. Table 7 contains descriptive statistics for this study's dataset and the histogram in Figure 4 represents the frequencies of participant ILSES composite scores. As discussed in Chapter 3, total scores could range from 28 to 196, with higher scores indicating higher levels of IL self-efficacy. The sample as a whole demonstrated a high level of IL self-efficacy ( $M = 152.8$ ,  $SD = 23.95$ ).

Table 7

*Descriptive Statistics for ILSES*

	Min	Max	Mean	Std. Dev.	Skewness		Kurtosis	
					Statistic	Std. Error	Statistic	Std. Error
ILSES 28-Item Scale	59	196	152.8	23.952	-4.94	.151	.466	.301

*Note.* N = 260

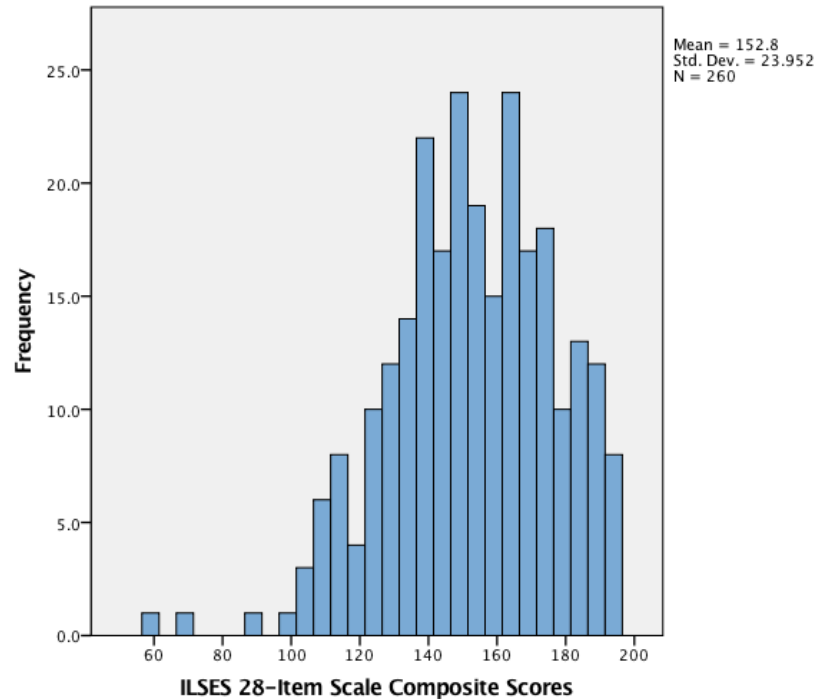


Figure 4. Frequency of ILSES composite scores.

In addition, descriptive statistics representing each individual 28-item ILSES scale question were analyzed. Student participants rated only two IL items between the highest two levels of self-efficacy, “7 = almost always true” and “6 = usually true.” Highest self-efficacy ratings occurred for Question 7 ( $M = 6.3$ ,  $SD = .859$ ) – “Use of electronic information sources” and Question 11 ( $M = 6.26$ ,  $SD = 1.009$ ) - “Use Internet search tools (such as search engines, directories, and so on).” Conversely, lowest item scores were those items where students rated themselves with less than a score of “5 = often true” and in the category of “4 = occasionally true.” Four items scored in this lowest range including Question 12 ( $M = 4.62$ ,  $SD = 1.653$ ) - “Use different kinds (types) of libraries”; Question 10 ( $M = 4.65$ ,  $SD = 1.827$ ) - “Locate resources in the library using the library catalogue”; Question 9 ( $M = 4.77$ ,  $SD = 1.796$ ) - “Use the library catalogue”; and Question 8 ( $M = 4.97$ ,  $SD = 1.656$ ) - “Locate information sources in the library.”

### **Reliability Data for ILSES**

As in previous studies, the ILSES continued to show excellent internal consistency when used in samples of baccalaureate nursing students. Cronbach’s alpha for the 28-item scale ( $\alpha = .95$ ) was similar to a previous dissertation study of senior baccalaureate nursing students by Wendekier (2015) reporting a Cronbach’s alpha of .93 ( $N = 90$ ). Wendekier’s dissertation study compared the 17-item ILSES scale to the 28-item version used in this study and found that the shorter version of the scale had lower values for internal consistency ( $\alpha = .89$ ) than the full version. No further comparisons to other nursing literature can be made as Wendekier’s study was the only available publication using the ILSES with baccalaureate nursing students. A 2011 research study by Stokes and Urquhart combined multiple tools into one questionnaire, using the shorter 17-item ILSES, to profile information behaviors of nursing students in the UK.

However, publication of research findings did not specify a numeric value for Cronbach's alpha of the ILSES as the authors only reported using the scale due to its "high" reliability (Stokes & Urquhart, 2011).

### **Research Question Two**

Research question two asked, "What student factors and educational strategies influence IL self-efficacy levels of prelicensure baccalaureate senior nursing students?" As described in Chapter 3, multiple linear regression was used to assess the ability of each independent variable to act as a predictor of IL self-efficacy as measured by scores on the ILSES tool. This section includes descriptive findings from a standard multiple regression, as well as analysis results from a subsequent stepwise multiple regression. Two IV predictors representing presence of educational strategies including "library course/lesson" and "EBP project" were removed from the analysis of both multiple regression models. All programs indicated the presence of both educational strategies; therefore, no variations occurred within the variable and relationships could not be explored.

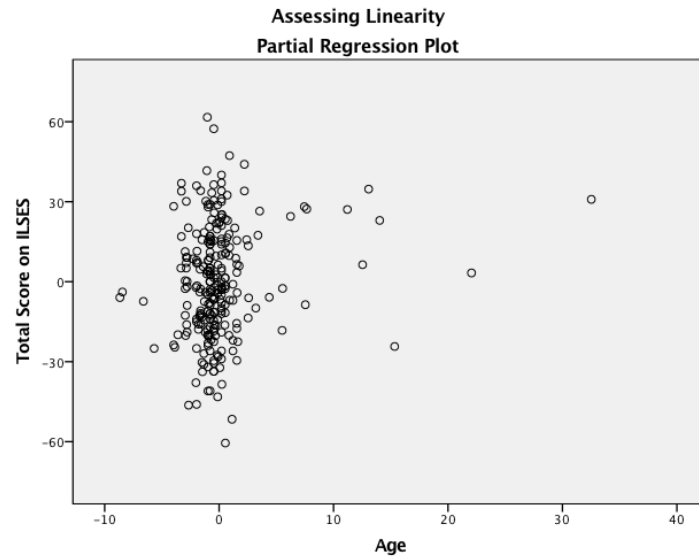
Prior to analyzing results of these statistical tests, the dataset was examined for violations of the assumptions of multiple regression. The following tables, figures, and discussion relate to data screening and recoding, as well as the normality, linearity, and homoscedasticity of the study dataset using results of the standard multiple regression.

### **Preliminary Analysis of Study Dataset**

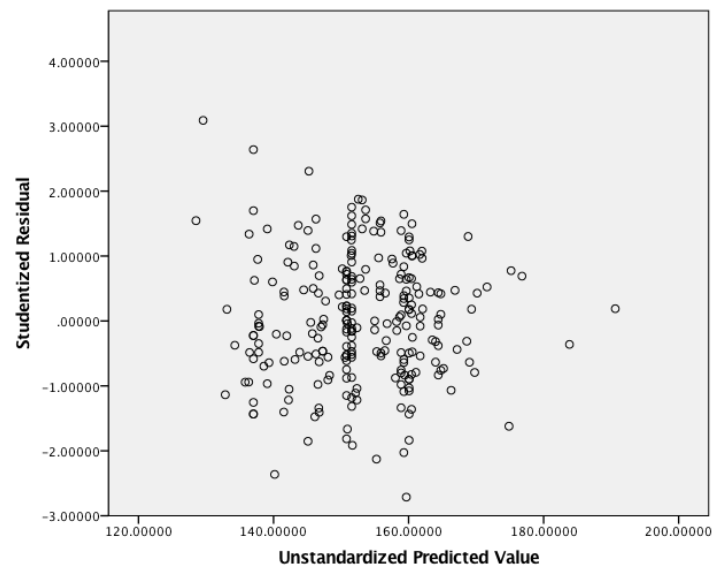
Variables that had less than 5 frequencies were collapsed and recoded to complete the remaining statistical analysis. Race, information source frequency, and online search preference were collapsed for the variable requirements deemed suitable for the statistical tests (Polit & Beck, 2012). The six categories of race were recoded into a dichotomous variable, white and

non-white. Both frequency of information sources used, and preference for online searching variables, were each collapsed into three categories. Dummy variables were created for the IVs information source and online search preference as they had more than two categories for use in the multiple regression analysis. Finally, a preliminary data screen revealed three outlier cases with a standardized residual of  $\pm 3$  standard deviations. Following recommendations by Pallant (2010), cases 3, 115, and 118 were removed from the dataset prior to further analysis. The final sample size used for the multiple regression analysis ( $N = 257$ ) greatly exceeded the minimum sample size of 63 as calculated in the power analysis for this study.

Further analysis indicated no other violations for other assumptions of linearity, homoscedasticity, or multicollinearity. A partial regression plot (Figure 5) showed a linear relationship between total ILSES score and age, as well as linearity visualized in a plot of residuals against the predicted values in the Figure 6. Homoscedasticity was determined by visual inspection of Figure 6 showing the plot of residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. In addition, none of the independent variables had correlations greater than 0.7 to one another as discussed below. There were no remaining outliers detected in the dataset, as no residuals were greater than  $\pm 3$  standard deviations and no Cook's values distances were above 1.



*Figure 5.* Linearity of partial regression plot between dependent variable, total ILSES score, and continuous independent variable, age.



*Figure 6.* Linearity and homoscedasticity of studentized residuals against the predicted values.

Contrarily, there were minor concerns relating to the assumption of normality. Once outliers were detected and removed, the researcher reanalyzed the screened dataset with descriptive statistics summarized below in Table 8 and the histogram in Figure 7 representing the frequencies of screened ILSES composite scores. Kurtosis and skewness values with outliers

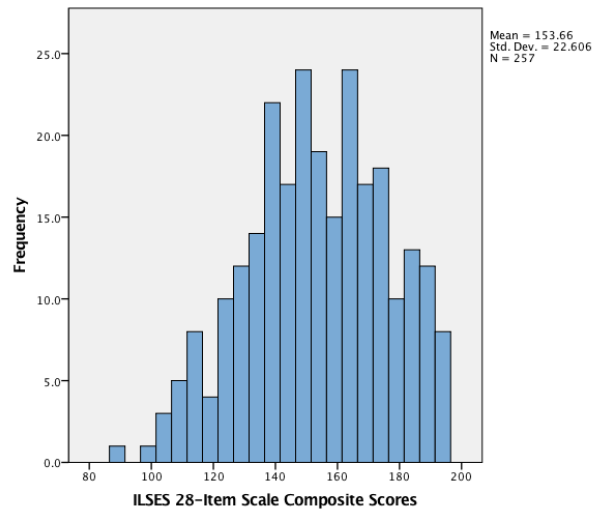
removed fell between -1 and +1, indicating the dataset contained a peak and had a relatively symmetrical distribution (Mertler & Vannatta, 2013).

Table 8

*Descriptive Statistics for Screened ILSES*

	Min	Max	Mean	Std. Dev.	Skewness		Kurtosis	
					Statistic	Std. Error	Statistic	Std. Error
ILSES 28-Item Scale	89	196	153.66	22.606	-.206	.152	-.509	.303

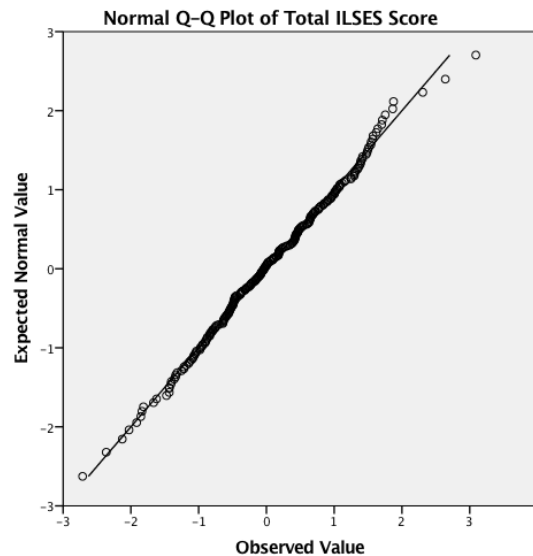
*Note.* N = 257



*Figure 7.* Frequency of screened ILSES composite scores.

Normality tests for the ILSES were all normal with the exception of the Shapiro-Wilk test. The Kolmogorov-Smirnov value for the ILSES dataset was insignificant ( $p = .200$ ) whereas the Shapiro-Wilk value of .987 was minimally significant ( $p = .024$ ). Literature suggests that the Shapiro-Wilk test may be too sensitive to small issues with normality when sample sizes are larger, over 100 to 200 participants, as was the case in this study (Mertler & Vannatta, 2013). Under the circumstances where only one of the tests for normality raised concerns, the researcher

examined the Q-Q plot in Figure 8 to determine normality of the study sample. Results of the Kolmogorov-Smirnov test and Q-Q plot indicated a normal distribution for the ILSES data.



*Figure 8.* Normality of dataset as visualized in Q-Q plot.

Before analyzing the results of the standard multiple regression analysis, correlations were calculated to detect relationships among the student factor predictor variables (IV) of age, gender, race, primary language, information source most frequently used, online searching preference, and completion of a college level library course with one another and with the DV, the total ILSES score. Additionally the same relationships were explored among the educational strategy predictor variables (IV) of nursing informatics, capstone/professional practice immersion, AEHR use, and integration of mobile technologies. Tables 9 and 10 provide a summary of the Pearson Correlation Coefficients.

Student factors demonstrating statistically significant correlations to the DV, total ILSES score, have been noted in these tables with an asterisk. Cohen's (1992) recommendations for determining strengths of association using coefficient values were followed. Small correlations



are represented by coefficient ( $r$ ) values between 0.1 and 0.3 (Cohen, 1992). There were four small but statistically significant positive correlations found between student factors and ILSES score: age and ILSES score,  $r(257) = .207, p = .013$ ; frequent use of professional journals and ILSES score,  $r(257) = .149, p = .024$ ; capstone/professional practice immersion courses and ILSES score,  $r(257) = .142, p = .034$ ; and frequent use of textbooks for information searching and ILSES score,  $r(257) = .109, p = .009$ . Additionally, there was a small statistically significant negative correlation between frequent use of Google for information searching and ILSES score,  $r(257) = -.251, p = .0005$ . The remaining seven student factors and three educational strategies had Pearson Correlation Coefficients of less than 0.1, showing no relationship to the DV of total ILSES score (Cohen, 1992). Based on these correlations, the researcher determined conduction of a stepwise regression analysis would result in the model most suitable for examining relationships between IVs and ILSES.

Table 9

*Pearson Correlations of Student Factor (IVs) Used in Standard Regression Model to Predict Total ILSES Score*

Variable	Age	Gender	Race	Primary Language	Professional Journal Info Source Frequently Used	Textbook Info Source Frequently Used	Other Info Source Frequently Used	Google Online Search Preference	Prof. Org. Website Online Search Preference	Other Online Search Preference	College Level Library Course
Total ILSES Score	.207*	.076	.016	.077	.149*	.109**	-.004	-.251**	.015	.071	-.006
Age	1	-.030	.178	.044	.096	-.050	-.009	.006	.141	-.031	.076
Gender	-.030	1	-.080	-.028	-.007	-.012	.080	-.018	-.038	.117	-.038
Race	.178	-.080	1	.190	.069	-.024	-.006	.125	.048	.026	.091
Primary Language	.044	-.028	.190	1	.064	-.076	.137	-.012	-.027	-.020	-.064
Professional Journal, Info Source Frequently Used	.096	-.007	.069	.064	1	-.282	-.094	-.135	-.048	-.005	-.061
Textbook, Info Source Frequently Used	-.050	-.012	-.024	-.076	-.282	1	-.097	.005	-.002	.059	.076
Other, Info Source Frequently Used	-.009	.080	-.006	.137	-.094	-.097	1	-.047	-.034	-.025	-.022
Google, Online Search Preference	.006	-.018	.125	-.012	-.135	.005	-.047	1	-.106	-.079	.183
Professional Organization Website, Online Search Preference	.141	-.038	.048	-.027	-.048	-.002	-.034	-.106	1	-.027	.026
Other, Online Search Preference	-.031	.117	.026	-.020	-.005	.059	-.025	-.079	-.027	1	.086
College Level Library Course	.076	-.038	.091	-.064	-.061	.076	-.022	.183	.026	.086	1

Note. N = 257. \*\*Correlation is significant at the 0.01 level (2-tailed). \*Correlation is significant at the 0.05 level (2-tailed).

Table 10

*Pearson Correlations of Educational Strategies (IVs) Used in Standard Regression Model to Predict Total ILSES Score*

Variable	Nursing Informatics	Capstone / Professional Practice Immersion	AEHR	Mobile Technologies
Total ILSES Score	-.074	.142*	.039	-.004
Age	-.150	.374	.025	.284
Gender	-.051	-.036	.001	.058
Race	-.087	.190	.030	.101
Primary Language	-.001	-.025	.001	-.068
Professional Journal, <i>Info Source Frequently Used</i>	-.073	-.094	.121	-.104
Textbook, <i>Info Source Frequently Used</i>	-.035	.010	.058	.100
Other, <i>Info Source Frequently Used</i>	.033	.097	-.033	-.028
Google, <i>Online Search Preference</i>	-.066	.005	-.048	.179
Professional Organization Website, <i>Online Search Preference</i>	.042	.332	.064	.180
Other, <i>Online Search Preference</i>	-.001	-.025	.001	-.068
College Level Library Course	-.033	.156	.111	.286
Nursing Informatics	1	.089	-.511	-.262
Capstone/PPP	.089	1	-.089	.374
AEHR	-.511	-.089	1	.262
Mobile Technologies	-.262	.374	.262	1

*Note.* N = 257. \*Correlation is significant at the 0.05 level (2-tailed).

## Stepwise Multiple Regression Analysis

After determining the dataset had met assumptions of multiple regression, a stepwise multiple regression was conducted to determine what student factors and educational strategies influence IL self-efficacy levels. A stepwise regression was chosen rather than interpret results from the standard multiple regression as the study contained a large number of IVs that did not correlate with the DV as described in Tables 9 and 10. The stepwise regression method is a combination of forward selection and backward elimination as the analysis software adds and removes controlled IVs as needed for each model step to produce the greatest increments to  $R^2$  (Polit & Beck, 2012). SPSS settings ended the stepwise procedure when all variables in the model had a p-value of less than or equal to 0.50.

The stepwise multiple regression resulted in a model with three statistically significant student predictor variables of age, information source frequency of use, and preference of online resources. Within these variables four items were found to have a significant relationship with ILSES score: online search preference for Google, frequent use of textbooks as information sources, frequent use of professional journals as information sources, and age. A multiple regression was run to predict Total ILSES Scores using these four variables with regression coefficients and standard errors found below in Table 11. The predictor multiple regression model was able to statistically significantly account for 13.9% of the variance in ILSES score,  $F(4, 252) = 10.192, p < .0005, R^2 = .139$ . All four variables added statistical significance to the prediction ( $p < .05$ ). Strength of relationships between individual predictor variables and DV of ILSES scores are denoted in Table 11 by standardized beta coefficients. For example, Google ( $\beta = -.233$ ) had the strongest relationship to the DV with the highest absolute value of the beta coefficient. The coefficient for an online search preference for Google was -12.368; as such, a

preference for conducting searches via Google was associated with a decrease in total ILSES score of 12.368 points (95% confidence interval [CI] = -18.52, -6.2,  $p = .000$ ). All other statistically significant relationships were positive. The coefficient for age was 1.1; as such, after controlling for other variables in the model, an increase in participant age of one year was associated with an increase in total ILSES score of 1.1 points (95% CI = .471, 1.729,  $p = .001$ ). The coefficient for most frequent use of textbooks as an information source was 8.687. After controlling for other variables in the model, frequent use of textbooks for information discovery was associated with an increase in total ILSES score of 8.687 points (95% CI = 2.2, 15.16,  $p = .009$ ). Finally, the coefficient for frequent use of journals as an information source was 7.901. After controlling for other variables in the model, frequent use of professional journals for information discovery was associated with an increase in total ILSES score of 7.901 points (95% CI = 1.21, 14.59,  $p = .021$ ).

Table 11

*Summary of Stepwise Regression Analysis for Predicting ILSES*

Predictor Variables	<i>B</i>	SE <sub>B</sub>	$\beta$	<i>p</i>	95% CI
(Constant)	127.964	7.459			(113.27, 142.65)
Google Online Search Preference	-12.368	3.130	-.233	.000	(-18.53, -6.20)
Age	1.100	.319	.202	.001	(.471, 1.729)
Textbook Info Source Frequently Used	8.687	3.290	.161	.009	(2.20, 15.16)
Professional Journal Info Source Frequently Used	7.901	3.397	.144	.021	(1.21, 14.59)

*Note.*  $N = 257$ . \*  $p < .05$ ; *B* = unstandardized regression coefficient; SE<sub>B</sub> = Standard error of the coefficient;  $\beta$  = standardized coefficient. Model Summary:  $R^2 = .139$ ; Overall Test  $F(4, 252) = 10.192$ ,  $p < .0005$

### **Research Question Three**

Research question three asked, “How do administrators, faculty, and deans of nursing programs describe educational strategies utilized in the development of IL competencies of prelicensure baccalaureate nursing students?” Data collection methods described in Chapter 3 detailed the researcher’s sampling plan for identification of faculty participants with knowledge and experiences regarding the phenomenon under study. The participants comprised of nursing faculty and administrators from colleges and universities across the United States whose senior students were subjects in the quantitative portion of this study. Participants of different age, experience, educational level, and background contributed to deeper information and richer variation of the phenomena under study. A total of 8 interviews were executed with video and audio recording using the semi-structured guide in Appendix E. Interviews lasted between 35 to 110 minutes. The interviews were recorded using audio and video software after getting consent of participants, transcribed verbatim, and analyzed using the framework below.

#### **Analysis of Qualitative Data**

As described previously, a directed approach to content analysis was used for this study that explored the application of Rogers’s Diffusions of Innovation (DOI) theory to innovations in nursing education. A five-stage framework approach was used for deductive content analysis using the processes outlined by Elo & Kyngäs (2008).

First, during the identification stage, the researcher developed a structured categorization matrix (Appendix J) to explore the application of DOI theory to innovations in nursing education. Six broad concept categories were identified and defined from DOI theory including innovation, communication channels/social systems, time, user segments, reinvention, and perceived innovation qualities. During this process step a thematic framework or coding matrix

was developed to classify all concepts and themes from which the data could be scrutinized and referenced. Next, the researcher immersed in data by listening to recordings and reading transcripts to begin to know recurrent themes during the familiarization stage. Third, during the indexing stage, the coding matrix categories were used to annotate and index all interview transcripts according to the six conceptual DOI categories.

During the charting stage, data quotes were lifted from their original text and placed in the coding matrix according to each category. Subthemes began to emerge across all interview cases and data points were reviewed a second time for content, recoded for theme, and rearranged on the matrix based on appropriate fit and correspondence with identified categories. Finally, in the mapping and interpretation stage, the matrix was used to develop a conceptual map and a range of phenomena was described. Different themes and their relationships were constructed to interpret findings based on the study objectives. The researcher totaled the frequency of occurrence for faculty's discussion and elaboration of each of the six coding categories and selected final data quotes from the interviews to exemplify each theme or subtheme.

### **Qualitative Themes**

provides a summary of the six coding themes and subthemes that emerged from interview transcripts. Coding matrix categories or main themes are organized by frequency of occurrence with communication channels/social systems being the most prominent coding category or main theme with 44 occurrences across all interviews and nine subthemes. Perceived innovation qualities followed with 42 occurrences and five subthemes followed by user segments with 31 occurrences and six subthemes, innovation with 17 occurrences and three subthemes, time with 16 occurrences and three subthemes, and reinvention with 14 occurrences and four subthemes.

Main theme categories are defined below and exemplars from study participants are provided to describe each subtheme.



Table 12

*Coding Matrix: Summary of Themes and Subthemes*

	Total Frequency of Code Occurrence	Number of Subthemes	Frequency of Subtheme
<b>Communication Channel/Social System</b>	44	9	
University librarian (CC)			7
Relationships among faculty (CC)			7
Curriculum committee (CC)			6
University committees/partnerships (CC)			6
Professional organization membership (SS)			5
Relationship with clinical stakeholders (SS)			4
Accrediting agencies/competencies (CC)			3
Outside vendors (SS)			3
Faculty scholarship, continued education (CC)			3
<b>Perceived Innovation Qualities</b>	42	5	
Complexity			13
Observability			10
Relative Advantage			8
Compatibility			7
Trialability			4
<b>User Segments</b>	31	6	
Lifelong learner			8
Role: Teaching assignments/learning approach			6
Technology/IL competence			5
Relationships inside/outside university			5
Age as barrier to IL competence			4
Stragglers present among faculty			3
<b>Innovation</b>	17	3	
New teaching pedagogies/technologies			7
IL as new concept to nursing program			7
IL as new concept to participant			3
<b>Time</b>	16	3	
Curricular adoption of IL			8
Individual adoption of IL			6
Technology adoption			2
<b>Reinvention</b>	14	4	
Technology training/resources			5
Librarian to assist faculty development			5
Curriculum Mapping			4

**Communication channels/social systems.** In the main theme of communication channels/social systems, participants described communication networks used to spread information among their faculty channels or social groups that had joined together in a common goal. Within this theme, nine types of communication systems were identified including faculty and student relationships with the university librarian, peer to peer nursing faculty relationships and mentorships, nursing curriculum committees, interdisciplinary/interprofessional university-wide committees, social systems with peers in professional organizations, communications with clinical agency stakeholders, integration of accreditation standards or competencies, trainings from external product vendor companies, and new information garnered from nursing faculty who were enrolled in doctoral programs for professional development and continued education.

Student and faculty relationships with a university librarian were mentioned most frequently as one participant stated:

Our librarians, in the very first semester come to a class with the students and they pull up on the screen the library and all the things you can access...they introduce themselves so that the students are aware of who they are of course. Our library is just less than a hundred feet away from our offices...they are really great about helping even the faculty. When we have things that we want to look up or we're trying to find, you just set up a time to come over with them and they'll walk you through things and help you get started, just be there to give you additional support or give you additional ideas.

The importance of having a strong relationship with a specified librarian was echoed by other participants, "I think our library is phenomenal...maybe it's because there's a person, you know there's an actual nursing person, that I can call up and say hey, can you help with this?" Another participant explained that her college had a designated health sciences librarian who spends 60-

70% of time in their college building stating: “She has office hours and spends a lot of time with our students helping them really focus their search terms. She helps faculty with grants, she’ll do a search for you so it’s just very very helpful...a great service.” One participant explained a team-teaching partnership with the librarian:

We have a nursing specific librarian that comes over and works with me in my nursing research class...we actually team teach them together in our computer lab and we work with them in how to ask appropriate questions, research questions and then how to search databases using appropriate keywords to find articles. So, I have a very good working relationship with our nursing research librarian and she has also come and helped other faculty who have had questions as well on what resources we have. So, I will say our librarians here on campus have been phenomenal in working with faculty in that role.

The role of faculty mentors and administrators in the spread of ideas among nursing faculty was a second common subtheme. Mentoring occurred formally through assigned peer-peer relationships, or informally as one participant explained use of a new AEHR system: “I would say that the faculty who teach in informatics class are our experts on DocuCare and so we would go to them for questions or for troubleshooting, they can give us pointers.” Participants identified relationships as a way to spread ideas among faculty as one explained: “I know several faculty are on the QSEN EBP board, so we get updates on that. With our DNP program, those faculty meet with the undergraduate faculty to keep them updated on things that they learn and exchange ideas.” Another participant described the role of a nursing administrator who helped faculty connect with a professional organization social system: “Our new division director just got us all into NLN. I noticed they have a lot of different resources for information on teaching in nursing.” The subtheme of membership in a professional organization occurred

again when a different participant stated: “Those who’ve gone to conference have brought back interesting information and ideas that we discussed as a department to adopt if we think we can. Computerized testing was something somebody had seen at a conference and brought back to us.”

Faculty described university-wide committees and nursing specific curriculum committees as communication networks used for teaching support and to spread ideas among members. While also explaining the integration of accreditation standards and competencies into their curricula, one participant described activities of a curriculum taskforce:

We did this in advance of our self-study and our re-accreditation visit. We went through all of the QSEN competencies and BSN Essentials and mapped them out. So, we brought in our syllabi clinical and non-clinical courses all the way throughout the curriculum. We looked at what each course was covering...we were looking at use of library resources and evidence-based practice incorporation with the information literacy...We brought it together and kind of did some concept mapping across the curriculum to see where it was and we actually did find holes. So, that's where we brought those objectives back into our informatics course to make sure we were covering all that content.

Many participants explained the work of the curriculum committee or taskforce based on the need for revision of outdated curricula and accreditation requirements. For example, one faculty subject stated:

I think the evidence based practice thread was definitely a coordinated effort when we developed this curriculum. We created it in 2008-2009 I think. We've kind of been evaluating it and are on the verge of a revision. And I have to say 10 years ago, we weren't even really thinking about the whole concept of information literacy and health

literacy. I think certainly we're looking at evidence-based practice because that was one of the Essentials - that's one of the BSN Essentials and of course we had to integrate that. So, I think it's kind of happened over the years because it is something that is becoming more of a concept and we realize we have to integrate but it really hasn't been a coordinated effort yet. I think when we do our revision, well we've just started talking about putting together a curriculum revision team maybe starting this summer. I think it's definitely something that will be more of a coordinated effort that is intentional.

Numerous types of committees and support groups were identified for faculty development on campus. One participant described an interdisciplinary network:

We're at a Health Sciences Center, so we have medical, pharmacy, PT, OT, speech, and nursing students all together and our simulation center is phenomenal...they are always bringing in new tools and they have times for us to come down and evaluate them...they have twice a year simulation education days where you come in and it's a full day of updating you on changes and new advances, new things that are available to you.

Many faculty described teaching support groups and established communication channels for technology assistance that aided in the spread of new ideas as one participant explained: "We also have what's called, teaching circles that send out information for professional development...then we have the Center for Instructional Design so we can go in there and get help with any type of technology innovation."

Interview subjects tapped into a variety of external social systems for ideas on adapting or improving their teaching strategies. One participant described relationships with clinical partners:

I think we try to be aware of what is current or will be a future trend. We will check with our agencies and ask for feedback, “What do you see that you think we should be training for? This has helped a lot in terms of explaining to our students why we think they need to know new things, because it’s part of your professional work! We know this because our agency feedback said so.

Faculty also used vendor resources and trainings to gather information on new innovations: “We use Kaplan, ATI, and Lippincott books. They are all very helpful and have a wealth of resources to help me develop and to help me develop the students but it’s just you have to use them.”

Lastly, interview participants expressed the presence of a unique communication channel with faculty who had returned to school in pursuit of doctoral education. One participant explained, “I’ve gone through my programs, my Ph.D. a few years ago and I feel like that has provided me a support network and with my faculty development too, I’m actively writing.” Interview subjects used school as a method to stay current on issues in nursing education: “I have several faculty who are in doctoral programs right now and I myself just graduated last year so that kind of keeps you up on things.”

**Perceived innovation qualities.** In the main theme of perceived innovation qualities, participants described components of an innovation that impacted its speed of adoption into nursing education. Within this theme, five characteristics or subthemes were defined, identified, and described based on DOI theory including an innovation’s complexity, observability, relative advantage, compatibility, and trialability. Trialability, the least frequent subtheme of an innovation quality, was construed by subjects as implementing or threading IL competencies across their courses through curriculum mapping. For example a participant stated:

Our curricular process of looking at these competencies across the curriculum and weaving it through was our strength. We kind of own what we teach and so I don't always know what my co-workers are doing in their classes. Until you sit down and look at it like that then you don't really understand what's going on across the curriculum. So, that's the strength, that we have that ability to look at it from a bird's eye view and see all the great things happening in our colleague's classes.

The most frequently mentioned aspect of an innovation, it's complexity, was perceived as study participants to be a degree of simplicity or difficulty in adoption. Components of complexity relating to technology and IL integration included the need for increased faculty resources and training, time as a barrier to adoption, difficulties relating to mobile device use in clinical education, and student financial burdens. One participant illustrated many of the aspects of complexity when stating:

I think we have to get more resources, certain apps and databases would be better to ensure that all faculty are being consistent in their practices but finance is an issue to get a good [library] website. I think it's licensing like right now we are trying to get up-to-date but we are just using the new journals that are online open access. All this learning, trying to keep updated and familiar with what are the good journals, so I think that's a barrier is it takes a lot of time.

Faculty reported issues when trying to adopt mobile devices for clinical education:

Some institutions have real problems with people standing openly with their phones. And so, the recommendation has been to pop in somewhere where you're not seen to look things up. Don't stand in an open area on your cellphone because that looks unprofessional, even if you are looking up your medication. Explain what you're doing.

You know, say, I'm looking up your medication on my phone because that's where I get my information. I think the only problem has been that these app programs or phones cost a bit and we're asking them to buy into more online computer-based programs already.

Complexities relating to time were depicted as faculty described experiences adopting IL-related teaching assignments into their curricula. One participant explained:

The other thing is the amount of time that's allotted in my workload to grade and give feedback for students it's certainly never enough. I have an average of 75 students and there's five writing assignments. It's very time consuming...I would really love to have the time to spend with individual students in terms of helping them process how they gather information and how to write. But as our program grows that's hard and harder for me to give every single student individual feedback on everything they give to me.

I'm looking at class sizes over 100 in the next year and I don't know how I'm going to be able to do that.

Participants reported observability characteristics of IL teaching strategies, describing visible results and improvements in student abilities. Improvements in student abilities after implementing IL teaching strategies relative to EBP research projects were chronicled: "I think the presentations they give at the end of each semester seem to get better every year. They have a better understanding of the resources that are available and how to get information." After infusing IL teaching strategies into their curricula, one participant reported improvements in searching skills: "Students are selecting more scholarly support, choosing to look up the right way and not doing quick searches. Several years ago people were using WebMD. I don't see



that any more since we integrated and infused it in every course.” Another faculty described observable improvements in IL competencies by stating:

I hear from the faculty who are in later semesters that the students come to them, because we teach searching and how to evaluate research articles in my early course, the faculty say, “Wow, students do come to me really knowing how to find a research article how to read it and how to evaluate it.” I get a lot of good feedback about their ability to find appropriate research and how to appraise it by faculty in those later semesters.

Additionally participants recounted that students and alumni had identified improvements in their level of preparation for practice relating to IL learning experiences.

We're getting anecdotal evidence from students when we do alumni surveys saying they feel well prepared. Once they're out and in jobs, they say they are in situations they feel well-prepared for, and they also feel comfortable with technology, whatever type it is...Then they also start getting involved with Magnet type of committees, groups, and those sort of research things because they know how to implement evidence-based practice...through the information searching we have taught them.

Faculty examined the relative advantage and compatibility of IL related to educational requirements and preferences of students during interviews. Participants perceived students as having little interest in learning IL skills as faculty stated their students did not perceive IL as important to their nursing education. For example, one participant stated, “Students say research is a boring class, just something they have to do. They don’t realize how important it is until they need it for an assignment or you know, to bolster their knowledge.” Faculty subjects expressed concern that students did not value IL learning experiences or understand their relation to nursing practice:

The biggest barrier I have is students being motivated enough to gather appropriate scholarly literature for their work. We struggle with this, there's a resistance...I think with the use of computers and students quick ability to access Google for everything, they rush to Google. They just don't want to do it and it's so easy to access it and many of them just don't take the time to learn how to do that. I often say to my students, I want to help you with this because someday you may want to move to a graduate program. Often their response is something like look at the electronic medical record and real nursing. And all they're asked to do is check off boxes! So, they don't really see why they need to learn how to do this well.

Another faculty questioned how IL fit into the already burgeoning nursing curricula when reflecting:

We educate toward the generalist nurse so I know you want the nurse to be able to function and to be able to know the resources that are out there. But NCLEX success is how our program is evaluated and time is a barrier. So how much information literacy is there on NCLEX you know?

**User segments.** In the main theme of user segments, participants described characteristics of faculty who were more or less likely to adopt educational innovations in their practice. None of the study participants used DOI theory terms of adopter categories for group classifications of innovators, early adopters, early majority, late majority, and laggards. However, faculty characteristics detailed by participants may be categorized by personal strengths and limitations relating to innovation adoption.

Subjects identified qualities of lifelong learning and technology/IL competence as strengths related to change adaptation. One nurse educator explained continued professional

development was an option for each faculty to explore stating, “Our program has lots of opportunities for faculty growth and development. It’s up to the individual to go fishing. A person told me you can do as much or as little as you want here - it’s up to you.” Many subjects described nursing faculty as lifelong learners who were more adaptive to change and accepting of innovation. One participant explained:

On the whole, I think our nursing faculty are open enough. We say, "You're going to have to be lifelong learners. Be flexible." So, if we say it, we need to do it too. And so, if there is a new kind of approach when it comes to some sort of IT or learning approach, I think, on the whole we try to be positive about it and so it’s accepted.

Similarly, when asked to identify program strengths related to teaching IL competencies, another subject detailed characteristics of lifelong learners:

We tell them, “You never know it all. You're never going to know it all and you need all the resources around you to be the best that you can be. At some point, you may be the resource for a lot of people but you're still going to need your resources.”...I think that we try to be very cutting edge and stay on top of changes in healthcare. I think one of our strengths is that we're not afraid of change. We don't always like it but we still keep trying to go there.

Participants described innovative nursing faculty as using student-centered approaches to learning and as having established relationships both inside and outside of their college or university. Lastly, competence in technology and IL skills was identified as important characteristics for adoption of new teaching strategies. One participant recounted skill and interest in IL as necessary for successful adaptation:

I'm a very student-centered faculty. And I think you have to have a passion for this kind of work. I don't think every faculty person can teach research or writing skills. I mean not that I'm special in that, I mean there are other areas of weakness that I certainly have, but I think you have to have some intrinsic skills about how they learn this type of content.

Characteristics of increased age, fewer years teaching experience, fluctuating teaching assignments, and resistance to change were identified as limiting qualities making faculty less adaptive to innovation. Faculty related increased age as a barrier to overcome relating to technology skill. For example, one participant stated, "Considering my age, I'm something of a computer dinosaur and have absolutely no idea what I'm doing. But I've worked to figure it out and I use our learning management systems." Another explained:

Well you're talking to a baby boomer so everything I know I'm learning along the way. I would consider myself to know enough to get by and navigate to do what I need to do. But certainly probably not at the level of younger faculty that are coming in and sharing their wonderful ideas.

A participant who was asked to expand upon characteristics of faculty who were more likely to adopt a new idea or educational innovation expressed many of these subthemes. The subject explained:

I will say that one barrier that I have noticed is, more experienced older faculty. So, older faculty are not always as comfortable with the technology. I've seen issues in my practice when we recently integrated a new electronic testing platform...and there was a big learning curve because we're all at different ages and levels with tech. I would also say the length of time they've been here – I think new faculty onboarding takes some time

and for a brand new person who's just given office keys they're not ready to innovate. For myself, I could tell you that it took me at least two and a half years, so, about five semesters, to really feel comfortable enough to try new things. That all depends on are you still teaching in the same classes consistently? Because sometimes we get ping-ponged around and that derails you...So, time of employment and steadiness of teaching in the class can make a difference because moving around you just have to start over from the bottom I think.

Finally, when describing a faculty member less likely to adapt to a new idea, an interviewee stated “Their mindsets, their choice, hold them back...It's not limited, like we only issue this information [opportunities for professional development] to a select group. No, it goes out to the masses.” Another participant identified stragglers present in their nursing faculty, stating:

I personally had issues with another faculty member whose interpretation of APA was different than the established textbook for the course and that's been periodically problematic for me...because we teach at the same time and this person will model one set of rules for accessing scholarly information and writing it up and it's in direct conflict with what's written in the established guide. And so students are confused and I've had personally some challenges with trying to motivate my colleague to be consistent with other members of the department.

**Innovation.** Participants described the fourth most frequent main coding theme, innovation, as an idea or object that was new to the user. Three subthemes were found as innovations including descriptions of new teaching pedagogies and technologies, IL as a new concept within nursing education, and IL as a new concept to the participant. Faculty subjects

chronicled the adoption of numerous teaching strategies and technologies. For example, a participant explained multiple adoptions of technology within their nursing program:

A while back, we had tried PDAs and had students buy into those...there was one project that tried iPads, but didn't really get anywhere. But there was that thought, the hope that maybe we could use iPads. But in the end with the smartphone technology, getting your apps on your smartphone, we went with that, and have the students have their preferences and resources on there, on their smartphones.

Similarly, another participant explained the successful implementation of numerous new teaching strategies and technologies within her nursing program, stating:

Our program has become more tech-friendly with our move into computer testing.

Really the academic EHR was the first electronic thing that we did here besides testing through ATI. Since then we have adopted clickers like the Student Response Systems.

We have Promethean boards in the classroom. We've moved to an electronic platform to track students regulatory paperwork like their CPR and PPD and all of that stuff...We have been doing more flipping the classroom...Our Dean has a big push to bring clinical into the classroom. I know that faculty use technology to live-stream simulations into the classroom. We'll run a simulation upstairs in our sim lab and then live-stream that down to the classroom so students can watch it and the students love that because they watch the faculty do stuff and sometimes we mess up on purpose and sometimes we don't.

Interview subjects also described IL as an innovative concept to their nursing programs. However, none of the participants were able to identify a specific curricular thread or program definition relating to IL. One participant explained: "I'm going back to our philosophy, which probably needs to be updated, but you know information literacy that term, I don't believe we

actually isolate it or define it. I would see that happening with the new curriculum revision.”

Similarly, other participants explained their program’s focus on health literacy or EBP instead of IL when asked to expand upon innovations in their curriculum. For example, a participant stated her nursing program had:

...a two or three hour lecture about health literacy and basically how to find the appropriate resources, how to evaluate resources and that kind of thing. So, we don't necessarily call it information literacy in our program right now because it's kind of a newer concept. I think there's work to be done but we are doing some of it...when it comes to evidence-based practice, I think we've done a really good job of threading that through. I think other types of literacy maybe we need to work on because we definitely have gaps there. That's something that we have to probably develop and pull into the curriculum.

Similarly another explained: “We don’t use that language, in our department at the graduate level we have a colleague who has worked closely with our library staff to increase the number of resources available under the guise of increasing health literacy.”

Likewise most nurse educators expressed that IL was a new concept that they were unaware of. All faculty subjects asked the researcher to explain or define IL during the process of recruitment. During the interview one faculty subject stated, “We do not have one [course or curricular thread related to IL] labeled that way. We don’t use the library definition in our curriculum.”

**Time.** In the main theme of time, participants described one of the five DOI time stage processes through which an innovation passes. Within this theme, time phases for curricular adoption of IL, individual participant adoption of IL, and technology adoption were identified

and described based on DOI theory. The five stage time phase process for each of these innovations, defined in Chapters 1 and 2 from DOI theory, was 1) knowledge/awareness, 2) persuasion/interest, 3) evaluation/decision, 4) implementation/trial, and 5) confirmation/adoption.

When identifying curricular adoption of IL as an innovation, four of the eight faculty described their nursing program within the fourth time phase of implementation/trial. For example, one participant reported full use of the innovation of IL:

They get introduced with information literacy in freshmen year classes from the foundational core then we build off of it in our nursing curriculum specific to health literacy. The largest class would be evidence based practice when they have introduction with the librarians and they have to conduct their own researches...what we did, was identified literature and the AACN Essentials, you know the necessary requirements of the curriculum, and we did a content map over the curriculum mapping to ensure the major concepts that we wanted were there, that they were threaded throughout and in our student learning outcomes. We found they were introduced to literacy through all the courses but it was mastered in the Capstone.

Two participants expressed aspects of curricular adoption indicating their program was in the third time phase of evaluation/decision. These faculty described mentally applying the concept of IL to their current curricular revision process. During the interview one participant stated:

This is really making me think how nice this is going to dovetail with our new curriculum. I need to go back now to our chair of our curriculum committee and have a conversation with her about information literacy and exactly what was previously done about it. I know right now they're kind of down in the weeds in terms of where certain



content is fitting and then I then I know they're going to weave these threads through and so I'm eager to have that conversation about where we see that throughout the whole curriculum. Bringing the vision away from content focus and more toward a competency model.

The last two interviewees provided details of curricular integration in the first section of knowledge/awareness phase. As previously quoted, these faculty identified only recent exposure of their nursing program to IL competencies and were beginning to form attitudes toward the idea based on perceived innovation qualities.

When identifying personal adoption of IL as an innovation, three of the eight faculty described themselves as within the second time phase of persuasion/interest. As quoted previously, these participants expressed an interest in the new idea and were seeking additional information related to the topic such as one subject stated:

I would say it's not an area of strength for me. I feel very confident when we're talking about finding research and appraising research, evaluating research, I think that part of it I'm very strong. However, in general, I would say I don't have a broad background. I have that narrow background you know, the ability to search for research, evaluate it, read it, appraise it, but when we talk about it in terms of information literacy in a broader sense, it's definitely something I would have to spend more time reading about, learning about.

Two subjects were not as far along in the time process and described being in the knowledge/awareness phase of personal adoption. Only one faculty described personal teaching experiences in the implementation/trial phase, where she demonstrated full use of the innovation:

I've certainly learned a lot in the last six years that I've been teaching the writing intensive course at this university. That's what the university calls it, writing intensive, and it's probably a similar framework to the information literacy language that you're using. So, I've certainly worked very closely with our librarian staff and our English department to make sure that I'm providing students with as much feedback and support as they need, especially as they complete exercises and writing assignments that incorporate current research and nursing literature into their work. I've also published a couple of things in the last few years. I'm sure I'm not perfect but I feel like my background is strong in this area.

Lastly, when identifying teaching technologies as an innovation, most participants described their programs as further along in the fifth time phase of confirmation/adoption. For example, one participant quoted above described full adoption of simulation technology in her nursing program through the creation of a well-established interdisciplinary simulation center. Other participants described full technology adoptions of AEHRs, simulated computerized learning environments, student clicker response systems, mobile devices, and apps for clinical education. One participant described adoption of a unique technological innovation at her university:

We have a virtual library in our new building...and this was my first experience with this, there are no books in this library. There are a number of computer stations, with computers or hookups where students can bring their computers. The difference is, there is a live librarian there to assist students as they are searching for information, guiding them in their searches, et cetera. So, I think that's the difference between, how you just access an online library from your home - the presence of our in person librarians, right

there to really help students make that transition. I also think that they serve as a guide to ensure that our students are accessing appropriate scholarly resources.

**Reinvention.** The last main theme, reinvention, was the least frequently mentioned in interviews. This theme describes the adaptation and refinement of an innovation to meet the needs of more risk-adverse adopters. Three subthemes emerged when describing reinvention of curricular innovations such as IL and teaching technologies: the need for increased training and resources, a librarian to assist in faculty development of IL skills, and curriculum mapping to clearly define the innovation.

Faculty detailed the need for repeated trainings to reinforce technology skills. One participant expressed her frustration with technology and training:

I will give credit to our learning technology department, who will have training when something new comes up...but it's a learning curve of what works best in class. And it can just be more embarrassing problems with it. For me getting that writing board to work in class is a problem- so that no matter how many notes I've taken and practiced, the morning of class, it still somehow would not write. I think if something doesn't come up and function, if there's some, sort of glitch for the day, it makes you feel like you did what you could to prepare but yet you still can't move past it.

Another participant explained how a lack of resources and continued training at her university prohibited faculty from fully implementing an existing AEHR system:

Whenever we transitioned to DocuCare, all of the faculty at that time went through an orientation process. I wasn't teaching in informatics then and I have not used that in the classroom so I'm not really comfortable with it. A lot of our new faculty have not been onboarded with our AEHR process too so that's a problem that I don't think our faculty,

and myself included, are fully educated on what resources there are and how we can integrate them into our curriculum. We've been using it in informatics and fundamentals since 2015 but we haven't had any further training on it so, we're not unleashing its full potential.

Interviewees also recounted how librarians assist in the development of nursing faculty member's IL skills. This subtheme is evident from previous participant quotes and also from one interviewee that stated, "Our librarians are a phenomenal resource and they don't only help me. They have helped other faculty - new faculty who come in and aren't familiar with the databases. We can set up one-to-one meetings and they will mentor you." Lastly, faculty described the need to better define IL through curriculum mapping to ensure its understanding and adoption among their colleagues. One participant noted:

I think one of the areas to address our gap is to make sure all the faculty know the definition of IL. And that when we do our curriculum revision to really step back and make a concerted effort to make sure that this is something that we are teaching across the curriculum and that we have in every level. We should all know how we are kind of building those competencies in the curriculum and what assignments build on the competencies.

Likewise another subject identified defining IL and curricular mapping as an opportunity for improvement:

We have opportunities to improve like having clearer communication regarding how we are doing information literacy. Maybe just having something said, information literacy, let's talk about it and because we're doing it. We may not use the term information literacy so maybe something to say, hey let's talk about the new thing is information

literacy. Let's talk about what it is - how we applied this and how we use this concept on day-to-day basis. Because people say, oh we don't use information literacy ... but yes actually we do!

### **Chapter Summary**

This chapter presented the results of data collected from the concurrent embedded quantitative dominant mixed method study. This chapter presented the results of the statistical analysis assessing IL self-efficacy as measured by the ILSES (Kurbanoğlu et al., 2006). The chapter discussed descriptive and inferential statistics related to the two quantitative study questions introduced in Chapter 3. A description of the quantitative student sample and eight study sites was provided. The IL self-efficacy score of the sample was identified and the relationship between student factors, educational strategies, and IL self-efficacy was examined. The second portion of the chapter presented findings from the directed content analysis that addressed the study's third qualitative research question. Six themes were identified from the categorization matrix (Appendix J) that applied DOI theory to the analysis of eight faculty interviews. Themes and exemplars were provided to describe faculty experiences in the adoption of IL educational strategies. The next chapter presents a discussion pertaining to this study's results, implications for nursing education, and recommendations for future research.

## CHAPTER FIVE

### DISCUSSION AND IMPLICATIONS

Chapter 5 offers a discussion about quantitative and qualitative data from this mixed method study. This chapter will present discussions of the study sample and research questions highlighted in Chapter 4 are further explained and interpreted. In addition, limitations of the study are identified and implications for nursing education are addressed. The chapter concludes with recommendations for future research and a summary of the study results.

#### **Discussion**

This section offers a discussion of the study's findings as presented in Chapter 4. Areas discussed include demographic characteristics of the quantitative student sample and educational strategies employed by participating nursing programs. Next, this section will review relationships between these factors and ILSES student scores discovered through statistical analysis. This section concludes with a discussion of data relating to each of the study's research questions, including qualitative data from faculty interviews presented in Chapter 4.

#### **Study Sample: Student Factors**

This is the first known study to explore student factors and educational strategies impacting IL self-efficacy of undergraduate student nurses using a multisite design recruiting nationally from accredited nursing programs. A large sample of senior nursing undergraduates was recruited from eight sites across the United States, which closely resembled national trends of student demographics based on most recent statistics collected by the NLN. The demographic data analyzed for this study included gender, race/ethnicity, primary language, and age. As reported in Chapter 4, demographics had little variance and the majority of the sample was female, young, white, and reported English as their primary language. Homogeneity of the

student sample in this study was reflective of past research on IL self-efficacy of undergraduate nursing students by Wendekier (2015) and Stokes and Urquhart (2011). These studies are the only publications exploring the topic among nursing undergraduates. Wendekier's (2015) study used a smaller sample ( $N = 88$ ) of senior students recruited from five sites located in Pennsylvania while Stokes and Urquhart's (2011) study included a larger sample ( $N = 194$ ) of nursing undergraduates from a single site in the United Kingdom.

Analysis of student factors regarding library learning experiences, information source frequency of use, and preference of online resources for conducting research was summarized in Chapter 4. Most (82.3%) of senior students reported that they had been taught how to use the library in a formal college-level class. However, when asked to describe educational strategies on the IL Curriculum Survey, all nursing faculty identified that their curricula included a lesson with review of library resources in freshman, sophomore, junior, and/or senior courses. This finding indicates a disconnect between student and faculty reports of library science learning experiences as nearly 20% of students reported never being taught how to use the library in their undergraduate courses. This small subsection of students may have transferred into the nursing program after the lesson on library resources occurred or they may not have understood and recognized the lesson design was focused utilizing university resources to locate information sources. The majority (52%) of students in this study's sample most frequently used the Internet to find answers to a nursing question; followed next by textbooks (22.7%), professional journals (21.2%), and other sources (3.5%). This finding was supported by previous studies of undergraduate students that participants used Internet sources such as Google and Wikipedia more frequently than library databases or print resources (Biddix et al., 2011; Ferguson et al., 2006; Özkul & Kaya, 2009; Salisbury & Karasmanis, 2011).

When asked to identify their preferred online source for conducting research during class assignments, students indicated a preference for library websites with access to databases such as CINAHL (70.4%); followed by Google (24%), professional organization websites (3.5%), and other online sources (1.9%). This finding differs some from previous research of undergraduate students' searching preferences. Ferguson et al.'s (2006) descriptive study of biology students found a large majority (90%,  $n = 129$ ) of students were most comfortable using Google for researching information with fewer students (63%,  $n = 90$ ) reporting confidence when using library Web pages for information searches. This finding was replicated from other studies of undergraduate students reporting preference for Internet and Google searches as library platforms were difficult for students to navigate and use (Biddix et al., 2011; Dee & Stanley, 2005; Duncan & Holtslander, 2012; Salisbury & Karasmanis, 2011). Perhaps nursing students have a distinctive preference for library database searches or conceivably their partiality results from the majority of participants ( $n = 214$ , 82.3%) noting that they had been taught how to use the library in a college-level course. Moreover, all faculty identified that their curricula had incorporated at least one nursing-specific library lesson with content that focused on use of electronic databases for searching and retrieving articles.

Partiality for library websites may be unique to this sample of senior nursing students; however, the investigator was unable to compare this finding to previous research with baccalaureate nursing students as no past studies have explored this topic. Opportunities exist for future research to explore factors such as semester timing of library lessons, or the value of repeated learning experiences, on IL self-efficacy and skills of nursing students. Additionally, future research should differentiate between Google, Google Scholar, online library websites,



and brick-and-mortar libraries to better distinguish student preferences and determine impact of searching choices.

### **Study Sample: Educational Strategies**

This study described educational strategies employed by participating nursing programs toward the development of IL competencies of prelicensure baccalaureate students. Educational strategies included nursing informatics course, library review, capstone course, EBP projects, AEHR use, and mobile device technologies. All programs reported implementations in EBP projects and courses or lessons with library review; however, only two of the eight faculty participants stated their program included a 3-credit nursing informatics course. The majority of faculty reported that informatics competencies were spread throughout numerous courses in their curricula. Yet, faculty subjects without a designated informatics course were not able to provide detail on the curriculum survey regarding assessment of student learning outcomes relating to informatics or describe the process by which their program had mapped informatics in their curricula during their interviews.

Both the AACN (2008) and NLN (2008b) recognize information management as an essential nursing skill and formally recommend the integration of ‘informatics competencies’ into nursing curricula. Additionally, the QSEN (2018) project outlined competencies in six key areas, one of which is informatics. Evidence from previous studies suggests that low ICT self-confidence and perceptions of poor computer self-efficacy may adversely affects students’ IL abilities and behaviors (Bond, 2004; Levett-Jones et al., 2009; Özkul & Kaya, 2009). Despite the consensus among nursing experts that informatics competencies are essential to the baccalaureate nursing curriculum and integral to development of IL skills, the potential informatics curriculum gap noted in this study is reflective of most nursing programs across the

United States (Spencer, 2012). Programs without a nursing informatics course or planned curriculum thread with identified student learning outcomes may fail to provide students with vital learning experiences necessary to develop technological competence integral to IL. Faculty may struggle to develop informatics-based learning activities appropriate to the level of student development, especially when unaware of content taught in previous courses.

In contrast, almost all faculty indicated their programs included a capstone or practice immersion experience. While the clinical immersion model has demonstrated successful outcomes over the past 15 years (Diefenbeck et al., 2015), implementations of this educational strategy varied significantly among programs in this study. For example, the number of required clinical hours varied greatly between programs, as did the selection of nursing preceptors from agency sites. Practicum or clinical immersion time requirements ranged from 72 to 224 practice hours among participating nursing programs. Selection of clinical preceptors for students also varied significantly with most faculty reporting nurse managers at partnering facilities identified RN staff for the role. Only three faculty identified requirements for preceptors including degree and experience criteria.

Although the design of practice immersions was not the focus of this study, faculty stressed the importance of the preceptor role in developing nursing students' practice competence and professional role identity during interviews. Similarly literature on IL in nursing education found that students attributed achievement of EBP and IL skills to support given by professors, librarians, and nurses during practice-based learning experiences (Janke et al., 2012). Conversely, students also reported experiencing stress and intimidation from working alongside practitioners in the clinical learning environment (Janke et al., 2012). Ensuring student support and exposure to appropriate role models during clinical immersions then becomes vital

to the development of positive perceptions of IL and EBP in nursing practice. In light of research on IL learning experiences, it may be necessary for nursing faculty to identify criteria for careful selection of RN preceptors and also closely examine the number of hours students spend independently in the practice setting.

Lastly, nearly all faculty indicated use of educational technologies such as AEHRs and mobile devices for resources during clinical learning experiences. Faculty reported adoption of AEHR due to issues accessing EHR systems in clinical and restrictions against student documentation. However, participants reported issues with AEHR implementation including lack of continued faculty and student training, burden of financial costs to students, and narrow application across multiple courses in the nursing curriculum. Previous studies regarding the implementation of these systems found that students' perceived ease of use and overall usefulness are primary determinants for developing a positive attitude toward using an AEHR (Kowitlawakul, Wai Chi Chan, Pulcini & Wang, 2015), both of which may be negatively affected by barriers of training, financial resources, and limited application reported above. Similarly faculty stated mobile electronic devices and smartphone applications had been integrated into clinical learning due to ease of use and availability. Although research indicates that having electronic resources readily available during clinical increases learners' ability to make decisions and feel confident in the provision of patient care (Wittmann-Price, Kennedy & Godwin, 2012) mobile devices may be detrimental for other aspects of learning. As can be gleaned from the results of this study and previous literature on smartphone integration, instituting mobile technology in nursing education requires an investment in orientation resources for students and implementation of an effective communication plan for educating clinical nursing staff on the purposes of student device use.

## Research Question One

The study's first research question asked: What are the IL self-efficacy levels of prelicensure baccalaureate senior nursing students as measured by the ILSES? This mixed method study used descriptive quantitative analysis to identify the IL self-efficacy levels of prelicensure baccalaureate nursing students who completed the ILSES. The majority of student participants reported positive IL self-efficacy levels on the ILSES tool where total possible scores can range from 28 to 196. The mean total ILSES score in the study population ( $N = 260$ ) was 152.8 with participants' total reported scores ranging from 59 to 196 ( $SD = 23.9$ ). As the tool was designed to measure perceptions of self-efficacy, authors of the tool have not set categories to indicate specific levels of IL confidence or competence. Considering the maximum score that can be calculated from the scale is 196, the mean total ILSES value of participants in this study of 152.8 may be regarded as rather high. Study results closely resembled those in Wendekier's (2015) sample of senior nursing students with a mean ILSES of 155.8 for the 28-item scale with a range of 108 to 194 ( $SD = 18.3$ ). No comparison of baseline ILSES scores could be made to Stokes and Urquhart's (2011) study of nursing students as the article only reported inferential statistics. Students in this sample reported higher mean ILSES scores than those in Geçer (2012) study of Turkish undergraduate student teachers ( $N = 703$ ,  $M = 149.67$ ).

Although ILSES scores remained relatively consistent over time between Wendekier's 2015 study and the current research sample, the range of scores varied significantly in this study with the lowest reported ILSES score of 59 compared to 108, respectively. A possible explanation for greater variation in student scores may be related to study design and number of participants. Wendekier's (2015) study recruited senior students from one geographical region

and had only 88 participants whereas this research recruited a larger and more geographically diverse sample.

**Mean ILSES scores for individual scale items.** Results of the 28-item ILSES were also examined by analyzing averages for each scale item independently. Participants indicated higher levels of self-efficacy, almost always true to usually true, on the seven-point Likert scale for only two ILSES items. Students indicated that they felt confident/competent in the “use of Internet search tools” and “use of electronic information sources.” Conversely, low levels of self-efficacy were noted on four ILSES items with students indicating only occasionally feeling confident/competent in the “use of different types of libraries”; in abilities to “locate resources in the library using the library catalogue”; in “use of the library catalogue”; and in abilities to “locate information sources in the library.”

Students rated highest levels of IL self-efficacy for tasks such as locating information using Internet search engines and electronic-based information sources; whereas lowest levels of confidence and competence were associated with IL skills of finding and using sources of information in a traditional library. Findings of these specific ILSES scale items are reflective of previous literature exploring undergraduate students’ frequency of Internet use for information searching and preference for online websites for conducting class research. Likewise, faculty interviews conducted for this study described student’s preferences for conducting quick online searches over more tedious research in a traditional library setting. One faculty member even described a unique innovation at her university where conventional library resources such as hardcopy books had been replaced with virtual computer systems.

Information searching preferences reported by participants in this study reflect findings from previous literature indicating that students chose Internet searching over the campus library

as they valued ease of access, navigation, and convenience (Biddix et al., 2011; Ferguson et al., 2006; Jones et al. 2008; Özkul & Kaya, 2009; Salisbury & Karasmanis, 2011). Nursing students' perceptions regarding personal levels of confidence and skill using an information source may impact their frequency of use and preference for the searching tool. Avoidance of a specific means of information searching, such as a traditional library, may further impair students' IL abilities and skills to locate sources of evidence using a wide variety of research tools.

Although students indicated a preference for research using an online library database, participants rated confidence and competence in “locating information sources in the library” and “using the library catalogue” low on corresponding ILSES items. Previous research found gaps in undergraduate students' abilities to use electronic databases effectively as they lacked skill in defining keyword terms to conduct a search and use Boolean operators or controlled vocabulary to narrow search results (Biddix et al., 2011; Duncan and Holtslander, 2012; Ferguson et al., 2006; Salisbury & Karasmanis, 2011). This raises questions whether nursing student participants would encounter the same difficulties locating information sources in an online library as they would in a traditional library. If that were the case, these particular IL skills would be imperative to include during library courses or lessons with nursing students. The researcher was able to determine that content related to search terms was presented during library course lessons in only two nursing programs based on faculty responses to the IL Curriculum Survey. Moreover, IL teaching strategies related to information searching, such as using keywords, MESH, or Boolean terms to narrow results, was described in only three of the eight faculty interviews. A curricular gap may exist in nursing programs without courses or lessons focused on use of library resources

or in those lacking structured mastery experiences for students on methods to refine, limit, and analyze information searches.

## **Research Question Two**

Next this mixed method study sought to build the science of nursing education research on IL through conduction of higher-level correlational analysis of relationships between IL self-efficacy, student factors, and educational strategies. The second research question stated: : What student factors and educational strategies influence IL self-efficacy levels of prelicensure baccalaureate senior nursing students? This is the first study to examine the relationship between both student and educational predictors of information literacy self-efficacy as measured by the ILSES. The final sample size used for the multiple regression analysis ( $N = 257$ ) greatly exceeded the minimum sample size of 63 as calculated in the power analysis for this study. The researcher developed seven IVs representing student factors described previously and six IVs representing educational strategies employed by participating nursing programs based on findings from the literature review. Stepwise multiple regression was used to explore relationships between the continuous and categorical IV variables to the continuous DV ILSES total score.

After completing a stepwise regression as described in Chapter 4, only four student factors were found to have a statistically significant relationship to ILSES. Online search preferences for Google, frequent use of textbook as information sources, frequent use of professional journal as information sources, and age were found to have a significant relationship with ILSES score. The stepwise multiple regression model was found to be statistically significant ( $p < .0005$ ) and accounted for 13.9% of the variance in ILSES score,  $F(4, 252) = 10.192$ ,  $p < .0005$ ,  $R^2 = .139$ . Google had an inverse relationship with ILSES scores whereas a

positive relationship was found for age, use of textbooks, and professional journals to self-efficacy. Despite being statistically significant, the stepwise regression model for these four variables had a small effect size accounting for 13.9% of variance in ILSES.

Although gender was not identified as a statistically significant factor in the regression model, male students in the study reported higher mean scores than female students, 162.2 to 152.43 respectively. Wendekier noted that her small sample size prohibited analyzing ILSES scores by genders; however, her findings of this demographic conflict with this study. Female participants in Wendekier's (2015) research reported higher mean ILSES score ( $M = 157.6$ ) than male counterparts ( $M = 144.3$ ). Studies relating to technology abilities and IL competency of nursing undergraduates using measurement tools other than the ILSES had mixed results when comparing students' attitudes toward personal skill based on gender. One study found freshman female nursing undergraduates had higher confidence in their abilities to use technology to access information over male students (Hossain et al., 2012); whereas male students in Maag's (2006) study reported higher confidence levels in their ability to learn about technology.

Despite inconclusive results of past studies exploring the relationship between gender and IL self-efficacy in baccalaureate nursing students, overall male students have expressed higher confidence in their technology skills and ability to learn new digital systems. IL self-efficacy levels of male participants in this study may have been impacted by recent advancements in technology that have revolutionized information searching abilities of students. For example, researchers have found that demographic variables including gender, cultural background, university of enrollment, and program of study could predict a student's technology experience. Two studies of millennial students specifically identified that male students were more comfortable using core information technologies and had higher ratings of frequency of



technology use (Caruso & Kvavik, 2005; Kennedy et al., 2010). The association of higher male ILSES scores may be a result of current innovations and technology exposure rather than IL predispositions based on gender; however, nursing faculty should be aware of study results when working with undergraduates, as the majority of students are female.

Findings from this study indicated a statistically significant relationship between age and IL self-efficacy. The mean age of student participants was 22.8 years with a range of 20 to 59 years. Older senior students reported higher IL self-efficacy scores, with just over one point increase in total ILSES per additional year of age, when all other model factors were held consistent. This study's findings on age are supported by previous research on technology and IL self-efficacy of nursing undergraduates. Both Hossain et al.'s (2012) and Maag's (2006) studies had similar results despite using different IL tools. The researchers found younger students reported lower levels of self-efficacy in accessing information through online databases and lower levels of confidence in their abilities to learn new technologies. Only one earlier study by Bond (2004) contradicts, as the researcher reported no statistically significant relationship between age, ICT abilities, and IL self-efficacy. Wendekier's study did not report findings on the relationship between age demographics and IL self-efficacy.

While previous literature supports the positive relationship between age and IL, this finding may seem surprising when considering technology skills of traditional, millennial undergraduate nursing students. These results contradict commonly held beliefs about millennial students and further illustrate the need for researchers and educators to cautiously examine generational stereotypes of millennials as digital natives. Per the ACRL (2013), IL has a relationship to information technology skills, which require students to be familiar with computers, software applications, and databases. Demographic factors other than age such as

computer self-efficacy and frequency of ICT use have been found to impact IL abilities of undergraduate students (Duncan & Holtslander, 2012; Levett-Jones et al., 2009; Özkul and Kaya, 2009). As such low levels of self-efficacy in technology and confidence in computer skills among young undergraduates may negatively impact their IL confidence and competence. Consideration should be given to possible explanations for this finding aside from computer or technology skill, such as past life and work experiences of older non-traditional students when compared to younger counterparts, and how those variables may impact information seeking skills and abilities. For example, older students were likely exposed to different pedagogies relating to IL that were less focused on technology use for information searching. Teaching sessions may have occurred in the library setting where students were encouraged to collaborate and develop a relationship with research faculty, which in turn have had a positive influence on students' development of confidence in their IL skills. Other compounding variables may impact IL self-efficacy such as socioeconomic/employment status, job experience, and/or family responsibilities. Traditional undergraduate millennial students may have lower IL self-efficacy levels due to lack of responsibilities or experiences related to employment. Additional research is needed in this area to draw more accurate conclusions between age, technology competence, and IL abilities of nursing students.

As discussed, results of this study regarding the negative relationship between conducting Google searches and IL self-efficacy were not surprising. According to regression analysis results, participants in this study who chose Google as their favored source for conducting online searches reported lower ILSES scores by 12 points. Google was the second most popular selection for online searching tool, with 24% ( $n = 63$ ) of student participants choosing this option on the survey item. Preferences for conducting searches through Google and other online

tools were replicated in studies of undergraduate students from other disciplines (Biddix et al., 2011; Ferguson et al., 2006; Henderson et al., 2011; Salisbury & Karasmanis, 2011) and with baccalaureate nursing students (Duncan & Holtslander, 2012; Özkul & Kaya, 2009).

Additionally, previous studies have revealed that students reported substantial frustration with Internet searches as they ended up with far too much irrelevant information (Biddix et al., 2011; Duncan & Holtslander, 2012).

The negative correlation between Google and IL may be resultant from known gaps in students' IL abilities related to narrowing search results (Ferguson et al., 2006; Russell, 2009; Salisbury & Karasmanis, 2011). Qualitative faculty interviews support this idea. Faculty perceived that despite improved abilities to differentiate between sources of credible evidence, senior students continued to struggle with using basic investigative strategies such as using Boolean operators to narrow search results. One faculty subject noted that although less students were citing Wikipedia for classroom assignments by their senior year, they continued to express frustration with identifying articles relevant to their specific topic of interest.

Although Google is convenient and familiar to nursing students for information searching, its frequent use may be detrimental to their development of positive IL self-perceptions. The significantly negative correlation with IL self-efficacy may have resulted from students' unsuccessful past experiences conducting searches using Google. Literature supports the idea that a student's use of complex processing strategies before his/her development of a basic understanding of content may lead to confusion and unsuccessful goal attainment (Bandalos, Finney & Geske, 2003). Thus, the student's level of perceived IL self-efficacy decreases and development of a positive attitude toward IL is impaired without sophisticated searching skills developed through faculty guidance and structured learning experiences.

A final distinctive finding from the stepwise regression analysis indicated that both participants' frequent use of textbooks and professional journals for information sources were associated with significantly higher ILSES scores of 8.687 to 7.901 points, respectively. Positive correlations between ILSES scores and textbook and/or professional journal use may be explained by examination through the conceptual lens of self-efficacy as an internal motivational construct. Self-efficacy encompasses an individual's personal judgment of his/her abilities to organize and execute courses of action toward the achievement of identified goals (Bandura, 1977). Students with a strong degree of self-efficacy undertake more challenging tasks and are more capable of adjusting to the learning environment to ensure academic success (Chemers, Hu & Garcia, 2001). The results from this study further support the belief that highly efficacious students employ select learning strategies, such as textbook and journal reading, to process information and apply course content when researching. However, consideration should be given to other possible explanations for this finding. Self-efficacy is often regarded as situational, task dependent, and influenced by numerous variables. Perhaps factors unexplored in this research design, such as students' study behaviors or engagement in professional organizations, relate to preferences for textbook and journal use and have greater influence on IL self-efficacy. Further discussion about these findings is limited. The literature review identified the lack of research on this topic; therefore, it is difficult to come to a conclusion regarding the relationship between IL self-efficacy and information source use. Additional research is needed in this area to draw thorough and precise conclusions.

### **Research Question Three**

DOI theory was used as a framework to explore faculty experiences during the innovation-diffusion-adoption process of integrating IL competencies into the nursing

curriculum. The final research question asked: How do administrators, faculty, and deans of nursing programs describe educational strategies utilized in the development of IL competencies of prelicensure baccalaureate nursing students? Rogers's (2003) DOI theory focuses on the process of diffusion, or movement of a new idea or object, through a social system over time. Major tenets of DOI theory include an innovation, time, communication channels and social systems, user segments, user-perceived innovation qualities, and reinvention. These concepts were defined in Chapter 4 and used to develop a coding matrix for analysis of faculty experiences describing educational strategies utilized in the development of IL competencies. Six themes and corresponding subthemes were derived from content analysis of faculty interviews that support application of the study's conceptual framework of DOI theory to faculty experiences in IL adoption. Findings from content analysis were discussed and exemplars representing each of the themes were provided in Chapter 4. Themes and subthemes that emerged from analysis of faculty interviews using the DOI theory coding matrix included communication channels/social systems; perceived innovation qualities; user segments; innovation; time; and reinvention.

**Communication channels and social systems.** DOI theory explains communication channels or social systems with peer-peer networks are a method to spread information and innovations among a group. The most prominent theme of spreading information through communication channels/social systems emerged from faculty interviews and descriptions of relationships with university librarians, nursing faculty colleagues, curriculum committees, university-wide teaching groups, professional organizations, clinical stakeholders, accrediting agencies, outside product vendors, and continuing education cohorts. When asked to describe relationships related to teaching IL competencies either inside or outside the university, all

faculty subjects focused on the importance of a one-on-one partnership with a librarian.

Participants explained differing partnerships. Some had a designated nursing or health science librarian onsite and in close proximity to their offices while others accessed resource staff in a separate building. Some participants partnered with faculty librarians to design, implement, and teach one or two IL learning sessions to undergraduate nursing students while others more simply invited faculty as guest speakers to explain search functions of the library database.

Although studies specific to nursing education and IL integration are sparse, current literature supports the need for collaboration between disciplines; especially in consideration that the IL concept originates from the American Library Association. Authors emphasized that a restructuring in nursing education must occur to maximize opportunities and access to the unique expertise of librarians in the development of strategic and successful IL learning experiences (Barnard et al., 2005; Brettle & Raynor, 2013; Janke et al., 2012). Faculty participants in this study echoed that a collaborative relationship with a librarian is of utmost importance for teaching IL competencies to undergraduate nursing students.

A second common subtheme in this category emerged relating to faculty connectedness through peer-to-peer networks such as relationships with administrators or mentors, teaching support groups, membership in professional organizations, service on a curriculum committee, continued schooling, and conference attendance. Subjects related currency of knowledge in new ideas and innovations to a combination of participation in these social systems. A subset of subjects explained that partnerships with university librarians had expanded to mentorship of nursing faculty as library staff regularly assisted with database searches and grant development. Exemplars described IL as a new concept to nursing and its diffusion and curricular adoption as dependent upon faculty's level of connectedness to a peer group, such as the QSEN task force, or

participation in curriculum revisions where the group compared current practices to accreditation standards to identify and examine gaps.

The theme of communication channels encompassed the most frequently described DOI category from faculty descriptions of innovation diffusion throughout their nursing programs. The spread of information and ideas relating to IL teaching practices may be dependent upon nursing faculty relationships. Further research is needed to explore communication channels or social systems necessary for IL integration in nursing programs.

**Perceived innovation characteristics.** Faculty described insights into innovation qualities that have been known to effect the spread, acceptance, or rejection of an innovation under the theme of ‘perceived innovation qualities’. Rogers’s (2003) DOI theory is based on the concept that diffusion of an innovation does not necessarily ensure its adoption. Speed of adoption will depend on five user-perceived qualities: relative advantage, compatibility, complexity, trialability, and observability (Berwick, 2003; Rogers, 2003). Each of these terms emerged as subthemes from faculty interviews, matching Roger’s definitions of innovation qualities.

Faculty described the complexity of IL, or its degree of difficulty of use or understanding, through examination of barriers to its curricular integration, as well as difficulties implementing technology into nursing education. Although none of the participants described IL competencies themselves as difficult to understand or use, faculty reported workload issues related to class sizes and grading and lack of time available to devote to development or integration of educational strategies focused on IL skills. Since most participants stated IL competencies were integrated into research, EBP, or writing-intensive courses, faculty perceived that associated class assignments required an increase in time spent on evaluation of student work and provision

of quality feedback. One participant expressed concern with maintaining IL assignments in her upcoming course when student enrollment numbers were projected to double. Faculty subjects reported the complexity of integrating IL into the nursing curricula was amplified by workload demands, lack of technology training, and use of writing-intensive activities for the teaching and evaluation of IL competency.

This research pioneered exploration of nursing faculty experiences integrating IL into the curricula; therefore, this experience of complexity may be unique to study participants.

However, faculty concerns relating to workload demands have long been an issue in higher education. In the past decade, nursing programs have been charged with the task of preparing more students to fill projected gaps in the nursing workforce. Increased student enrollment and reduced university resources have led to larger class sizes and often contributes to an environment that discourages adoption of new ideas and development of teaching scholarship (Hornsby & Osman, 2014). Large class sizes combined with a culture of ‘publish or perish’ may create an environment where educators feel pressured to focus solely on writing or research publications without consideration of teaching scholarship and course development. In turn, faculty may perceive efforts spent implementing new curricular innovations as time wasted and role-related barriers to innovation adoption too difficult to overcome. Faculty must have adequate time built into the workload formula necessary for integrating new technologies and pedagogical innovations into the classroom.

Additionally, interview subjects identified a need for further technology training to better prepare faculty with skills necessary to innovate in the classroom. Faculty reported that trainings occurred during a concentrated period of time, frequently just after a new digital tool or program was adopted, and were led by technology vendors. Technical support after implementation was



less than optimal as subjects stated they reached out individually to vendors or expert super-user colleagues. Peer support was difficult for some faculty to obtain due to time constraints and lack of a formal plan for technology mentorship. As a result, many subjects felt they were not maximizing use of educational technologies due to lack of faculty confidence and skill that could be cultivated through training.

The pivotal IOM report (2011b) had previously identified nursing faculty as a barrier to greater technology integration in education due to their lack of knowledge and skills. However, integrating technologies into the curriculum is no simple charge as faculty are frequently ill-equipped with appropriate resources to do so effectively (Connors, Skiba, Jeffries, Rizzolo & Billings, 2017). A survey of 193 nursing faculty from across the United States found that participants identified as novice to competent technology users and the majority felt that technical support was available to them for the use of distance learning tools (92%); whereas fewer respondents reported having support for the use of simulation, telehealth, and informatics (Nguyen, Zierler & Nguyen, 2011). The researchers reported that despite high reports of training and technical support for certain technologies, 69% of faculty still expressed a need for additional instruction to effectively use educational technologies in nursing. However, despite their apparent need, faculty development programs focused on the integration of technology innovations into the nursing curriculum are uncommon. Moreover, nursing literature asserts that most available training programs have not been designed to meet the needs of faculty and lack a balanced focus on content, pedagogy, and technology (CDW-G, 2011; Chen, Voorhees, & Weaver Rein, 2006). Successful technology training programs must be designed to engage faculty with practical hands-on experiences, offer flexibility for demanding teaching schedules

(Eib & Miller, 2006), and promote connectedness and collegiality between participants and mentors (Connors et al., 2017).

The last subtheme of complexity related to faculty descriptions of writing-intensive learning activities used to evaluate IL competency in nursing students. The majority of faculty described evaluating IL through writing-intensive or nursing research courses, lessons, or activities such as EBP writing assignments and poster presentations. Although faculty expressed positive attitudes about the value of IL assignments, they also voiced concern regarding burdens of time spent grading and providing adequate formative and summative feedback on students especially with growing class sizes. Results of this study regarding the complexity of teaching EBP supported previous research describing barriers such as characteristics of the organization including support, resources, and grading time (Stichler, Fields, Kim & Brown, 2011). Subjects in this study described one method of managing workload related to IL teaching assignments by using group work for writing assignments in nursing research courses or team partnerships with community nursing agencies for EBP projects. Participants shared that group or team projects were not without issue, as students reported decreased satisfaction with grading and lack of personalized feedback on their individual skills. Faculty also struggled to manage group dynamics while encouraging students' professional development and use of conflict resolution and communication skills. Similar student issues have been reported by faculty using innovative EBP teaching strategies that incorporate group work and hospital partnerships between nursing programs and hospitals (Janke et al., 2012). In light of these findings, nursing faculty are in need of varied IL teaching strategies that promote achievement of student learning outcomes, help manage grading workload, and encourage collaborative partnerships between students.

Faculty subjects described the next subtheme of observability, or the visible benefits of innovation adoption, during study interviews. All participants described observable improvements in student abilities after targeted competency lessons such as knowledge of available resources, skills in locating and retrieving research studies, and identification of credible information sources. Likewise subjects reported that recent graduates had expressed an increase in preparedness for research utilization, participation in EBP/quality improvement projects, and conduction of clinical research in their nursing practice based on their undergraduate IL learning experiences. This finding differs from perceptions of educators and researchers in three previous studies of nursing students who found either no change or decreases in student IL learning outcomes post intervention (Hossain et al., 2012; Janke et al., 2012; Verhey, 1999). Past studies exploring student experiences also reported that some participants associated feelings of annoyance, uncertainty, confusion, and anxiety with IL (Courey et al., 2006; Duncan & Holtslander, 2012; Hossain et al., 2012; Levett-Jones et al., 2009). Conflicting perceptions of faculty may be related to possible improvements in students' baseline IL and technology abilities in the years between studies as more students own computers and are familiar with their use for information searching.

All subjects in this study stated that a student's achievement of IL learning objectives was evaluated through course assignments and instructor-developed rubrics. Level of student satisfaction was also frequently mentioned as an observable evaluation of the innovative pedagogical strategy. None of the participants described use of a valid and reliable IL measurement tool such as the ILSES or IL knowledge tests. Moreover, faculty participants failed to describe observable changes in student behavior based on the ACRL's IL competency standards. Additionally, none of the participants in this study were able to describe full diffusion

of IL throughout their programs as all reported lacking a definition for the innovation and curricular thread or course specific to its competencies. Improving measurement of student learning outcomes requires faculty to have past experience in curriculum development, better knowledge of the innovation or new idea, a defined outline of the concept's integration accomplished through curriculum and course mapping, and acquaintance with and access to valid and reliable assessment tools.

Advancing the science of nursing education and the creation of evidence-based IL teaching strategies may be difficult if faculty continue to use only course-specific rubrics to evaluate learning. Reflective of past nursing literature (Carlock & Anderson, 2007; Schutt & Hightower, 2009; Smith-Strom & Norvedt, 2008), participants in this study lacked accurate and reliable measures of IL competency based on the ACRL framework to assess knowledge of student learning and skill acquisition. With such few studies of nursing students using valid and reliable measurement tools of learning, not enough is known to draw final conclusions regarding observability of student improvements post pedagogical intervention.

The third and fourth subthemes in this category, the relative advantage and compatibility of integrating IL teaching strategies into the nursing curriculum, were examined in light of faculty reports of students' negative attitudes. Faculty perceived students to have both a lack of interest in learning research-related skills and a poor understanding of how IL relates to evidence-based nursing practice and/or clinical education. Students were described as resistant to using search instruments other than Google. Reports of negative student attitudes toward IL learning experiences were replicated in past studies as students failed to recognize connections between IL, EBP, and nursing practice (Courey et al., 2006; Hossain et al., 2012; Levett-Jones et al., 2009). In fact, Aglen's (2016) systematic review of literature on pedagogical strategies to

teach undergraduates EBP found the main problem addressed by authors in over 39 articles was students' negative attitudes toward nursing research topics and lack of motivation to gather, evaluate, and use information.

A need to address the affective domain in the design of IL education exists as negative student perceptions were consistent with findings from previous studies. It may be difficult for students to connect IL to practice when research lessons are limited, short in duration, and sparsely distributed throughout the curriculum. Additionally, student perceptions may be impacted by nursing faculty who are not role-modeling aspects of IL competency such as lifelong learning through higher education, participation in nursing research, or membership in professional organizations. Attention should be given to the provision of achievable IL learning experiences in the clinical environment, such as post-conference debriefings, that may help improve students' perceptions and emotions associated with the concept. For example, allowing students to choose the topic for a paper or clinical presentation may foster a sense of control and stability over attributions, such as IL self-efficacy, that may motivate their use of IL skills to acquire, critique, and apply research studies to their personal practice. Expanding IL teaching sessions to the clinical domain would encourage students to associate IL competencies with all areas of nursing education. A stable anticipation of the need to demonstrate IL competencies in unchanging conditions may motivate students to repeat past behaviors that required the use of IL skills (Weiner, 1986).

**User segments.** The idea of understanding adoption needs of different user segments requires the identification of personality characteristics as each person adapts to change based on his or her own strengths and limitations (Rogers, 2003). Although the category of user segments appeared with less frequently than other DOI codes, participants in the study described

characteristics of faculty who were more or less likely to adopt innovations in their teaching practices. Persons more likely to adopt were described as lifelong learners in pursuit of further education, highly competent in technology and IL skills, well connected with relationships both inside and outside of the nursing department, and as having less variability in teaching assignments; while those less likely to adopt were older in age and disconnected from current practices and/or other nursing faculty. Faculty participants emphasized the importance of matching teaching assignments to individual strengths in skill and personality characteristics. Subjects perceived explained that faculty members who were more accepting of change were also better equipped and more likely to embrace IL teaching strategies.

Only one characteristic, variability in teaching assignments, was exemplified as outside of the subject's control. Study subjects experienced difficulties with accepting change and adopting new practices when teaching assignments were changed frequently. This is not surprising as preparing new courses requires experience, content knowledge, and significant preparation time.

**Innovation, Time, and Reinvention.** The last three DOI themes of innovation, time, and reinvention occurred much less frequently than the previous three categories. Subthemes in each of these major themes are interconnected to describe faculty experiences with multiple innovations including the adoption of various teaching pedagogies and technologies, integration of IL as a new nursing curriculum concept nursing curriculum, and IL as novel to their own practice. Rogers (2003) defines innovation as an idea or object that is new to the user. When discussing the implementation of new pedagogies such as AEHR systems, subjects stated a lack of training resources or funding issues inhibited full implementation or diffusion of the innovation across their nursing program. Additionally, participants described the planning

process whereby a specific faculty taskforce or committee moves, or spreads, new ideas throughout their nursing curricula. Many subjects explained that only a few number of faculty were involved in this process. Time was relevant as all subjects related innovation adoption from curriculum committee work as occurring around the timeline of CCNE reaccreditation. Most participants stated their last accreditation visits were seven to 10 years prior and so they were just beginning the process of compiling a self-study report. Faculty participants explained that self-study and progress reports for accreditation, as well as curriculum or competency standards such as *The Essentials* by AACN and QSEN competencies, provided the bulk of data for curricular analysis.

Rogers (2003) asserted that the innovation-decision process varies in length of time and consists of steps encompassing the time in which the individual first learns of the innovation until the innovation is adopted or rejected. The process described for curricular mapping, based on timing of reaccreditation visits, may be inhibiting the spread of new ideas and nursing competencies among faculty members and undergraduate programs. It is unlikely that a new innovation can take root and diffuse throughout many courses in a nursing curriculum if revisions and gap analyses are conducted by a select group of faculty and occur only once every 10 years. An opportunity exists to explore a more adaptive curricular process, one that is not rooted in accreditation visits, so that time from innovation exposure to adoption or rejection may be shortened.

Moreover, in describing preparation for accreditation visits, interview participants only mentioned use of *The Essentials* or QSEN competencies as guides to examine the application of IL innovation to their programs. However, these tools do not provide a complete picture of IL implementation as it is a relatively new concept to nursing education with origin roots from the

discipline of library sciences. For example, the most commonly mentioned curricular guide, *The Essentials* by the AACN (2008), mentions the term “information literacy” only three times - under the first essential on generalist nursing practice and twice under the fourth essential on information management and application of patient care technology. The document does not provide a definition for the term and most commonly mentions IL in conjunction with computer literacy. Moreover, the current Essentials were published 10 years ago and lack updated references. Similarly, the *Accreditation Standards for Nursing Education Programs* released by NLN’s Commission for Nursing Education Accreditation (CNEA) in 2016 also fails to include IL within its requirements. In contrast, the independent accrediting body of the NLN, ACEN (2017) provides a definition for the term IL in its glossary but does not expand on the concept within its standards. Current baccalaureate curricular guidelines need to effectively address IL including expectations for its use in a nursing curriculum.

Likewise, the QSEN competencies do not specifically use the term ‘information literacy’ in the entirety of their prelicensure guide, which they state is, “a resource to serve as a guide to curricular development for formal academic programs” (QSEN, 2018). As discussed prior, QSEN’s prelicensure competency document clusters IL-related skills under headings for EBP and informatics. Although resources such as learning modules, courses, and consultative services may be found on the organization’s website, the document itself lacks citations for nursing literature that may be used by faculty as supplemental resources. Interestingly none of the participants mentioned use of the TIGER reports or website as a curriculum guide, suggesting that little has been achieved by this specific framework to advance the state of IL in nursing education.



Finally, very few interview subjects mentioned the last category of DOI theory regarding reinvention, or the adaptation and refinement of an innovation to meet the needs of risk-adverse adopters (Rogers, 2003). This process is vital to innovation decisions such as curriculum gap analysis, especially because faculty who are in adopter-prone categories may self-select to participate. Participants who were in early adoption stages may not have considered the importance of IL reinvention as their concerns were focused on earlier DOI theory time phases - going through processes of gaining knowledge/awareness, building persuasion/interest, or further along in the evaluation/decision period. Those describing reinvention of IL teaching strategies discussed the need to improve communication of new ideas to all faculty, an opportunity to better define the concept and its use in the nursing curriculum, and a call for distinctive curricular mapping of the innovative term throughout all undergraduate nursing courses.

Given the need to better define IL in nursing education and curricula, and in light of valued relationships faculty have established with their librarians, a synergistic partnership may exist between nursing and library science faculty. Authorities in library sciences have already published an established set of IL standards that have been refined and studied for nursing faculty to explore for adoption. The ACRL (2000) competencies are an essential document for integration of IL learning outcomes into higher education and are the only structured guide for assessing an individual's IL skill (p. 5). Each standard includes specific IL skills followed by a list of associated performance indicators with learning outcomes. Remarkably the ACRL convened a taskforce in 2013 to produce an addendum modeled after the original standards with outcomes written specifically to support nursing resources, language, and value of EBP. *The Information Literacy Competency Standards for Nursing* released by the ACRL (2013) were written in collaboration with nursing experts with all of the above mentioned sources such as *The*

*Essentials*, QSEN publications, and TIGER Competencies consulted during preparation. More recently the ACRL released a *Framework for Information Literacy for Higher Education* (2016) that serves to restructure the original standards into six frames that are “clusters of interconnected core concepts, with flexible options for implementation, rather than on a set of standards or learning outcomes” (p. 2). Although controversial among library science faculty, the new ACRL framework expands the definition of IL and explores student factors that may impact IL self-efficacy.

The IL nursing standards released by the ACRL in 2013 directly address IL skills needed by students at various levels. The document was written to support faculty and librarians in the development of programs that meet accreditation criteria for baccalaureate education and has many uses for curriculum and pedagogical design. The standards are useful for curriculum mapping as they clearly breakdown the ACRL IL framework into performance indicators with associated outcome measures. For example, competency standard one includes five performance indicators that may be used by a curriculum committee to map program outcome measures and ensure the integration of essential IL skills throughout a nursing program. Faculty teaching research or EBP courses can then use the seven behavioral outcomes underneath the first performance indicator to design lessons that evaluate student achievement of the measure. IL outcomes may also be used on course syllabi and assignment rubrics to reinforce professional expectations for information searching and EBP skills among nursing students. Lastly, the IL nursing standards would be useful for ensuring the incremental build or scaffolding of teaching sessions according to student level. ACRL standards one and two may be the focus of freshman level courses, standard three for sophomore, four for junior, and five for senior classes so that IL lessons are tailored per student level and build upon one another.

## **Limitations**

Although quantitative and qualitative data analysis addressed all research questions, there were limitations to the mixed method study. Limitations of the study primarily related to its sample and confines of multiple regression analysis. First, convenience sampling methods, low completion rates from two participating nursing programs, and homogeneity of the study population may limit the generalizability of the study results. A type of non-probability sampling plan was used to first identify participating programs meeting inclusion criteria. Quota sampling was used secondary to convenience sampling to divide the population into regional subgroups and improve representation of population characteristics specific to geographic regions. However, no program sites were successfully recruited to participate from the midwestern geographic region. Despite a lack of representation from a midwestern nursing program, great diversity in university type, Carnegie classification, class size, and clinical hour requirements was achieved among the eight programs that comprised the study setting. Therefore, lack of a midwestern program site may have had a limited impact on the overall study.

A total of 300 survey responses were received for a moderately high response rate of 50.6%. Of note, two out of the eight participating sites had significantly lower response and completion rates when compared to other sites in the sample. Students affiliated with two participating universities comprised only 7% of the study population; which when combined together, is smaller than the next size sites each representing 8% of the sample. Because the study design and IRB protocol did not allow the researcher to have direct contact with students, faculty buy-in and active participation in data collection was crucial to student recruitment. Faculty at both affiliate research sites did not allow class time for student completion of the

survey, despite the average completion time of the survey was 5 to 8 minutes. Data analysis from these sites may only reflect students who have high IL self-efficacy levels and survey responses. Students who did not complete the ILSES could have changed the study results. Missing data from these students may have revealed new relationships between IL self-efficacy, student factors, and educational strategies. Although the researcher met regional requirements of the quota sampling plan, no sites were recruited from the midwestern region and only one was recruited from the west.

Homogeneous characteristics of the student population may also limit generalizability of study results. The study sample overall lacked diversity in student demographic factors of gender, race/ethnicity, and primary language despite obtaining a sample from various geographic regions in the United States. This may have hindered the ability of the multiple regression model to detect variance in the relationships between these student factors and IL self-efficacy. Only the demographic factor of age, which demonstrated more variance than those listed above, was determined to have a statistically significant relationship to ILSES scores. The analysis for differences in total ILSES results between males and females yielded insignificant findings which may have been due to insufficient power related to the small sample of males ( $n = 10$ , 3.8%). A larger study sample may have helped increase the robustness of the dataset by allowing the researcher to assess differences in IL self-efficacy between genders.

Similarly, the small sample of students whose primary language was not English ( $n = 6$ , 2.3%) may not have been large enough to detect a relationship between language and IL self-efficacy. This factor, previously unexplored in nursing students relating to IL, may be significant when studying a more diverse sample, especially as concerns of ESL baccalaureate nursing students have been well documented in nursing literature when exploring other

pedagogical practices (Choi, 2005). For example, a recent correlational study conducted in Texas found reading comprehension scores to be low among ESL students and a higher associated risk of attrition without a specific interventional reading program (Donnell, 2005). Moreover, research on ESL students from the discipline of library science indicates that second-language students suffer library anxiety more than native learners (Johnston, Partridge & Hughes, 2014) as they experience significant issues with identifying and locating sources of information (Lombard, 2016). In light of these research findings, primary language may be a vital factor to explore relating to IL, especially as faculty have reported frequent use of writing assignments to assess competency.

A final limitation relating to the sample was that the study only allowed for the determination of IL skills in baccalaureate nursing students at one point in time as only senior-level prelicensure nursing students were invited to participate. Because of this requirement, the study results do not reflect IL self-efficacy levels of freshmen, sophomore, or junior nursing students. This may also have impacted the higher mean ILSES scores. Future research with other levels of students should be completed to compare mean scores according to class standing.

The second main limitation of the study relates to student factors and educational strategy data collected via the Qualtrics survey and faculty IL curriculum survey. Although the regression model found a statistically significant negative relationship between preference for use of Google as an online source for research and ILSES self-efficacy, the survey item language limited ability of the researcher to distinguish between preference for Google or Google Scholar. This is an important distinction to create another item choice in future studies of IL as educational strategies can be tailored to either information source depending on frequency of student use and impact on IL skill development.

Additionally, the researcher encountered issues with the IL curriculum tool. Although all participating faculty were required to submit the IL Curriculum Survey, the researcher encountered issues with its completion beyond the basic questions. Participants reported issues with colleagues who were unwilling to share details regarding courses or lessons they were assigned to teach including learning objectives, outlines of content presented, major course assignments, and/or preceptor selection. The tool was structured to first to ask if an educational strategy was used in the program through dichotomous (yes/no) questions then followed by open-ended queries regarding program development, design, and learning objectives related to the pedagogy. This structure limited abilities of the regression to detect relationships between educational strategies employed by participating nursing programs and IL self-efficacy of students as minimal variations occurred between programs. For example, two categorical educational strategy predictors representing “library course/lessons” and “EBP project” were not included in the multiple regression analysis as all programs indicated “yes” for their presence, causing no variations in responses to occur for examination of a relationship to ILSES. This may have resulted in failure of the stepwise regression to detect a significant relationship between any of the six educational strategies and IL self-efficacy of prelicensure senior students.

Lastly, the ILSES tool may not reflect current language relating to IL skills and modern library resources. For example, the ILSES tool refers to use of information searching resources such as a library catalog that were essential at its time of development in 2006. ILSES items with the lowest mean scores were examined and found to use outdated language such as “different types of libraries” and “library catalog” that may not have resonated with today’s undergraduate senior students. Students may have rated these items as low in terms of

competence and self-confidence because they were unfamiliar with their use in a more modern library environment.

### **Implications**

The purpose of this mixed methods study was to identify factors that influence IL self-efficacy of senior-level prelicensure baccalaureate nursing students and to describe the implementation of educational strategies utilized in the development of IL competency. This large multisite study also pioneered the application of DOI theory to explore faculty experiences related to IL in nursing education. The ILSES was used in this study to measure IL self-efficacy of prelicensure senior nursing students. This tool was chosen as it was the only survey whose structure and content were based on the ACRL competence standards and incorporated the established definition of IL. Implications of the study results center on the application of the study findings to nursing students, faculty and administrators, and policy.

### **Implications for Nursing Students**

Overall student participants in this study reported high levels of IL self-efficacy indicating feelings of confidence and competence in areas of skill assessed by the ILSES. This study supplied initial findings related to demographic student factors that may influence IL skills in nursing students. Personal characteristics of students including age, preference for online searching using Google, and frequent use of textbooks and/or professional journals to find answers to a nursing question were found to have significant relationships to IL self-efficacy. Results of this study suggest less efficacious students may be younger in age and have a preference for Google searching; whereas students who frequently used textbooks or professional journals had higher levels of IL self-efficacy. The majority of prelicensure nursing students are young in age and so building their awareness of appropriate information sources is

imperative. Students should be aware of findings from this research study so that adaptations can be made to study and information searching behaviors. For example, prelicensure nursing students who prefer Google may find that subscribing to an electronic journal or using digital textbooks for classroom research projects provides many of the same tools and familiar features of Internet searching. Adapting and expanding their use of electronic information sources beyond Google may help develop a stronger sense of achievement related to IL competency.

Similarly students in the study reported a preference for electronic searching with the majority choosing library websites as their most preferred source of online information. However, the lowest-ranking survey items on the ILSES all related to use of university library resources. These findings indicate that nursing students preference for online web-based searching systems may be negatively impacting their use of more traditional brick-and-mortar library resources and in turn impacting their perceptions of IL skill development. Students must increase awareness of all available library resources and searching tools at their disposal in the university setting. Simple undertakings such as saving hyperlinks to digital library resources on their computer desktop or adding the webpage to their browser “favorites” would help to remind students of their availability for use in everyday life.

Study outcomes related to IL self-efficacy and library skill were also noteworthy given all nursing programs included at least one educational session on use of library searching and the majority of students reported they had been taught to use library resources in a college level course. However, not all undergraduates learn best in groups or can achieve competence in only one lesson or course and so students should be aware of opportunities for tutoring. Seeking individual tutoring sessions with library faculty or staff may help students to learn database skills, such as how to limit search results, that can be applied to nursing assignments. Students



may be more likely to share concerns related to information searching and seek help to find solutions for common gaps in knowledge such as database options that limit search results. For example, a one-on-one session may provide the opportunity for a student to learn how to set and save basic database search preferences such as publication type, year, language, and discipline so that fewer information sources are retrieved for analysis. Additionally if students learn digital library database tools that decrease the burden of research, such as exporting APA citations to an automated reference list, they may see improvements in IL skill, attitude, and competency development.

Lastly, locating and sharing library tutorials such as posting helpful videos demonstrating library searching methods to an online classroom discussion board would build awareness of IL skills among student peer groups. This study also revealed that prelicensure students are in need of tools for handling group assignments and so sharing IL skills and resources in a social setting may also help in the development of professional behaviors that foster positive dynamics in teams.

### **Implications for Nursing Faculty and Administrators**

There are many recommendations from this study for nursing faculty, administrators, and researchers in the areas of teaching, scholarship, and service. First, qualitative faculty interviews revealed a significant gap in knowledge regarding the term information literacy. All subjects asked for a definition of the concept prior to conduction of the interview demonstrating a lack of exposure to IL. Likewise, none of the faculty participants mentioned use of the ACRL's IL competencies or associated performance indicators.

Qualitative and quantitative findings converge in this mixed method study to present a full picture of teaching and learning IL skills in today's nursing classrooms. The lack of faculty

awareness for IL terminology and competencies may be negatively impacting student opportunities to learn essential skills or develop a positive attitude toward information searching. Faculty subjects' unfamiliarity with IL may hamper students' abilities to recognize when targeted lessons occur and opportunities to associate learned knowledge, skills, and attitudes with IL competency. Both qualitative and quantitative study findings expose IL as a weak competency area for nursing education especially as only two of the eight faculty reported having an informatics course in their nursing curriculum where these skills are often targeted. Additionally, formal measurements of student outcomes using existing IL competency or self-efficacy surveys by nursing programs across the United States are scarce.

These discoveries demonstrate a necessity for nursing educators to use the ACRL competencies to structure learning experiences and the ILSES survey to collect and examine baseline student learning outcomes data for the future creation of evidence-based IL pedagogies. Forward movement of IL and EBP education requires more consistent use of tools, such as the ILSES, that build upon established competency standards.

The ILSES could be used in the collection and analysis of individual student outcomes; whereas ACRL nursing-specific performance indicators could be applied to IL course assignments, rubrics, and clinical assessment tools for the evaluation of student learning over time. Creating faculty awareness regarding IL self-efficacy limitations related to demographic factors of prelicensure students would also encourage the use of screening measures for identifying individuals at risk. First, educators may administer a survey with demographic questions and the ILSES tool to each cohort of learners regularly throughout the program. The presence of specific student characteristics, such as young age, preference for online searching using Google, and infrequent use of textbooks and/or professional journals to find answers to a

nursing question, would alert faculty that certain students may struggle to develop a positive self-image related to IL abilities. Faculty could then tailor IL teaching strategies based on student data and identified gaps in knowledge and areas of improvement. If risk factors were identified, such as presence of the above four student factors or areas of low IL self-efficacy on the ILSES, faculty could address the trend by arranging for additional lessons and assistance be provided by a research librarian for students in need. IL competency tests not used in this study also present options for IL learning measurement that could be implemented at the beginning and end of a term or program to observe student progression.

Faculty collaborations with academic librarians must be expanded upon overall to create and sustain comprehensive diffusion of IL throughout all nursing courses. Strengthening the presence of the librarian in the nursing curriculum and classroom appears paramount to improving IL pedagogies in baccalaureate programs. Qualitative subjects with a designated onsite health-science librarian described benefits of close proximity and physical presence to IL skills of students and faculty. Simple measures may be taken to improve librarian visibility and access such as inviting faculty to present information searching lessons during nursing classes, embedding contact information into online courses for support, and requesting that librarian faculty keep regular office hours in the nursing building with time open to students.

Nursing faculty can also collaborate with librarians to create targeted IL lessons. For example, participants in this study rated ILSES items low in terms of confidence and competence using print resources in library buildings including the library catalogue. Nurse educators can work collaboratively with librarians to create library tutorials, in both written and video format, that demonstrate basic database skills that have been previously problematic for undergraduates. Instructional resources could be broken into mini skill lessons, such as demonstrating how to

navigate the library website or use of Boolean search terms to narrow publication results, and embedded into online learning environments or learning management systems. Faculty should also consider creating or finding resources on proper use of Google and similar Google Scholar tools that students may review individually. Demonstrating use of Google Scholar with students to answer a question asked in class may be a way for faculty to open dialogue about proper use of online search tools to locate credible sources of information. Minimally, nurse educators can provide students with links to appropriate search engines or publications within a digital course. Lastly if non-digital information resources exist within a university library setting, nursing faculty should create learning opportunities for students in these surroundings as students reported lowest levels of skill and preference for using such sites. Nursing faculty could arrange for a tour by librarian staff and collaborate to design a simple and practical hands-on learning activity whereby students are required to find and locate an appropriate journal publication based on a clinical question. Both disciplines could engage and support student learning in this setting so that students experienced achievement of fundamental IL skills.

Participants in this study described limited pedagogical interventions for IL instruction with a focus on use of library lessons, writing assignments, and EBP project group work with peers and community partners. However, faculty expressed concerns with the utilization of both writing assignments and EBP group work relating to time and grading burdens, issues managing student group dynamics, and reports of increased student stress when working alongside clinical practitioners. A number of suggestions to overcome these issues and further develop IL specific teaching strategies can be garnered based on findings of this study. A simple measure such as allowing students to use a topic of their choice for a research assignment may produce an improvement in attitudes toward learning experiences as motivation may be peaked in the

application of IL skills to topics of interest. Active learning strategies that foster engagement and inquiry are crucial to use when learning EBP topics (Burns & Foley, 2005).

Past nursing publications assert that IL should mainly be taught by following the stages of EBP: (a) formulate searchable clinical questions; (b) perform systematic searches in bibliographic databases or other relevant tools and separate the relevant from the irrelevant sources; (c) critically assess the research and summarize key results; (d) transfer findings into nursing practice; and (e) evaluate the outcomes (Aglen, 2016; Ciliska, 2005). Faculty can use this model to arrange the curriculum according to EBP stages with IL interventions focused on how to elaborate evidence from research findings for implementation into nursing practice. An opportunity exists for faculty serving on nursing curriculum committees to evaluate whether their program integrates IL concepts based on the ACRL competency standards. Faculty can then develop and design targeted IL lessons based on the findings of their gap assessment. Lessons should then be threaded or scaffolded across courses in the full curriculum to ensure students' repeated exposure to IL competencies. Curriculum mapping at the course level will also help ensure learning experiences are designed appropriate to students' developmental needs.

Early nursing courses could include lessons on how to retrieve research studies from relevant bibliographic databases and how to evaluate, understand, and summarize relevant findings. For example, authors have described success by requiring beginning students to retrieve and summarize a limited number of journal articles based on a clinical topic of interest using established research guidelines (Burns & Foley, 2005). Once students have achieved early IL skills faculty can focus on deepening students understanding of the second and third stages of EBP. Pedagogical interventions have been described by educators for these advanced stages where students learn how to judge the strength of the evidence (Killeen & Barnfather, 2005),

discriminate between single studies and reviews (Meeker, Jones, & Flanagan, 2008), and learn to evaluate and develop clinical guidelines (Dawley, Bloch, Suplee, McKeever, & Scherzer, 2011). Structuring IL educational strategies according to continuity and progress of EBP may also encourage nursing faculty to adopt IL competencies, as they are likely more familiar with EBP stages and its curricular integration.

As found in other research, faculty participants in this study described nursing students as having negative attitudes toward IL learning experiences and a general misunderstanding of how IL relates to evidence-based nursing practice. Despite identifying a gap in student abilities to connect IL and EBP to nursing practice, very few faculty participants in this study described educational interventions for clinical teaching. Participants mainly reported adoption of IL pedagogies in undergraduate nursing research and informatics classes through either a single lesson or activity that was short in duration. Faculty must recognize the importance of providing more frequent IL learning occasions for students and ensure they have multiple opportunities to practice IL skills in a variety of settings including clinically oriented environments. Nursing publications have described such activities including the use of journal clubs as a learning activity facilitating students' IL skills comparing clinical experiences to research findings (Goodfellow, 2004; Steenbeek et al., 2009) and application of EBP during post-conference to discuss identified gaps between research and practice (Schams & Kuennen, 2012). Clinical post-conference provides an excellent opportunity for students to present their case on closing an identified practice gap after they have performed a literature search and constructed an argument based on research findings (Schams & Kuennen, 2012). An opportunity exists to incorporate IL teaching strategies into simulation experiences as well. Simulation assignments may be modified to include prework related to IL competencies where students are required to use

nursing literature to address pertinent patient care questions such as providing rationales for changes in pharmacy or practice protocols.

Recommendations can also be made based on findings of this study relating to faculty scholarship and service. The application of DOI theory to the analysis of educator's IL experiences revealed a phenomenon whereby nursing faculty ascribed the adoption-decision process of innovation diffusion to curriculum committee service preparations for accreditation visits. This research supports the need for nurse educators to evaluate curricular revision procedures in support of processes more capable of adapting to change. The timing of curricular revisions around reaccreditation visits may severely limit adaptability of programs whose nursing faculty are less engaged in analysis of self-study reports. Consequently, existing processes used to examine curricular gaps create significant lapses in time for both the nursing curriculum and faculty knowledge to become outdated. Nurse educators must explore more fluid and consistent methods of examining their curricula, as well as tools such as the ACRL competency standards that will help all faculty to further their understanding of IL. Specific to IL in nursing education, curriculum revisions should incorporate essential ACRL competencies so that faculty can clearly define the concept, associated learning objectives, and performance indicators to ensure the diffusion of IL throughout all undergraduate courses.

The most prominent theme relating to DOI theory that emerged from faculty interviews related to communication channels and social systems. Subjects described the importance of connectedness to peer groups, service in professional organizations, and continued scholarship through lifelong learning that is required to develop personal knowledge and skill in IL and EBP. Faculty may overcome barriers to implementing IL pedagogies, such as the identified need for increased technology training, by deepening their connections to social systems. For example,

Connors et al. (2017) recently published about the Health Information Technology Scholars (HITS) program that was developed to address faculty development issues related to technology. The purpose of the HITS project was to develop, implement, evaluate, disseminate, and sustain a faculty development collaborative to integrate information and other technologies into nursing curricula (Connors et al., 2017). During the five-year program, 265 technology leaders across 132 nursing programs were developed and mentored by experts from multiple universities and the NLN. Professional development and scholarship opportunities, such as the HITS collaborative, are available to assist faculty through the implementation of new pedagogies in nursing education; however, faculty must be connected to peer groups to maintain awareness of training resources. Engaging in faculty scholarship and lifelong learning also constitute vital components of teaching IL and EBP to prelicensure nursing students, as they need to see these activities role-modeled by registered nurses.

Many of the faculty issues addressed in this study require a commitment by nursing program administrators to devote resources toward professional development that will help educators build upon basic IL skills required of the discipline. Barriers to IL implementation expressed in this study included lack of funding, time constraints, large class sizes, issues with frequent turnover in teaching assignments, and a limited number of qualified or interested faculty capable of teaching IL-related content. Subjects also identified the presence of laggards among their nursing faculty who were less likely to adopt a new idea due to user characteristics such as advanced age, lack of furthered education, and deficiencies in their own IL or technology skills. These concerns all present opportunities for administrators to improve hiring practices of nursing faculty and to better establish support and training for identified gaps in faculty knowledge.



Administrators should explore the formation of teaching support groups, funding for faculty membership in professional organizations or conference attendance, organize recurrent technology training updates, and seek further recognition on university evaluations for excellence in teaching scholarship to further opportunities for faculty development of IL. Nursing leaders may also seek creative ways to relieve faculty workload pressures such as large class sizes and increased time spent grading by onboarding teaching assistants, securing graduate students for writing-intensive courses, or maintaining small class sizes in writing or research focused courses. Finally, administrators must carefully examine innovation barriers that are more easily controlled and do not require intensive resource allocation, such as the process of constructing faculty teaching assignments. Many subjects in this study expressed concern over the negative impact of frequently changing class assignments on teaching innovation. Opportunities may exist for nursing program leaders to adopt shared governance strategies proven effective in clinical nursing where faculty are included in development of assignments and turnover of teaching duties is reduced.

### **Implications for Nursing Policy**

Based on the limited number of nursing education studies published on the topic of IL, it can be stated that baccalaureate programs are either unaware of IL competencies similar to participants in this study or that they are not viewed as a priority. However, given that IL is required for EBP in practice, integration of IL throughout the nursing curriculum is paramount. Although organizations that set curriculum standards for baccalaureate nursing education such as the AACN have included some mention of IL in their requirements, little directive has been given in these documents as to the meaning of the term or resources available to nursing programs for its curricular integration. Similarly QSEN has also published curricular

competencies for faculty resources that identify IL-related skills under EBP and informatics requirements but do not provide references for the ACRL framework.

Gaps in baccalaureate education and nursing competency standards demonstrate the need for policy changes toward interprofessional collaboration. *The Essentials* document, now 10 years old, requires updating to current and emerging practices in nursing education and to drive excellence in academic nursing, as is the mission of the AACN. Leaders of these professional organizations have the opportunity to demonstrate how to breakdown nursing silos through the revision of standards and competencies that incorporate findings from other disciplines in higher education. For example, the well-established and widely studied ACRL IL competencies should be cited and referenced in both *The Essentials* and QSEN competency future updates so that nurse educators are aware of extensive resources, learning measurement tools, and new behavioral IL measures released by the ACRL for nursing. Nursing organizational leaders must also work collaboratively with members from the ALA to partner on research studies related to IL and EBP pedagogies of prelicensure nursing students. Lastly, the process of accreditation in nursing education should be examined carefully relating to frequency of self-study reports and reaccreditation. Many of the participating nursing faculty in this study described examining their curricula for updates only during times of accreditation application and compiling of self-study documents at their 10-year reaccreditation mark. This process creates concern regarding the abilities of nursing education to innovate. If nursing faculty only evaluate new ideas or concepts every 8-10 years for applicability to their program, based on Roger's DOI theory the acceptance and diffusion of those pedagogies will be even more delayed. An opportunity exists for accrediting bodies to reexamine timeframes and interim reports required by their organizations.

## **Recommendations for Future Research**

Given this study's findings and limitations, additional research is needed to further explore both student factors and educational strategies that influence IL competency and self-efficacy of prelicensure baccalaureate nursing students. Prior to this research, only two studies had been conducted using the ILSES with prelicensure nursing students including an unpublished dissertation and a publication providing only descriptive findings. Other published studies failed to identify other standardized tools for collecting data on IL knowledge of nursing students, as well as no universal benchmarks to determine IL competency based on test scores could be identified. This study demonstrated excellent reliability of the ILSES using a large sample of prelicensure senior baccalaureate nursing students ( $N = 260$ ,  $\alpha = .95$ ). Consistently high Cronbach's Alpha values greater than .93 establish the 28-item ILSES tool as a preferable measure of IL self-efficacy. Student participants in the study took less than 10 minutes to complete the full survey, making its administration a feasible option for measuring IL self-efficacy levels in a nursing program. Due to the limited use of ILSES with nursing students, researchers need to conduct a similar examination to ensure findings of this study are replicable with larger samples of participants. In addition, further exploration is needed to compare different levels of students and types of nursing programs, including those with RN/BSN and accelerated students, to explore the impact of class standing and program type on IL competency development. Further research could help determine if significant differences occur in ILSES scores between populations of RN-BSN, accelerated, or distance program nursing students.

This study revealed statistically significant relationships between four student factors and ILSES scores including age, textbook and journal use, and employment of Google for online searches. However, questions still remain regarding other factors unexplored in this study, such

as student work experiences and economic stressors, computer knowledge, and use of Google Scholar or other online searching tools, that may also effect IL skill development. Demographic items on the student IL survey could be adjusted for future exploratory quantitative studies that explore the relationship of student factors listed above. Additionally, forthcoming qualitative studies may also assess students' experience with use of Google and Google Scholar due to the popularity and preference for online searching among prelicensure nursing students. This research may help to better understand student motivation and searching behaviors related to Google tools that would help educators to better tailor IL and library teaching sessions to meet needs of learners. In addition, studies with more diverse student samples are needed to better explore the relationship of demographics such as gender, ethnicity, and language relating to IL competencies. Nurse researchers may choose differing sampling methods to ensure greater diversity in the study population.

None of the six educational strategies explored in this study were found to significantly influence IL self-efficacy. This study's use of presence or absence of educational variables in the multiple regression analysis to address the second research question may have inhibited the detection of relationships between pedagogy and IL self-efficacy. Additional research should also assess the influence of educational variables on IL skill development such as those examined on the IL Curriculum Survey in this study. For example, future analysis may explore more detailed facets of educational strategies, such as the impact of semester timing of library lessons, number of clinical hours required for capstone courses, or influence of service-learning research projects compared to traditional student papers. Researchers may also conduct higher-level randomized controlled trials to explore differences in IL self-efficacy levels between groups of prelicensure students who receive specific pedagogical interventions. For instance,

researchers may compare student achievement of specific ACRL IL competencies after a virtual library teaching session and compare outcomes to two groups of students, one who receive no intervention and another who experience the lesson in person. Findings would help to shape pedagogical interventions for distance learners and also for students in programs that are embracing technological interventions, such as the program site in this study with only virtual library resources.

Lastly, an important opportunity exists to investigate collaborative relationships between library science and nursing faculty in the development of targeted IL pedagogies. Library science faculty are a vital resource for understanding IL competency development of prelicensure nursing students and educators can glean a wealth of information from years of library literature on undergraduate students. Faculty participants in this study stressed the importance of developing synergistic relationships with library faculty and some subjects even described partnerships that extended to collaborative teaching sessions. Further information is needed on developing effective teaching partnerships, as well as exploration of the perceptions of library science faculty regarding learning needs of prelicensure nursing students and experiences with applicable pedagogies. Qualitative interviews and case study methodology may be helpful to target successful partnerships between the disciplines and better describe experiences from both faculty perspectives.

### **Conclusions**

This mixed method study fills a gap identified from nursing literature as it examines IL self-efficacy of baccalaureate nursing students using the validated ILSES while also exploring educator's IL teaching experiences. Quantitative findings of this study provide nurse educators with foundational knowledge regarding students' ILSES levels, preferences for searching, areas

of perceived deficit in research skills, and the relationships between student factors, educational strategies, and IL self-efficacy. Additionally DOI theory affords a framework for exploring and identifying faculty and university characteristics that may influence the adoption or rejection of new ideas among nursing programs. The implications of this study may be used to aid in the development and implementation of curriculum and evidence-based teaching methods that build a foundation for improved IL skills and self-efficacy perceptions of prelicensure students. Findings from this study support the need for future research to investigate additional internal and external factors that may further explain interrelationships between self-efficacy, skill, and IL competency thereby improving nursing programs and student preparation for practice.

## References

- Accreditation Commission for Education in Nursing. (2017). *Accreditation manual: Section 1 - general information*. Retrieved from <http://www.acenursing.org/resources-acen-accreditation-manual/>
- Adetoro, N., Simisaye, O. O., & Oyefuga, A. B. (2010). Relationship between perceived self-efficacy and information literacy among library and information science undergraduates in a Nigerian university of education. *Journal of Education and Training Studies*, 5(2), 172–191.
- Aglen, B. (2016). Pedagogical strategies to teach bachelor students evidence-based practice: A systematic review. *Nurse Education Today*, 36, 255-263. doi:10.1016/j.nedt.2015.08.025
- Akkoyunlu, B., & Yılmaz, A. (2011). Prospective teachers' digital empowerment and their information literacy self-efficacy. *Eurasian Journal of Educational Research*, 44, 33–50.
- Allen, R. (2016, August 11). What happens online in 60 seconds? [Web log post]. Retrieved from <http://www.smartinsights.com/internet-marketing-statistics/happens-online-60-seconds/>
- American Association of Colleges of Nursing. (2008). *The essentials of baccalaureate education for professional nursing practice*. Retrieved from <http://www.aacnnursing.org/Education-Resources/AACN-Essentials>
- American Library Association. (1989). *Presidential committee on information literacy: Final report*. [Document ID: 126315]. Retrieved from <http://www.ala.org/ala/acrl/acrlpubs/whitepapers/presidential.cfm>

- American Library Association. (1998, March). *A progress report on information literacy: An update on the American Library Association Presidential Committee on Information Literacy: Final report*. Chicago, IL: American Library Association. [Online]. Retrieved from <http://www.ala.org/acrl/publications/whitepapers/progressreport>
- Argüelles, C. (2012). Program-integrated information literacy (PIIL) in a hospital's nursing department: A practical model. *Journal of Hospital Librarianship*, 12(2), 97-111. doi:10.1080/15323269.2012.665717
- Association of College and Research Libraries. (2000). *Information literacy competency standards for higher education*. Chicago, IL: American Library Association. Retrieved from <http://www.ala.org/ala/mgrps/divs/acrl/standards/standards.pdf>
- Association of College and Research Libraries. (2013). *The information literacy competency standards for nursing*. Chicago, IL: American Library Association. Retrieved from <http://www.ala.org/acrl/standards/nursing>
- Association of College and Research Libraries. (2016). *Framework for information literacy for higher education*. Chicago, IL: American Library Association. Retrieved from <http://www.ala.org/acrl/standards/ilframework>
- Australian and New Zealand Institute for Information Literacy. (2004). *Australian and New Zealand information literacy framework: Principles, standards, and practices* (2<sup>nd</sup> ed.). Adelaide, Australia: Anzil University of South Australia Library.
- Ball, M. J., & Hannah, K. J. (Eds.). (2011). *Nursing informatics: Where technology and caring meet* (4<sup>th</sup> ed.). New York, NY: Springer-Verlag London.
- Bandalos, D. L., Finney, S. J., & Geske, J. A. (2003). A model of statistics performance based on achievement goal theory. *Journal of Educational Psychology*, 95, 604-616.



- Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of Social and Clinical Psychology, 4*(3), 359–373.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: W. H. Freeman.
- Barnard, A., Nash, R., & O'Brien, M. (2005). Information literacy: Developing lifelong skills through nursing education. *Journal of Nursing Education, 44*(11), 505-510.
- Bashshur, R. L., Shannon, G. W., Krupinski, E. A., Grigsby, J., Kvedar, J. C., Weinstein, R. S., ... Tracy, J. (2009). National telemedicine initiatives: Essential to healthcare reform. *Telemedicine and e-Health, 15*, 600-610.
- Beck, S., Blake-Campbell, B., & McKay, D. (2012). Partnership for the advancement of information literacy in a nursing program. *Community & Junior College Libraries, 18*(1), 3-11.
- Bergman, M. M. (Ed.). (2008). *Advances in mixed methods research: Theories and applications*. Los Angeles, CA: Sage.
- Berwick, D. (2003). Disseminating innovations in health care. *The Journal of the American Medical Association, 289*(15), 1969-1975.
- Biddix, J. P., Chung, C. J., & Park, H. W. (2011). Convenience or credibility? A study of college student online research behaviors. *Internet and Higher Education, 14*(3), 175–182.  
doi:10.1016/j.iheduc.2011.01.003
- Bond, C. S. (2004). Surfing or drowning? Student nurses' Internet skills. *Nurse Education Today, 24*(1), 169-173. doi:10.1016/j.nedt.2003.10.013
- Brettle, A., & Raynor, M. (2013). Developing information literacy skills in pre-registration nurses: An experimental study of teaching methods. *Nurse Education Today, 33*(2), 103-109. doi:10.1016/j.nedt.2011.12.003

- Brettle, A., Hulme, C., & Ormandy, P. (2007). Effectiveness of information skills training and mediated searching: Qualitative results from the EMPIRIC project. *Health Information and Libraries Journal*, 24, 24-33. doi:10.1111/j.1471-1842.2007.00702.x
- Bryman, A. (2012). *Social research methods* (4<sup>th</sup> ed.). Oxford, UK: Oxford University Press.
- Burns, H.K., & Foley, S.M. (2005). Building a foundation for an evidence-based approach to practice: Teaching basic concepts to undergraduate freshman students. *The Journal of Professional Nursing*, 21(6), 351–357.
- Bussert, L. (2011). Millennial students' online search strategies are associated with their mental models of search. *Evidence Based Library & Information Practice*, 6(3), 77–81.  
doi:10.1016/j.acalib.2010.10.003
- Carlock, D., & Anderson, J. (2007). Teaching and assessing database searching skills of student nurses. *Nurse Educator*, 32(6), 251-255. doi:10.1097/01.NNE.0000299477.57185.ba
- Caruso, J., & Kvavik, R. (2005). Students and information technology, 2005: Convenience, connection, control and learning. *EDUCASE Center for Applied Research*. Retrieved from <https://net.educause.edu/ir/library/pdf/ERS0506/ekf0506.pdf>
- Casey, D., & Murphy, K. (2009). Issues in using methodological triangulation in research. *Nurse Researcher*, 16(4), 40-55.
- CDW-G. (2011, July 26). 2011 CDW-G 21st-century campus report. Retrieved from [www.cdwnewsroom.com/2011-cdw-g-21st-century-campus-report/](http://www.cdwnewsroom.com/2011-cdw-g-21st-century-campus-report/)
- Chemers, M. M., Hu, L., & Garcia, B. F. (2001). Academic self-efficacy and first-year college student performance and adjustment. *Journal of Educational Psychology*, 93, 55-64.

- Chen, B., Voorhees, D., & Weaver Rein, D. (2006, April 17–18). *Improving professional development for teaching online*. Presented at Edutainment 2006: International Conference on E-learning and Games, Zhejiang University, Hangzhou, China.
- Choi, L. (2005). Literature review: Issues surrounding education of English-as-a-second-language (ESL) nursing students. *Journal of Transcultural Nursing*, 16(3), 263-268. doi: 10.1177/1043659605274966
- Ciliska, D. (2005). Educating for evidence-based practice. *The Journal of Professional Nursing*, 21(6), 345–350. <http://dx.doi.org/10.1016/j.profnurs.2005.10.008>.
- Cohen, J. (1992). Statistical power analysis. *Current Directions in Psychological Science*, 1, 98-101.
- Cole, L., & Kelsey, A. (2004). Computer and information literacy in post-qualifying education. *Nurse Education in Practice*, 4, 190–199. doi:10.1016/S1471-5953(03)00065-9
- Connaway, L. S., Dickey, T. J., & Radford, M. L. (2011). If it is too inconvenient I'm not going after it: Convenience as a critical factor in information-seeking behaviors. *Library and Information Science Research*, 33(3), 179-190. doi:10.1016/j.lisr.2010.12.002
- Connors, H. B., Skiba, D. J., Jeffries, P. R., Rizzolo, M. A., & Billings, D. M. (2017). Health information technology scholars program: From implementation to outcomes. *Nursing Education Perspectives*, 38(1), 3-8.
- Courey, T., Benson-Soros, J., Deemer, K., & Zeller, R. (2006). The missing link: Information literacy and evidence-based practice as a new challenge for nurse educators. *Nursing Education Perspectives*, 27(6), 320-323.
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches*. Los Angeles, CA: Sage.

- Currie, L., Devlin, F., Emde, J., & Graves, K. (2010). Undergraduate search strategies and evaluation criteria: Searching for credible sources. *New Library World*, 111(3/4), 113-124. doi:10.1108/03074801011027628
- Dawley, K., Bloch, J. R., Suplee, P. D., McKeever, A., & Scherzer, G. (2011). Using a pedagogical approach to integrate evidence-based teaching in an undergraduate women's health course. *Worldviews Evidence Based Nursing*, 8(2), 116–123.  
<http://dx.doi.org/10.1111/j.1741-6787.2010.00210.x>.
- Dee, C., & Stanley, E. (2005). Information-seeking behavior of nursing students and clinical nurses: Implications for health sciences librarians. *Journal of the Medical Library Association*, 93(2), 213-222.
- Demiralay, R., & Karadeniz, Ş. (2010). The effect of use of information and communication technologies on elementary student teachers' perceived information literacy self-efficacy. *Educational Sciences: Theory & Practice*, 10(2), 841–851.
- Diefenbeck, C., Herrman, J., Wade, G., Hayes, E., Voelmeck, W., Cowperthwait, A., & Norris, S. (2015). Preparedness for clinical: Evaluation of the core elements of the clinical immersion curriculum model. *Journal of Professional Nursing*, 31(2), 124-132.  
doi:10.1016/j.profnurs.2014.08.004
- Dixon, B. E., & Newlon, C. M. (2010). How do future nursing educators perceive informatics? Advancing the nursing informatics agenda through dialogue. *Journal of Professional Nursing*, 26(2), 82-89.
- Donnell, W. M. (2015). A correlational study of a reading comprehension program and attrition rates of ESL nursing students in Texas. *Nursing Education Perspectives*, 36(1): 16-21.  
doi:10.5480/13-1212

- Downe-Wamboldt, B. (1992). Content analysis: Method, applications, and issues. *Health Care for Women International*, 13, 313-321.
- Doyle, G. J., Garrett, B., & Currie, L. M. (2014). Integrating mobile devices into nursing curricula: Opportunities for implementation using Rogers' Diffusion of Innovation model. *Nurse Education Today*, 34(5), 775-782. doi:10.1016/j.nedt.2013.10.021
- Dulong, D., & Ball, M. (2008, February). *Technology informatics guiding educational reform: Nine TIGER collaboratives*. Paper presented at the HIMSS 2008 Annual Conference & Exhibition, Orlando, FL.
- Duncan, V., & Holtslander, L. (2012). Utilizing grounded theory to explore the information-seeking behavior of senior nursing students. *Journal of the Medical Library Association*, 100(1), 20–27. doi:10.3163/1536-5050.100.1.005
- Eib, B. J., & Miller, P. (2006). Faculty development as community building. *International Review of Research in Open and Distance Learning*, 7(2), 1-15.
- Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, 62(1), 107-115.
- Englebright, J., & Caspers, B. (2016, April). *The CNE and the big data revolution*. Paper presented at the American Organization of Nurse Executives Conference, Fort Worth, Texas. Retrieved from <http://www.aone.org/annual-meeting/docs/presentations/ID31.pdf>
- Erdem, M. (2007). Self-efficacy levels of teachers in information and computer literacy. *World Applied Sciences Journal*, 2(4), 399–405.
- Estabrook, L., Witt, E., & Rainie, L. (2007). *Information searches that solve problems: How people use the Internet, libraries, and government agencies when they need help*. Washington, DC: Pew Internet & American Life Project.

- Facebook Inc. (2012). *Securities and Exchange Commission: Form 8-K*. Retrieved from <http://pdf.secdatabase.com/700/0001193125-12-316895.pdf>
- Ferguson, J. E., Neely, T. Y., & Sullivan, K. (2006). A baseline information literacy assessment of biology students. *Reference & User Services Quarterly*, 46(2), 61–71.  
doi:10.5860/rusq.46n2.61
- Fetter, M. S. (2008). Enhancing baccalaureate nursing information technology outcomes: Faculty perspectives. *International Journal of Nursing Education Scholarship*, 5(1), 1-15.  
Retrieved from <http://www.degruyter.com/view/j/ijnes>
- Fineout-Overholt, E., & Melnyk, B. M. (2005). Transforming health care from the inside out: Advancing evidence-based practice in the 21st Century. *Journal of Professional Nursing*, 21(6), 335–343. doi:10.1016/j.profnurs.2005.10.005
- Flood, L. S., Gasiewicz, N., & Delpier, T. (2010). Integrating information literacy across a BSN curriculum. *The Journal of Nursing Education*, 49(2), 101-104. doi:10.3928/01484834-20091023-01
- Folley, D. (2010). The lecture is dead long live the e-lecture. *Electronic Journal of E-Learning*, 8(2), 93–100.
- Fox, L. M., Richter, J. M., & White, N. (1989). Pathways to information literacy. *The Journal of Nursing Education*, 28(9), 422-425.
- Freeman, E., & Lynd-Balta, E. (2010). Developing information literacy skills early in an undergraduate curriculum. *College Teaching*, 58(3), 109-115.  
doi:10.1080/87567550903521272

- Geçer, A. K. (2012). An examination of studying approaches and information literacy self-efficacy perceptions of prospective teachers. *Eurasian Journal of Educational Research*, 49, 151–172.
- Giddens, J. F., & Walsh, M. (2010). Collaborating across the pond: The diffusion of virtual communities for nursing education. *The Journal of Nursing Education*, 49(8), 449-454. doi:10.3928/01484834-20100430-04
- Goodfellow, L.M. (2004). Can a journal club bridge the gap between research and practice? *Nurse Educator*, 29(3), 107–110.
- Google Company. (n.d.). *Google: Our history in depth*. Retrieved from <http://www.google.com/about/company/history/>
- Greenhalgh, T., Stramger, K., Bratan, T., Byrne, E., Mohammad, Y., & Russel, J. (2008). Introduction of shared electronic records: Multi-site case study using diffusion of innovation theory. *British Medical Journal*, 337, a1786. doi:10.1136/bmj.a1786
- Greiner, A. C., & Knebel, E. (2003). *Health professions education: A bridge to quality*. Washington, DC: National Academies Press
- Grove, S., Burns, N., & Gray, J. (2012). *The practice of nursing research: Appraisal, synthesis, and generation of evidence* (7<sup>th</sup> ed.). St. Louis, MI: Elsevier.
- Head, A. (2007). Beyond Google: How do students conduct academic research? *First Monday*, 12(8). Retrieved from <http://firstmonday.org/article/view/1998/1873>
- Head, A., & Eisenberg, M. (2009). Lessons learned: How college students seek information in the digital age. *Project Information Literacy Progress Report*. Retrieved from [http://projectinfolit.org/pdfs/PIL\\_Fall2009\\_finalv\\_YR1\\_12\\_2009v2.pdf](http://projectinfolit.org/pdfs/PIL_Fall2009_finalv_YR1_12_2009v2.pdf)

- Hebda, T., & Calderone, T. L. (2010). What nurse educators need to know about the TIGER initiative. *Nurse Educator*, 35(2), 56–60. doi:10.1097/NNE.0b013e3181ced83d
- Henderson, F., Nunez-Rodriguez, N., & Casari, W. (2011). Enhancing research skills and information literacy in community college science students. *American Biology Teacher*, 73(5), 270–275. doi:10.1525/abt.2011.73.5.5
- Herbert, V. M., & Connors, H. (2016). Integrating an academic electronic health record: Challenges and success strategies. *Computers, Informatics, Nursing: CIN*, 34(8), 345–354. doi:10.1097/CIN.0000000000000264
- Hickey, G., & Kipping, C. (1996). Issues in research. A multi-stage approach to the coding of data from open-ended questions. *Nurse Researcher*, 4, 81–91.
- Hilbert, M., & López, P. (2011). The world's technological capacity to store, communicate, and compute information. *Science*, 332(6025), 60–65. doi:10.1126/science.1200970
- Hornsby, D., & Osman, R. (2014). Massification in higher education: Large classes and student learning. *Higher Education*, 67, 711–719. doi:10.1007/s10734-014-9733-1.
- Hossain, D., Perrin, C., & Cumming, K. (2012). Information literacy and its application in nursing education. *International Journal of Modern Education and Computer Science*, 10, 1–8. doi:10.5815/ijmecs.2012.10.01
- Howe, N., & Strauss, W. (2000). *Millennials rising: The next greatest generation*. New York, NY: Vintage Books.
- Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277–1288.
- Institute of Medicine. (2001). *Crossing the quality chasm: A new health system for the 21st century*. Washington, DC: National Academy Press.



- Institute of Medicine. (2003). *Health professions education: A bridge to quality*. Washington, DC: The National Academies Press.
- Institute of Medicine. (2008). *Evidence-based medicine and the changing nature of health care: 2007 IOM annual meeting summary*. Washington, DC: The National Academies Press.
- Institute of Medicine. (2011a). *Digital infrastructure for the learning health system: The Foundation for Continuous Improvement in Health and Health Care: Workshop series summary*. Washington, DC: The National Academies Press.
- Institute of Medicine. (2011b). *The future of nursing: Leading change, advancing health*. Washington, DC: National Academies Press.
- Jacobsen, H. E., & Andenæs, R. (2011). Third year nursing students' understanding of how to find and evaluate information from bibliographic databases and Internet sites. *Nurse Education Today*, 31(8), 898–903. doi:10.1016/j.nedt.2011.01.003
- Janke, R., Pesut, B., & Erbacker, L. (2012). Promoting information literacy through collaborative service learning in an undergraduate research course. *Nurse Education Today*, 32(8), 920–923. doi:10.1016/j.nedt.2011.09.016
- Johnston, N., Partridge, H., & Hughes, H. (2014). Understanding the information literacy experiences of EFL (English as a foreign language) students. *Reference Services Review*, 42(4), 552– 568.
- Jones, S., & Fox, S. (2009). *Generations online in 2009: Data memo*. Washington, DC: Pew Internet and American Life Project. Retrieved from [http://www.pewinternet.org/w/media//Files/Reports/2009/PIP\\_Generations\\_2009.pdf](http://www.pewinternet.org/w/media//Files/Reports/2009/PIP_Generations_2009.pdf).
- Jones, S., & Madden, M. (2002). *The Internet goes to college: How students are living in the future with today's technology*. Washington, DC: Pew Internet & American Life Project.

- Jones, S., Johnson-Yale, C., Millermaier, S., & Pérez, F. S. (2008). Academic work, the Internet and U.S. college students. *Internet and Higher Education*, 11(3-4), 165-177.  
doi:10.1016/j.iheduc.2008.07.001
- Kaminski, J. (Spring 2011). Diffusion of Innovation Theory. Theory in nursing informatics column. *Canadian Journal of Nursing Informatics*, 6(2). Retrieved from  
<http://cjni.net/journal/?p=1444>
- Kennedy, G., Judd, T., Dalgarnot, B., & Waycott, J. (2010). Beyond natives and immigrants: Exploring types of net generation students. *Journal of Computer Assisted Learning*, 26, 332-343. doi:10.1111/j.1365-2729.2010.00371.x
- Kent State University. (2014a). *Project SAILS: The individual assessment of information literacy*. Retrieved from <https://www.projectsails.org/IndividualTest>
- Kent State University. (2014b). *Testing and measurement that respects your budget*. Retrieved from <https://www.projectsails.org/Pricing>
- Kiliç-Çakmak, E. (2010). Learning strategies and motivational factors predicting information literacy self-efficacy of e-learners. *Australasian Journal of Educational Technology*, 26(2), 192–208.
- Killeen, M. B., & Barnfather, J. S. (2005). A successful teaching strategy for applying evidence based practice. *Nurse Educator*, 30(3), 127–132.
- Klauegger, C., Sinkovics, R. R., & Zou, H. (2007). Information overload: A cross-national investigation of influence factors and effects. *Marketing Intelligence & Planning*, 25(7), 691–718. doi:10.1108/02634500710834179
- Koehn, M. L., & Lehman, K. (2008). Nurses perception of evidence-based nursing practice. *Journal of Advanced Nursing*, 62(2), 209-215. doi:10.1111/j.1365-2648.2007.04589.x

- Kohn, L. T., Corrigan, J. M., & Donaldson, M. S. (2000). *To err is human: Building a safer health system*. Washington, DC: National Academies Press.
- Kowitlawakul, Y., Wai Chi Chan, S., Pulcini, J., & Wang, W. (2015). Factors influencing nursing students' acceptance of electronic health records for nursing education (EHRNE) software program. *Nurse Education Today*, 35, 189-194.
- Krathwohl, D. R., Bloom, B. S., & Masia, B. B. (1964). *Taxonomy of educational objectives: The classification of educational goals, handbook II: Affective domain*. New York, NY: David McKay.
- Ku, Y., Sheu, S., & Kuo, S. (2007). Efficacy of integrating information literacy education into a women's health course on information literacy for RN-BSN students. *Journal of Nursing Research*, 15(1), 67-77.
- Kurbanoğlu, S. S., Akkoyunlu, B., & Umay, A. (2006). Developing the information literacy self-efficacy scale. *Journal of Documentation*, 62(6), 730-743.  
doi:10.1108/00220410610714949
- Landrum, B. J. (1998). Marketing innovations to nurses, part 1: How people adopt innovations. *Journal of Wound, Ostomy and Continence Nurses Society*, 25(4), 194-199.
- Leasure, A. R., Delise, D., Clifton, S. C., & Pascucci, M. A. (2009). Health information literacy: Hardwiring behavior through multilevels of instruction and application. *Dimensions of Critical Care Nursing*, 28(6), 276-282.
- Lee, T. (2004). Nurses' adoption of technology: Application of Rogers' innovation-diffusion model. *Applied Nursing Research*, 17(4), 231-238.
- Lekan-Rutledge, D. (2000). Diffusion of innovation: A model for implementation of prompted voiding in long-term care settings. *Journal of Gerontological Nursing*, 26(4), 25-33.

- Levett-Jones, T., Kenny, R., Van der Riet, P., Hazelton, M., Kable, A., Bourgeois, S., & Luxford, Y. (2009). Exploring the information and communication technology competence and confidence of nursing students and their perception of its relevance to clinical practice. *Nurse Education Today*, 29(6), 612-616. doi:10.1016/j.nedt.2009.01.007
- Levine, A., & Dean, D. R. (2012). *Generation on a tightrope: A portrait of today's college student*. San Francisco, CA: Jossey-Bass.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage.
- Lombard, E. (2016). Translating information literacy: Online library support for ESL students. *Journal of Library & Information Services in Distance Learning*, 10(3), 312-319. doi: 10.1080/1533290X.2016.1221615
- Lowery, J. W. (2004). Student affairs for a new generation. *New Direction for Student Services*, 106, 87-98.
- Maag, M. (2006). Nursing students' attitudes toward technology: A national study. *Nurse Educator*, 31(3), 112-118.
- Madison Assessment. (2013a). *Information literacy test*. Retrieved from <http://www.madisonassessment.com/assessment-testing/information-literacy-test/>
- Madison Assessment. (2013b). *Online ordering agreement*. Retrieved from <https://www.madisonassessment.com/order-now/>
- Mayring, P. (2000). Qualitative content analysis. *Forum: Qualitative Social Research*, 1(2). Retrieved from <http://www.qualitative-research.net/fqs-texte/2-00/02-00mayring-e.htm>
- McCulley, C., & Jones, M. (2014). Fostering RN-to-BSN students' confidence in searching online for scholarly information on evidence-based practice. *Journal of Continuing Education in Nursing*, 45(1), 22-27. doi:10.3928/00220124-20131223-01

- McNeil, B. J., Elfrink, V., Beyea, S. C., Pierce, S. T., & Bickford, C. J. (2006). Computer literacy study: Report of qualitative findings. *Journal of Professional Nursing*, 22, 52-59.
- Meeker, M. A., Jones, J. M., & Flanagan, N. A. (2008). Teaching undergraduate nursing research from an evidence-based practice perspective. *Journal of Nursing Education*, 47(8), 376–379.
- Mertler, C. A., & Vannatta, R. A. (2013). *Advanced and multivariate statistical methods*. Glendale, CA: Pyrczak.
- Morgan, P. D., Fogel, B., Hicks, P., Wright, L., & Tyler, I. (2007). Strategic enhancement of nursing students' information literacy skills: Interdisciplinary perspectives. *The ABNF Journal*, 18(2), 40–5.
- National College Health Assessment. (2015). Spring 2015 Reference Group Executive Summary. Retrieved from [http://www.acha-ncha.org/docs/ncha-ii\\_web\\_spring\\_2015\\_reference\\_group\\_executive\\_summary.pdf](http://www.acha-ncha.org/docs/ncha-ii_web_spring_2015_reference_group_executive_summary.pdf)
- National League for Nursing. (2008a, May 29). *NLN board of governors urges better preparation of nursing workforce to practice in 21st-century, technology-rich health care environment*. Retrieved from [http://www.nln.org/newsreleases/informatics\\_release\\_052908.htm](http://www.nln.org/newsreleases/informatics_release_052908.htm)
- National League for Nursing. (2008b). *Research priorities in nursing education*. Retrieved from <http://www.nln.org/research/priorities.htm>
- National League for Nursing. (2016). Biennial Survey of Schools of Nursing, Academic year 2015-2016. Retrieved from <http://www.nln.org/newsroom/nursing-education-statistics/biennial-survey-of-schools-of-nursing-academic-year-2015-2016>

- Nguyen, D. N., Zierler, B., & Nguyen, H. Q. (2011). A survey of nursing faculty needs for training in use of new technologies for education and practice. *The Journal of Nursing Education, 50*(4), 181-189. doi:10.3928/01484834-20101130-06
- O'Reilly, T. (2005, September 30). What is Web 2.0? Design patterns and business models for the next generation of software [Web log post]. Retrieved from <http://oreilly.com/web2/archive/what-is-web-20.html>
- Oblinger, D. G., & Oblinger, J. L. (2005). *Educating the net generation*. Washington, DC: EDUCAUSE.
- Orr, D., Appleton, M., & Wallin, M. (2001). Information literacy and flexible delivery: Creating a conceptual framework and model. *The Journal of Academic Librarianship, 27*, 457-463.
- Özkul, H., & Kaya, H. (2009). The views of nursing students about their own information literacy. *New Educational Review, 19*(3/4), 45–57.
- Pallant, J. (2010). *SPSS survival manual* (4<sup>th</sup> ed.). Berkshire, England: McGraw-Hill.
- Park, H. W., Barnett, G. A., & Nam, I. (2002). Hyperlink-affiliation network structure of top web sites: Examining affiliates with hyperlink in Korea. *Journal of The American Society for Information Science & Technology, 53*(7), 592-601. doi:10.1002/asi.10072
- Partnership for 21st Century Skills. (2008). *21st century skills, education & competitiveness: A resource and policy guide*. Retrieved from [http://www.p21.org/index.php?option=com\\_content&task=view&id=82&Itemid=1850](http://www.p21.org/index.php?option=com_content&task=view&id=82&Itemid=1850)
- Pearcey, P., & Draper, P. (1996). Using the diffusion of innovation model to influence practice: A case study. *Journal of Advanced Nursing, 23*(4), 714-721.

- Pew Research Center. (2002). *The Internet goes to college*. Retrieved from <http://www.pewinternet.org/2002/09/15/college-students-say-the-internet-helps-them/>
- Pew Research Center. (2014). *The rising cost of not going to college*. Retrieved from <http://www.pewsocialtrends.org/2014/02/11/the-rising-cost-of-not-going-to-college/>
- Phillips, J. M., & Vinten, S. A. (2010). Why clinical nurse educators adopt innovative teaching strategies: A pilot study. *Nursing Education Perspectives*, 31(4), 226-229.
- Pinto, M. (2010). Design of the IL-HUMASS survey on information literacy in higher education: A self-assessment approach. *Journal of Information Science*, 36(1), 86–103.  
doi:10.1177/0165551509351198
- Pinto, M. (2011). An approach to the internal facet of information literacy using the IL-HUMASS survey. *Journal of Academic Librarianship*, 37(2), 145–154.
- Polit, D. F., & Beck, C. T. (2012). *Nursing research: Generating and assessing evidence for nursing practice* (9th ed.). Philadelphia, PA: Lippincott Williams & Williams.
- Potter, W. J., & Levine-Donnerstein, D. (1999). Rethinking validity and reliability in content analysis. *Journal of Applied Communication Research*, 27, 258-284.
- Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon*, 9(5), 1–6.
- QSEN. (2018). *Prelicensure QSEN competencies*. Retrieved from <http://qsen.org/competencies/pre-licensure-ksas/>
- Quevedo Garcia, S. P., Greco, K. E., & Loescher, L. J. (2011). Teaching strategies to incorporate genomics education into academic nursing curricula. *The Journal of Nursing Education*, 50(11), 612-619. doi:10.3928/01484834-20110715-04
- Robinson, L. (2009). *A summary of diffusion of innovations*. *Changeology*. Retrieved from [http://www.enablingchange.com.au/Summary\\_Diffusion\\_Theory.pdf](http://www.enablingchange.com.au/Summary_Diffusion_Theory.pdf)

- Rogers, E. (1995). *Diffusion of innovations* (4<sup>th</sup> ed.). New York, NY: Free Press.
- Rogers, E. (2003). *Diffusion of innovations* (5<sup>th</sup> ed.). New York, NY: Free Press.
- Russell, P. (2009). Why universities need information literacy now more than ever. *Feliciter*, 55(3), 92-94.
- Salisbury, F., & Karasmanis, S. (2011). Are they ready? Exploring student information literacy skills in the transition from secondary to tertiary education. *Australian Academic & Research Libraries*, 42(1), 43–58. doi:10.1080/00048623.2011.10722203
- Schams, K. A., & Kuennen, J. K. (2012). Clinical post conference pedagogy: exploring evidence-based practice with millennial-inspired “building blocks”. *Creative Nursing*, 18(1), 13–16.
- Schutt, M. A., & Hightower, B. (2009). Enhancing RN to BSN students' information literacy skills through the use of instructional technology. *Journal of Nursing Education*, 48(2), 101-105. Retrieved from <http://www.healio.com/journals/jne>
- Shellenbarger, T. (2017). Evidence-based teaching: Moving evidence into practice. In B. Patterson, & A. Krouse (Eds.), *Scientific inquiry in nursing education: Advancing the Science* (pp. 99-117). Philadelphia, PA: Wolters Kluwer.
- Shorten, A., Wallace, M., & Crookes, P. (2001). Developing information literacy: A key to evidence-based nursing. *International Nursing Review*, 48(2), 86-92.
- Skiba, D. J. (2005). Preparing for evidence-based practice: Revisiting information literacy. *Nursing Education Perspectives*, 26(5), 310-311.
- Smith-Strom, H., & Nortvedt, M. W. (2008). Evaluation of evidence-based methods used to teach nursing students to critically appraise evidence. *Journal of Nursing Education*, 47(8), 372-375. Retrieved from <http://www.healio.com/journals/jne>



- Society of College, National and University Libraries (SCONUL). (2004). *Learning outcomes and information literacy: SCONUL seven pillars model for information literacy*. SCONUL, London. Retrieved from [http://www.sconul.ac.uk/groups/information\\_literacy/papers/outcomes.pdf](http://www.sconul.ac.uk/groups/information_literacy/papers/outcomes.pdf)
- Soper, D. (2013). *Statistics calculators*. Retrieved from <http://www.danielsoper.com/statcalc3/calc.aspx?id=1>
- Spencer, J. (2012). Integrating informatics in undergraduate nursing curricula: Using the QSEN framework as a guide. *Journal of Nursing Education*, 51(12), 697-701. doi:<http://dx.doi.org.proxy-iup.klnpa.org/10.3928/01484834-20121011-01>
- Starkweather, A. R., & Kardong-Edgren, S. (2008). Diffusion of innovation: Embedding simulation into nursing curricula. *International Journal of Nursing Education Scholarship*, 5(1), 1-11. doi:10.2202/1548-923X.1567
- Steenbeek, A., Edgecombe, N., Durling, J., LeBlanc, A., Anderson, R., & Bainbridge, R. (2009). Using an interactive journal club to enhance nursing research knowledge acquisition, appraisal, and application. *International Journal of Nursing Education Scholarship*, 6(12). doi: <http://dx.doi.org/10.2202/1548-923X.1673>.
- Stichler, J. F., Fields, W., Kim, S. C., & Brown, C. E. (2011). Faculty knowledge, attitudes, and perceived barriers to teaching evidence-based nursing. *Journal of Professional Nursing*, 27(2), 92-100. doi:10.1016/j.profnurs.2010.09.012
- Stokes, P., & Urquhart, C. (2011). Profiling information behavior of nursing students, part 1: Quantitative findings. *Journal of Documentation*, 67(6), 908-932. doi:10.1108/00220411111183528

- Tapscott, D. (1998). *Growing up digital: The rise of the net generation*. New York, NY: McGraw-Hill.
- Tarrant, M., Dodgson, J. E., & Law, B. K. (2008). A curricular approach to improve the information literacy and academic writing skills of part-time post-registration nursing students in Hong Kong. *Nurse Education Today*, 28(4), 458-468.
- Taylor, P., & Keeter, S. (2010). *Millennials: Confident, connected, open to change*. Pew Research Center. Retrieved from <http://www.pewsocialtrends.org/files/2010/10/millennials-confident-connected-open-to-change.pdf>
- Technology Informatics Guiding Education Reform. (2012). *Informatics competencies for every practicing nurse: Recommendations from the TIGER Collaborative*. Retrieved from [http://www.tigersummit.com/uploads/3.Tiger.Report\\_Competencies\\_final.pdf](http://www.tigersummit.com/uploads/3.Tiger.Report_Competencies_final.pdf)
- Terhaar, M., Taylor, L. A., & Sylvia, M. L. (2016). The doctor of nursing practice: From start-up to impact. *Nursing Education Perspectives*, 37(1), 3-9. doi:10.5480/14-1519
- Trail, M. A., Gutierrez, C., & Lechner, D. (2006). Reconsidering a traditional instruction technique: Reassessing the print workbook. *The Journal of Academic Librarianship*, 32(6), 632–640. doi:10.1016/j.acalib.2006.07.003
- Tuncer, M. (2013). An analysis on the effect of computer self-efficacy over scientific research self-efficacy and information literacy self-efficacy. *Educational Research and Reviews*, 81(1), 33–40. doi:10.5897/ERR12.122
- Verhey, M. P. (1999). Information literacy in an undergraduate nursing curriculum: Development, implementation, and evaluation. *The Journal of Nursing Education*, 38(6), 252-259.

- Weiner, B. (1986). *An attributional theory of motivation and emotion*. New York, NY: Springer-Verlag.
- Wendekier, C. (2015). *Information literacy: Correlation of self-efficacy and proficiency* (Unpublished doctoral dissertation). Indiana University of Pennsylvania, Indiana, PA.
- White, M. (2018, April). *Factors Influencing Information Literacy Self-Efficacy of Prelicensure Baccalaureate Nursing Students*. Poster session presented at Sigma Theta Tau International Nursing Education Research Conference, Washington, D.C.
- Wise, S. L., Cameron, L., Yang, S., & Davis, S. L. (2009). *The Information Literacy Test (ILT) test manual*. Retrieved from <http://www.jmu.edu/assessment/pdfDocs/ILT%20Test%20Manual%202010.pdf>
- Witek, D., & Grettano, T. (2012). Information literacy on Facebook: An analysis. *Reference Services Review*, 40(2), 242–257. doi:10.1108/00907321211228309
- Wittmann-Price, R. A., Kennedy, L. D., & Godwin, C. (2012). Use of personal phones by senior nursing students to access health care information during clinical education: Staff nurses' and students' perceptions. *Journal of Nursing Education*, 51(11), 642-646. doi:10.3928/01484834-20120914-04
- Yılmaz, K. (2008). Constructivism: Its theoretical underpinnings, variations, and implications for classroom instruction. *Educational Horizons*, 86(3), 161–172.
- Zerwekh, J., Thibodeaux, R., & Plesko, R. (2000). Chart it once: Innovation in public health documentation. *Journal of Community Health Nursing*, 17(2), 75-83.

## Appendix A

### Information Literacy Self-Efficacy Survey

This scale has been prepared to determine your level of efficacy on issues related to the information (to find, use, and communicate information). Here the notations shall be referred to as 7 = almost always true, 6 = usually true, 5 = often true, 4 = occasionally true, 3 = sometimes but infrequently true, 2 = usually not true, 1 = almost never true.

Please mark the most suitable choice for you. Thank you for your cooperation.

#### **I feel confident and competent that I can:**

Define the information I need	1	2	3	4	5	6	7
Identify a variety of potential sources of information	1	2	3	4	5	6	7
Limit search strategies by subject, language and date	1	2	3	4	5	6	7
Initiate search strategies by using keywords and Boolean logic	1	2	3	4	5	6	7
Decide where and how to find the information I need	1	2	3	4	5	6	7
Use different kinds of print sources (i.e., books, periodicals, encyclopedias, chronologies)	1	2	3	4	5	6	7
Use electronic information sources	1	2	3	4	5	6	7
Locate information sources in the library	1	2	3	4	5	6	7
Use library catalogue	1	2	3	4	5	6	7
Locate resources in the library using the library catalogue	1	2	3	4	5	6	7
Use Internet search tools (such as search engines, directories, and so on)	1	2	3	4	5	6	7
Use different kinds (types) of libraries	1	2	3	4	5	6	7
Use many resources at the same time to make a research	1	2	3	4	5	6	7
Determine the authoritativeness, currentness, and reliability of the information sources	1	2	3	4	5	6	7
Select information most appropriate to the information need	1	2	3	4	5	6	7
Identify points of agreement and disagreement among sources	1	2	3	4	5	6	7
Evaluate www sources	1	2	3	4	5	6	7
Synthesize newly gathered information with previous information	1	2	3	4	5	6	7
Interpret the visual information (i.e., graphs, tables, diagrams)	1	2	3	4	5	6	7
Write a research paper	1	2	3	4	5	6	7
Determine the content and form the parts (introduction, conclusion) of a presentation (written, oral)	1	2	3	4	5	6	7
Prepare a bibliography	1	2	3	4	5	6	7

Create bibliographic records and organize the bibliography	1	2	3	4	5	6	7
Create bibliographic records for different kinds of materials (i.e., books, articles, Web pages)	1	2	3	4	5	6	7
Make citations and use quotations within the text	1	2	3	4	5	6	7
Choose a format (i.e., written, oral, visual) appropriate to communicate with the audience	1	2	3	4	5	6	7
Learn from my information problem-solving experience and improve my information literacy skill	1	2	3	4	5	6	7
Criticize the quality of my information-seeking process and its products	1	2	3	4	5	6	7

Citation for ILSES Tool: Kurbanoglu, S. S., Akkoyunlu, B., & Umay, A. (2006). Developing the information literacy self-efficacy scale. *Journal of Documentation*, 62(6), 730–743.  
doi:10.1108/00220410610714949

**Please answer the following demographic questions:**

1. What is your age? *Please fill in the box indicating your age in years.*

\_\_\_\_\_

2. What is your gender?

Female, Male, Prefer not to answer

3. Is English your primary language?

Yes, No

4. What is your primary race/ethnicity?

American Indian or Alaskan Native

Asian

Black/African American

Native Hawaiian or other Pacific Islander

White

Other (Specify) \_\_\_\_\_

Prefer not to answer

5. Have you been taught how to use the library in a formal college course?

Yes, No

6. What information source do you use most frequently when searching for an answer to a nursing question?

Professional Journal

Textbook

Classmate

Internet

No specific preference

Other (Specify) \_\_\_\_\_

7. If using an online source to conduct research for a class assignment, what would be your preference?

Google

Library website (with access to databases such as CINAHL)

Government website

Professional organization website

Other (Specify) \_\_\_\_\_

8. *Please fill in the box indicating your institution of enrollment.*

\_\_\_\_\_

## Appendix B

### Letter of Permission to Use the Information Literacy Self-Efficacy Scale



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October 7th 2017

To whom it may concern,

Meagan White has permission to use the Information Literacy Self-Efficacy Scale in her research on information literacy in nursing education. She has permission to use the 28-item scale published in the Journal of Documentation (Kurbanoglu, Akkoyunlu, & Umay, 2006).

The only condition she must fulfill when using the scale in her research is citing the original creators and the source of information in her research study, any related publications, and/or any related professional presentations.

Sincerely,

A handwritten signature in blue ink, reading 'Serap Kurbanoglu'.

Serap Kurbanoglu,  
Hacettepe University  
Department of Information Management  
Ankara, Turkey  
[serap@hacettepe.edu.tr](mailto:serap@hacettepe.edu.tr)

#### References

Kurbanoglu, S. S., Akkoyunlu, B., & Umay, A. (2006). Developing the information literacy self-efficacy scale. *Journal of Documentation*, 62(6), 730-743. doi: 10.1108/00220410610714949

## Appendix C

### Email to Potential Student Participants

(Using IUP email template)

Hello,

My name is Meagan White and I am a nursing PhD candidate at the Indiana University of Pennsylvania. I am working on my dissertation titled, *Factors Influencing Information Literacy Self-Efficacy of Prelicensure Baccalaureate Nursing Students*. I am asking for your help to complete my dissertation research. Can you help me by taking a short survey?

I am collecting information through an electronic survey to evaluate students' ability to find and use information. You are eligible to participate because you are a senior baccalaureate nursing student! The survey does not ask for any identifying information and I will not be able to track your answer back to you. This invitation to participate in my study was sent to you by faculty or people at your school who already had access to your directory information. I do not have access to your email addresses; therefore, your answers will remain anonymous.

This survey will take approximately 10 minutes to complete. After you complete the survey, you will be directed to a different Internet site where you can enter a drawing to win one of two \$50 Visa gift cards! Information that you submit for the gift card drawing cannot be linked to your survey responses. All survey answers will be kept confidential.

If you are willing to take the survey, please click the link below. You will be provided with more information about my study to help you make an informed decision whether or not to participate. If you have any questions regarding the study or have any difficulties accessing the survey using the link below, please email me at [RNVT@iup.edu](mailto:RNVT@iup.edu).

Thank you for helping me! As a busy student myself, I truly appreciate your time and support!

**Follow this link to the Survey:** (Insert link from Qualtrics)

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*THIS RESEARCH STUDY HAS BEEN APPROVED BY THE IRB AT INDIANA UNIVERSITY OF PENNSYLVANIA. IRB CONTACT INFORMATION: (724) 357-7730; IUP EMAIL: [irb-research@iup.edu](mailto:irb-research@iup.edu)*



Sincerely,

Meagan White, PhD candidate at Indiana University of Pennsylvania

Department of Nursing and Allied Health Professions  
1010 Oakland Avenue, Johnson Hall Room 210  
Indiana, PA 15705  
814-392-1025  
m.l.white2@iup.edu or RNVT@iup.edu

Faculty Advisor:      Dr. Kristy Chunta  
                                 Department of Nursing and Allied Health Professions  
                                 1010 Oakland Avenue, 223 Johnson Hall  
                                 Indiana, PA 15705  
                                 724-357-3091  
                                 kchunta@iup.edu

## Appendix D

### Faculty Information Literacy Curriculum Survey



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#### Information Literacy (IL) Curriculum Survey

Please complete the following survey by answering each of the questions in regards to IL educational interventions and curricula within your nursing program. Please return the survey electronically to the primary investigator Meagan White via email at [m.l.white2@iup.edu](mailto:m.l.white2@iup.edu) or [RNVT@iup.edu](mailto:RNVT@iup.edu).

#### GENERAL UNIVERSITY/COLLEGE ITEMS

1. Which of the following best describes your university/college type? (Select ONLY ONE answer)

- ☐ For-profit  
☐ Public  
☐ Private

2. Which of the following best describes the geographic location of your nursing program? (Select ONLY ONE answer)

- ☐ Urban/Metropolitan area  
☐ Suburban area  
☐ Rural area

3. What is your university's basic Carnegie Classification? (Select ONLY ONE answer)

Click drop-down arrow to select

4. Approximately how many students are currently enrolled in your prelicensure baccalaureate nursing program?

\_\_\_\_\_ total # of students in prelicensure nursing courses

\_\_\_\_\_ total # of senior students in prelicensure nursing courses

5. How many credits are students required to complete for graduation from your prelicensure baccalaureate nursing program?

\_\_\_\_\_ total # of academic credits required for graduation

6. What is the total number of clinical hours prelicensure baccalaureate nursing students are required to complete in your program?

\_\_\_\_\_ total # of clinical hours required for completion of program



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## (PAGE 2) NURSING CURRICULUM ITEMS

1. Does your nursing program have a course specific to nursing informatics?

☐ Yes ☐ No

*If yes, is the course required and when is it taken by students?*

*If yes, how many credits is the informatics course?*

*If yes, please describe the course objectives and assignments.*

2. Does your nursing program include a course or lesson that provides students with a review of the university library and its resources?

☐ Yes ☐ No

*If yes, is the course or lesson required and when is it taken by students?*

*If offered as a separate library course, how many credits is the course?*

*If yes, please describe the course or lesson further by providing learning objectives, an outline of content presented, major course assignments, and/or information related to partnerships with library faculty or staff.*



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## NURSING CURRICULUM ITEMS CONTINUED (Page 3)

3. Does your program include a formal capstone experience or professional practice immersion?

☐ Yes ☐ No

*If yes, when is it taken by students?*

*If yes, how many credits is the course and/or how many immersion practice hours are the students required to complete?*

*If yes, Are students precepted or mentored by registered nurses during the practice immersion? If so, how many registered nurses precept/mentor the students and how are preceptors/mentors selected?*

*If yes, please describe the learning objectives of this capstone or practice immersion course and its assignments.*

4. Do students complete an evidence-based practice (EBP) project?

☐ Yes ☐ No

*If yes, when do students complete the EBP project?*

*If yes, please describe how the project is integrated into your curriculum.*



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**NURSING CURRICULUM ITEMS CONTINUED (Page 4)**

*If yes, please describe the EBP project learning objectives and assignment.*

5. Does your program use educational technologies for clinical education such as an academic electronic health record (AEHR)?

☐ Yes ☐ No

*If yes, please describe how an AEHR is integrated into your curriculum and used by your faculty?*

*If yes, how are students oriented to the AEHR system?*

6. Does your program integrate mobile devices, PDAs, tablets, smartphones, or other mobile technologies into your curriculum?

☐ Yes ☐ No

*If yes, please describe how these devices are integrated into your curriculum and used by your faculty?*

*If yes, are students required to purchase the device specified or is the device provided by the university/school?*

*Thank you for completing the Curriculum Survey. Please return electronically to the study's primary investigator Meagan White via email at [m.l.white2@iup.edu](mailto:m.l.white2@iup.edu) or [RNVN@iup.edu](mailto:RNVN@iup.edu).*

## Appendix E

### Qualitative Tool for Faculty Interview- Interview Guide

1. Tell me about how your nursing program has incorporated the concept of information literacy into your curriculum.
  - a. What was that process like?
  - b. Does your program provide an IL course that highlights the five components recommended by the Association of Colleges and Research Libraries?
  - c. How does your nursing program use technology during classroom and/or clinical teaching to promote IL competency?
2. How does your nursing program define information literacy?
3. What is your level of knowledge and skills in information literacy? Do you have the necessary skills to build upon and expand this concept within your courses?
  - a. What resources are available to help faculty maintain and expand their knowledge and skills of information literacy?
  - b. Can you describe some of the barriers you face when you are teaching IL knowledge and skills in your course or program?
4. Can you describe how students demonstrate information literacy competency to your faculty? How is IL assessed?
5. Can you describe relationships or partnerships your nursing faculty have developed both inside and outside of your university related to your program focus on IL?
6. Tell me about how your program and your students have changed since your faculty has adopted IL competencies and teaching strategies.

7. What do you feel are some of your programs' strengths related to teaching IL competencies? What are some of your programs' weaknesses?
8. Is there anything you have not yet described related to your programs development of IL teaching strategies, but would like to discuss?

Use of additional prompts:

Tell me more about...

You used the term \_\_\_\_\_, what does that mean?

What was that like...

Can you expand...

Can you give me an example...

Help me understand...

## Appendix F

### Cover Letter to Institutions

(On IUP Letterhead)

Meagan White, PhD candidate  
Indiana University of Pennsylvania  
Department of Nursing and Allied Health Professions  
PhD in Nursing Program  
1010 Oakland Avenue, Johnson Hall Room 210  
Indiana, PA 15705

(Contact name and address)

Dear Ms./Mr.

I would like to introduce myself. I have been a senior program analyst with the American Nurses Credentialing Center since fall of 2015 and am pursuing a doctorate of philosophy in nursing at Indiana University of Pennsylvania. My dissertation, *Factors Influencing Information Literacy Self-Efficacy of Prelicensure Baccalaureate Nursing Students*, focuses on information literacy of prelicensure baccalaureate senior nursing students. The study will investigate the relationship between information literacy self-efficacy and student/educational factors.

I have identified your nursing program as a potential study site because of your commitment to building the science of nursing education. I am requesting your permission to recruit prelicensure baccalaureate students enrolled in your program to participate in this research study. In addition to answering a short demographic questionnaire, study participants will complete the Information Literacy Self-Efficacy Scale. It will take students approximately 10 minutes to complete the instrument and answer the demographic questions. Students will complete the assessments through the use of Qualtrics electronic survey, which will be administered to students through email. Invited students interested in participating in the study can access the survey through a link within the email. Other than completing these data collection tools via the electronic survey, student study participants will have no further obligations towards the study protocol.

A second component of the study will include conduction of one to two interviews with a faculty member or administrator within your nursing program. Qualitative interviews and completion of a curriculum survey will require approximately 60 minutes of faculty time and will help to provide a description of educational methods aimed at IL competency development of nursing students. Inclusion criteria for participation include current fulltime employment as a faculty or administrator within a prelicensure baccalaureate nursing program. The faculty member must have didactic teaching responsibilities including instruction of at least one class per week and have five or more years of experience in their current faculty role. For inclusion in this study, faculty members must have current and historical knowledge of the nursing program and curriculum.



Upon agreement of participation, I ask that you provide contact information of a faculty member or administrator meeting these criteria.

This study has been approved by Indiana University of Pennsylvania's Institutional Review Board. I enclosed a copy of the IRB approval letter for your review. I would welcome the opportunity to further explain the study and answer any questions you may have regarding this dissertation. Please respond to this email indicating your program's interest in participating and include the name and contact information of a faculty member or administrator who meet the study's inclusion criteria.

Thank you.

Sincerely,

Meagan White MSN, RNC-MNN  
NLN Jonas Scholar 2017-2018

**Faculty Advisor:** Dr. Kristy Chunta  
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## Appendix G

### Student Consent Statement on Qualtrics Survey



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#### Student Consent Statement on Qualtrics Survey

Dear senior nursing student,

You have been invited to participate in a research study. This survey will evaluate your confidence in gathering and using information. The following information is provided to help you make an informed decision whether or not to participate. If you have any questions, please do not hesitate to contact the Principal Investigator using the information below.

**Study Description** The purpose of this research study is to better understand factors that influence nursing students' ability to gather and use information. This study involves completing a brief questionnaire that will take you approximately 10 minutes to complete. You will be asked to rate your level of confidence and competence related to statements about your ability to find, use, and communicate information.

**Compensation and Benefits** Please remember that your participation in this study is strictly VOLUNTARY and has no bearing on your grades or enrollment at your university. Your involvement could help in the identification of methods and strategies for encouraging student learning in the classroom and clinical settings.

If you choose to, you can enter a drawing to win one of two \$50 Visa gift cards. After you complete and submit the survey, you will be directed to a different Internet site where you may enter the gift card drawing by providing your name, email, and mailing address. The information you use to enter the drawing is not connected to the survey answers so that none of your responses can be traced back to you. The researcher will contact winners by email and request confirmation of their mailing address to send the gift card using certified, priority, flat rate mail. The winners must reply to the researchers email within two weeks. If the winner does not respond to the email in two weeks of the date the notification email was sent, the researcher will draw another name. This process will continue until two winners have accepted the gift cards.

**Risks** There are no known risks to participating in this study.

**Confidentiality** Any form of information obtained during this study will remain anonymous and none of your responses can be traced back to you. Faculty at your nursing program will not know if you participated or what your recorded responses are. Only the investigator of this study will have access to the data. When you submit your answers for the electronic survey, there is no way your responses can be linked to your name. Qualtrics, the software that delivers the survey, removes all identifiers from your responses.



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The results of the study may be published or presented at a professional conference but your identity will be kept confidential. Survey answers will be considered only in combination with those from other participants and analysis will not report individual responses.

**Withdrawing from the Study** You are free to decide not to participate in this study or to withdraw at any time without adverse consequences. To withdraw from the study, you may stop taking the survey at any time and exit your browser without submitting your responses. Once you complete the survey, I will not be able to remove your responses because I will not know which are yours.

**Principle Investigator:** Meagan White

Doctoral Student, Nursing and Allied Health Professions, Indiana University of Pennsylvania.  
Contact Information: Indiana University of Pennsylvania, 1010 Oakland Avenue, Johnson Hall Room 210, Indiana, PA 15705. (814) 392-1025. IUP email: [m.l.white2@iup.edu](mailto:m.l.white2@iup.edu) or [RNVT@iup.edu](mailto:RNVT@iup.edu)

**Faculty Sponsor:** Dr. Kristy Chunta

Nursing Faculty, Indiana University of Pennsylvania. Contact Information: Indiana University of Pennsylvania, 1010 Oakland Avenue, Johnson Hall Room 223, Indiana, PA 15705. (724) 357-3091. IUP email: [kchunta@iup.edu](mailto:kchunta@iup.edu)

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(Consent question on Qualtrics):

If you are willing to participate in this study, please indicate your consent by clicking 'YES' on the first response below.

- ☐ Yes
- ☐ No

## Appendix H

### Faculty Consent Form



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### Faculty Consent Form

You have been invited to participate in a research study and have been selected because of your experience and knowledge about educational strategies at your nursing program. The following information is provided in order to help you make an informed decision regarding whether or not to participate. If you have any questions, please do not hesitate to contact the Principal Investigator using the information below.

**Study Description** The purpose of this research study is to describe educational strategies aimed at promoting information literacy competency of prelicensure baccalaureate nursing students. Participation in this study will require approximately 60 minutes of your time, as you will complete a survey describing your program curriculum and participate in an individual interview related to your nursing school. The interview will be audio-taped and transcribed for accuracy. In the event that additional data or clarification is needed for the study, the researcher may contact you for a second interview, which may take approximately 15 minutes.

**Compensation and Benefits** Information gained from this study has the potential to impact nursing pedagogy and provide insight into information literacy competency development of undergraduate nursing students.

Participation will remain strictly VOLUNTARY and you will not be compensated for participation. After you complete the curriculum survey and interview, your name, email, and mailing address will be added to a drawing to win one of two \$50 Visa gift cards. The researcher will contact winners by email and request a confirmation of their mailing address to send the gift card using certified, priority, flat rate mail. The winners must reply to the researchers email within two weeks. If the winner does not respond to the email in two weeks of the date the notification email was sent, the researcher will draw another name. This process will continue until two winners have accepted the gift cards.

**Risks** There are no potential risks associated with this research.

**Confidentiality** Your confidentiality will be maintained throughout the study, as a pseudonym will be given to you for the purpose of interview transcription. Privacy will be maintained by protecting your information, data sources, and interview transcriptions on a password-protected computer or in a locked file cabinet. Federal guidelines will be followed and your interview data will be kept for three years. The results of the study may be published or presented at a professional conference; however, all of the collected information will be analyzed and reported using pseudonyms. Only the investigator of this study will have access to the data.

**Withdrawing from the Study** You have the right to refuse to participate or withdraw at any point in the research process and can do so by stopping the interview or by contacting the researcher in person, by phone, or through email. If you choose to withdraw from the study, your data will be destroyed.

**For More Information** This research is being conducted by Meagan White. If you have questions about this study at any time you may contact the Principal Investigator by email at [m.l.white2@iup.edu](mailto:m.l.white2@iup.edu) or [RNVT@iup.edu](mailto:RNVT@iup.edu).



# Indiana University of Pennsylvania

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If you are willing to participate in this research study, please sign the statement below. If you choose not to participate, return the unsigned consent copy to the Principal Investigator. Participation in this study is voluntary and you are free to decide not to participate in this study or to withdraw at any time by notifying the researcher.

*THIS RESEARCH STUDY HAS BEEN APPROVED BY THE IRB AT INDIANA UNIVERSITY OF PENNSYLVANIA. IRB CONTACT INFORMATION: (724) 357-7730; IUP EMAIL: [irb-research@iup.edu](mailto:irb-research@iup.edu)*

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**Faculty Sponsor:** Dr. Kristy Chunta

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**Voluntary Consent Form**

I have read and understand the information on this form and I consent to volunteer to be a subject in this study. I understand that my responses are completely confidential and that I have the right to withdraw at any time. I have received a copy of this Consent Form to keep in my possession.

Name (PLEASE PRINT): \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Phone number or location you can be reached: \_\_\_\_\_

Best days/times to reach you: \_\_\_\_\_

I certify that I have explained to the above individual the nature and purpose, the potential benefits, and possible risks associated with participating in this research study, and have answered any questions that have been raised.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Investigator's Signature

# Appendix I

## CITI Training Record

### COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM) COURSEWORK REQUIREMENTS REPORT\*

\* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Meagan White (ID: 4646083)
- **Institution Affiliation:** Indiana University of Pennsylvania (ID: 1711)
- **Institution Unit:** Nursing
- **Curriculum Group:** Human Subjects Research
- **Course Learner Group:** Social, Behavioral, Educational Researchers
- **Stage:** Stage 1 - Basic Course
- **Report ID:** 15163977
- **Completion Date:** 02/23/2015
- **Expiration Date:** N/A
- **Minimum Passing:** 80
- **Reported Score\*:** 94

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
History and Ethical Principles - SBE	02/23/15	5/5 (100%)
Defining Research with Human Subjects - SBE	02/23/15	5/5 (100%)
The Federal Regulations - SBE	02/23/15	5/5 (100%)
Assessing Risk - SBE	02/23/15	5/5 (100%)
Informed Consent - SBE	02/23/15	5/5 (100%)
Privacy and Confidentiality - SBE	02/23/15	5/5 (100%)
Belmont Report and CITI Course Introduction	02/23/15	3/3 (100%)
Conflicts of Interest in Research Involving Human Subjects	02/23/15	5/5 (100%)
Vulnerable Subjects - Research Involving Workers/Employees	02/23/15	4/4 (100%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research	02/23/15	5/5 (100%)
Research with Children - SBE	02/23/15	2/5 (40%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

**CITI Program**  
Email: [citisupport@miami.edu](mailto:citisupport@miami.edu)  
Phone: 305-243-7970  
Web: <https://www.citiprogram.org>

## Appendix J

### DOI Coding Matrix

	INNOVATION		COMMUNICATION CHANNELS / SOCIAL SYSTEMS		TIME STAGE		USER SEGMENTS		REINVENTION		PERCEIVED INNOVATION QUALITIES	
	Theme Summary	Transcript Line Number	Theme Summary	Transcript Line Number	Theme Summary	Transcript Line Number	Theme Summary	Transcript Line Number	Theme Summary	Transcript Line Number	Theme Summary	Transcript Line Number
Case A												
Case B												
Case C												
Case D												
Case E												
Case F												
Case G												
Case H												
TOTAL CODE/THEME OCCURRENCE ACROSS ALL INTERVIEWS												

#### DEFINITION KEY

1. **INNOVATION:** an idea or object that is new to the user
2. **COMMUNICATION CHANNELS:** communication channels or social systems with peer-peer networks as a method to spread information ;  
**SOCIAL SYSTEMS:** Any formal or informal group that joins together in a common goal
3. **TIME:** five-stage process through with innovations pass
  - ☐ 3.1. Knowledge/Awareness: Exposure to the innovation, despite lacking complete information, individual forms an attitude toward the idea based on his/her perception of its characteristics;
  - ☐ 3.2. Persuasion/Interest: Individual becomes interested in the new idea and seeks additional information;
  - ☐ 3.3. Evaluation/Decision: Mental application of innovation to present and anticipated future situations; Individual decides whether or not to try it;
  - ☐ 3.4. Implementation/Trial: Individual makes full use of innovation;
  - ☐ 3.5. Confirmation/Adoption: Individual decides whether to continue full use and adopt the innovation.
4. **Concept of understanding needs of USER SEGMENTS:** requires the identification of group personality characteristics as each group adapts to change based on its own strengths and limitations.  
 Five adopter categories: innovators, early adopters, early majority, late majority, and laggards
5. **Concept of REINVENTION** the adaptation and refinement of an innovation to meet the needs of more demanding and risk-averse adopters
6. **SPEED OF ADOPTION BASED ON FIVE USER PERCEIVED QUALITIES**
  - ☐ 6.1 relative advantage: the degree to which an innovation is perceived to be superior to the current practice or idea -  
 the greater the perceived relative advantage of an innovation, the more rapid its rate of adoption
  - ☐ 6.2 compatibility: the degree to which the innovation is perceived to be consistent with an individual's existing sociocultural values, beliefs, previous ideas, and/or perceived needs;
  - ☐ 6.3 complexity: the degree to which an innovation is perceived as difficult to use or understand - the simplicity of an innovation;
  - ☐ 6.4 trialability: the degree to which the innovation can be altered or implemented on a small scale
  - ☐ 6.5 observability: the degree to which the results of an innovation are visible to others - innovations whose outcomes are easily observed are more readily adopted than those with understated outcomes