INCOMING ONLINE GRADUATE STUDENT INFORMATION LITERACY KNOWLEDGE AND SELF-EFFICACY: A MIXED-METHODS STUDY

By

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DEDICATION

This dissertation is dedicated to my husband, Trace, who has encouraged and supported me throughout this whole journey and kept the house from falling apart while I sat endlessly at my computer. To my sons, Christopher, and Jack, thank you for cheering on your old mom. You are my heart.

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I am grateful for my cat, Chester (RIP), who sat with me through all of my coursework, but couldn't quite make it through my dissertation. I don't blame you. Also, to my dog, Sam, who made me go outside and play at least once a day.

Finally, I want to acknowledge my mom and dad who gave me a loving and solid foundation in life. I wish you could have been here to celebrate, but I know you are here with me in spirit.

ABSTRACT

Information Literacy (IL) is vitally important for student success among college students. Graduate students are often assumed to have basic information literacy skills, but research has shown that this isn't always the case ((Bussell et al., 2017; Lamb, 2017, Hebert, 2018, Xie & Savory, 2022; Robertson & Felicilda-Reynaldo, 2015; Click, 2018; Saunders et al., 2015). In recent years, much emphasis has been placed on undergraduate students and rightly so. However, students entering graduate program at the master's and doctoral level can still benefit from information literacy instruction.

This explanatory sequential mixed methods study sought to understand the level of information literacy knowledge and self-efficacy of incoming online graduate students and to determine if online modules introduced as a self-guided orientation to graduate research are helpful for student success and increases their information literacy knowledge and self-efficacy skills. Quantitative and qualitative assessments were utilized using the Open Test of Information literacy (OTIL) (Hollis, et al., 2019), and the Information Literacy Self-Efficacy Scale (ILSES) (Kurbanoglu et al., 2004), along with follow-up interviews after the intervention of the IL modules.

Paired t-test analysis determined that both the IL knowledge and self-efficacy of the participants significantly increased after completing the IL modules. Qualitative analysis of data from the follow-up interviews indicated that participants were appreciative of the IL modules, found them helpful and anticipated referring to them during their graduate program.

Graduate research orientation delivered through IL modules can increase IL knowledge and self-efficacy of incoming online graduate students, fill in any gaps from previous schooling, and serve as a needed refresher as students begin a new program. The researcher recommends

continuing to use the IL modules and locating them in a fixed place. Librarians and faculty should collaboratively work to keep the content current and applicable. Further studies on the utilization of IL modules in a fixed location along with a longitudinal study of graduate students as they progress through their programs are recommended.

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LIST OF ABBREVIATIONS

AAHE: American Association for Higher Education

ACRL: Association of College & Research Libraries

ALA: American Library Association

B-TILED: Beile Test of Information Literacy for Education

CILIP; Chartered Institute of Library and Information Professionals

COI: Community of Inquiry

EFL: English as a Foreign Language

ERL: Emergency Remote Learning

ETS: Educational Testing Service

IFLA: International Federation of Library Associations and Institutions

IL: Information Literacy

ILSES: Information Literacy Self-Efficacy Scale

ILT: Information Literacy Test

IRB: Institutional Review Board

LMS: Learning Management System

MTSU: Middle Tennessee State University

OTIL: Open Test of Information Literacy

PILS: Perception of Information Literacy Scale

SDL: Self-directed Learning

SEND: Special Educational Needs and Disabled

SPIL-Q: Students' Perceptions of Their Information Literacy Skills Questionnaire

CHAPTER I: INTRODUCTION

National Context

Information Literacy (IL) has been recognized as a critical need the world over. UNESCO states that, "Information Literacy empowers people in all walks of life to seek, evaluate, use and create information effectively to achieve their personal, social, occupational and educational goal" (UNESCO, 2023). Over twenty years ago in 2000, following the American Library Association's Presidential Committee in 1998, the Association of College & Research Libraries (ACRL) in cooperation with the American Association for Higher Education (AAHE), developed the first set of information literacy standards for higher education in America to be used in colleges and universities (ACRL, n.d.; ACRL, 2000; Breivik, 2000). These standards have since been updated and formed into a threshold concepts framework (ACRL, 2016).

The need for information literacy skills is even more important now perhaps more than ever as various types of online content inundate our world, and increasingly strategic skills are needed to find and evaluate information that is used for educational, vocational, and recreational purposes. Critical thinking skills are vital for sorting credible sources from misleading ones. Caulfield & Wineburg (2023) in their book *Verified: How to think straight, get duped less, and make better decisions about what to believe online* found that because of the confusion caused by misinformation found online, students were reluctant to "share *any* news, based on the fear that it may turn out to be false, and an unwillingness to challenge false stories they see, based on the fear they may be wrong about them."

In a perfect world, graduate students would arrive on campus with basic information literacy skills that were honed during their undergraduate studies. In that perfect scenario, students would be able to jump right in to graduate research and move on to higher level subject

specific information literacy skills that their chosen discipline requires. Graduate students range in age from 22 to retirement age and beyond, and there is often a multi-year gap between the completion of their undergraduate degree and the beginning of their graduate coursework (Hebert, et al., 2023). Graduate students whose undergraduate degrees are older have a lesser chance that the research skills they learned previously will serve them well now. Undergraduate degrees are all different, with some more research focused and others not so much. It's possible for undergraduates in some disciplines to graduate without having written any research papers that require credible sources obtained through the library. Those students who did well using sources during their undergraduate degree might need a refresher since electronic resources change frequently. If the previous degree was completed decades before, they might need to start all over in their understanding of modern information literacy skills. A study by Hebert et al. (2023) found that online graduate students benefitted from information literacy modules offered at the beginning of their coursework.

There seems to be a perennial tension between the library and teaching faculty about who will teach these skills and how (Owusu-Ansah, 2004). Although the ACRL Information Literacy Framework of 2016 which is discussed more fully in Chapter II recommends that faculty take a more active role and at the least collaborate with librarians, in practice this is haphazard at best at many institutions, especially in graduate classes (ACRL, 2016). Some faculty don't want librarians involved in their courses and would rather try and teach basic library research skills themselves. Still other faculty don't want to take the time to introduce information literacy concepts into their courses because their courses are already crowded with content, and they don't have time for it. Lastly, some professors believe that students should already know the basic information literacy skills and should figure it out on their own if they don't.

Local Context

The information literacy program at Middle Tennessee State University has focused mainly on undergraduate students. There has never been a full semester information literacy course, however, there is an information literacy curriculum created and taught by faculty in the Walker Library's User Services Department which introduces information literacy skills into several general education courses (James E. Walker Library, n.d.-a). A 2012 study by faculty librarians at MTSU established that students who receive library instruction had a higher GPA on average than students who didn't (Vance, et al., 2016).

In 2016, the James E. Walker Library instituted an Information Literacy Curriculum Integration Grant for faculty wanting to incorporate information literacy standards into their curriculum (James E. Walker Library, n.d.-b). Full disclosure, this author was awarded this grant in 2018. Recently, the MTSU general education program, called "True Blue Core" was revamped and introduced the option of information literacy adoption into the foundational skills of written communication courses (MTSU, 2023c). A general education information literacy course is being considered by the College of Education and it is hoped that it will be proposed soon. In addition, the James E. Walker Library faculty have created several online information literacy tutorials which are available through the library website. (James E. Walker Library, n.d.-d). Also, a LibGuide of library resources prepared by Walker librarians, specifically geared for graduate students contains basic information about the library, its services, and various information literacy sources (James E. Walker Library, n.d.-c). MTSU is perceived by many as having a loyal student base and many 'homegrown' graduate students who earned their undergraduate degree from MTSU return for their next degree. Those who graduated recently would have benefitted from the information literacy efforts at MTSU, but others who graduated earlier, or those who

attended undergraduate programs at colleges and universities without information literacy programs likely have gaps in their information literacy skills.

Statement of the Problem

Graduate students often come back to school with various degrees of information literacy competency. They have had different undergraduate experiences and there has often been a considerable gap of time in between their undergraduate experience and starting their graduate studies. Starting graduate school can be a scary time of trying to remember how to find appropriate sources and write research papers. This can present a problem for the faculty as well, who don't have time to teach students how to navigate these skills, nor are discipline faculty necessarily fluent in the variety of library resources or the nuances of citation styles as are faculty librarians. Assumptions are made that students learned how to do these tasks in their undergraduate work, but this isn't always the case; even if it was, the process has probably changed since they did their undergraduate work due to the changing nature of information (particularly online information). Consequently, well-meaning teachers rely on one-shot instruction from the librarians on how to use library resources. One-shot instruction, while helpful, cannot cover all that is needed (Adams, 2023; Pagowsky, 2021; Jones et al., 2019).

Purpose of the Study

In light of this challenge, this study seeks to explore the efficacy of an intervention to help these students. The purpose of this study then is two-fold. The first purpose is to examine the information literacy skills and self-efficacy of incoming online graduate students. The second purpose is to determine if online modules introduced as a self-guided orientation to graduate research are helpful for student success and increases their information literacy knowledge and self-efficacy skills.

Rationale and Justification

Because the focus of information literacy at higher education institutions has been centered mainly on undergraduate students, and because the information literacy skills and self-efficacy of incoming graduate students is uneven, it's important to study this further to determine possible solutions to promoting greater student success among graduate students. Several studies show the need for library skill training for graduate students who either are lacking in self-efficacy and/or information literacy knowledge that can be demonstrated by graduate level research work (Bussell et al., 2017; Lamb, 2017, Hebert, 2018, Xie & Savory, 2022; Robertson & Felicilda-Reynaldo, 2015; Click, 2018; Hebert et al., 2023; Saunders et al., 2015). This need for instruction applies not only to master's level students, but to doctoral level students as well. Tunon and Ramirez (2010) created a four-part model of library training for doctoral students that included workshops specifically for ABD students that included sessions on "sessions on designing research studies, SPSS, the Institutional Review Board process, APA formatting, and library research". Initial feedback from students was positive.

Theory or Conceptual Framework

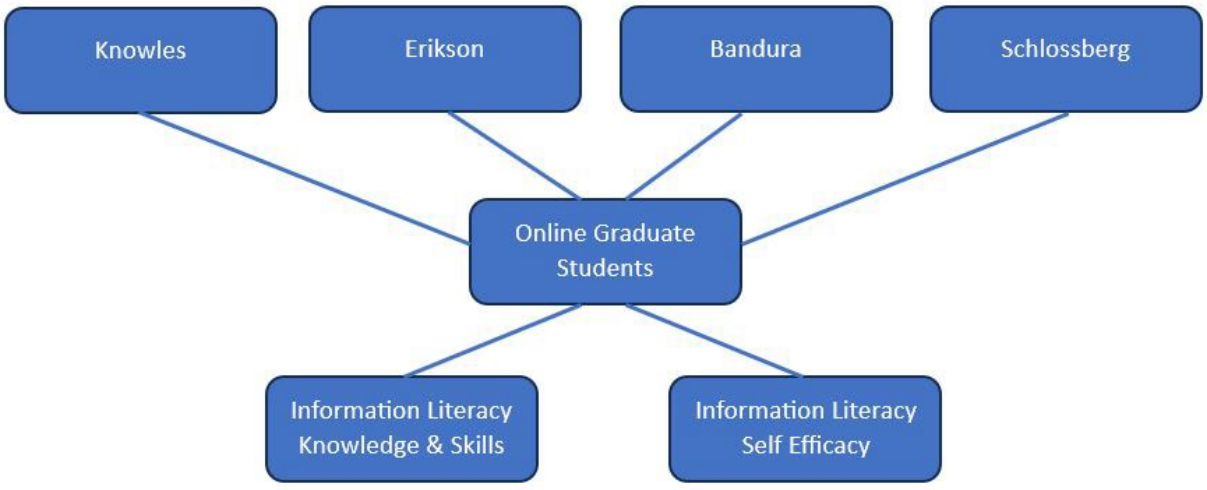
Graduate students are by definition adult learners, and although they may be at different stages according to Erickson's Psychosocial Theory of Development, they all are considered adults and have completed an undergraduate degree successfully (Erikson & Erikson, 1998; Degges-White, 2017). When graduate students first return to school to begin their graduate degrees, they are in a state of transition and their needs are unique. Therefore, this study is framed by adult learning theory as proposed by Knowles (1980) that adult learners are motivated, self-directed, task oriented, ready to learn, come with life experience, and have a need to know why they need to learn the topic. Bandura (1997) speaks to the motivation of individuals

specifically in the area of self-efficacy, in which learners believe that they have the skills and confidence to do what they need to do; in this case, students need to produce quality graduate research. Erikson (1998) further characterizes the three stages that adults go through as they age, bringing different needs and wants for each one. Graduate students fall into all three of these stages, although there are not as many students who start graduate school in the last stage of their life. Regardless of the adult stage they are in when starting a graduate program, they are in a time of transition. Schlossberg's Transition Theory proposes a process which can help learners through the transition phase when starting graduate school which Barclay (2017) believes can increase the chance of student success.

These four theories of Knowles' Adult Learning Theory or Andragogy, Erickson's Stages of Psychosocial Development, Bandura's self-efficacy studies, and Schlossberg's Transition Theory each inform the approach taken in this study and the design of the information literacy modules. See Figure 1.

Figure 1

Theories Informing Structure of Study



Research Questions and Hypotheses

Drawing upon this theoretical framework and to achieve the purposes established earlier, this study will seek to answer four research questions:

RQ 1. What levels of information literacy knowledge do incoming online graduate students at MTSU possess and can they be improved through participation in voluntary information literacy modules?

RQ1a How does participation in IL Modules impact level of information literacy knowledge?

RQ1b Which information literacy areas of the ACRL Framework are most affected by participation in IL Modules?

H 1. Information literacy modules improve student information literacy knowledge.

RQ 2. What levels of information literacy self-efficacy beliefs do incoming online graduate students at MTSU possess and can they be improved through participation in voluntary information literacy modules?

RQ2a How does participation in IL Modules impact level of information literacy self-efficacy?

RQ2b Which information literacy self-efficacy areas of the ACRL Framework are most affected by participation in IL Modules?

H 2. Information literacy modules improve student information literacy self-efficacy.

RQ 3. How do incoming graduate students describe their experience with the information literacy modules?

RQ 4. How do incoming online graduate students feel about their competency to handle graduate level research going forward?

Reflexivity Statement

As a member of Generation X, I began using the library at a time when there was only a physical card catalog, and my first research papers were typed on a typewriter while citing print sources. During my career, I have been a graduate student three separate times, with two of my degrees being obtained solely online. When I first went to graduate school, it had been 16 years since I attended college and I was married, worked two part-time jobs, and had two young children. Because of my knowledge and skills as a librarian and as a faculty member in a library science program I am very involved in all things information literacy and am vested in helping incoming online graduate students acclimate quickly to the rigors of graduate level.

Methodology

This study uses an explanatory sequential mixed methodology consisting of quantitative and qualitative components in order to gain a more comprehensive understanding of the problem of graduate students and information literacy (Creswell & Creswell, 2018). All Fall 2023 incoming online graduate students at MTSU were invited to participate in this study, which began with a survey instrument consisting of two parts: the Open Test of Information Literacy, Information Literacy Self-Efficacy Scale, and demographic questions. Students then worked through online self-directed information literacy modules built and delivered through D2L, which is their learning management system. They then completed a post-test consisting of the

Open Test of Information Literacy, Information Literacy Self-Efficacy Scale. A purposeful sample of students were invited to participate in individual interviews via Zoom.

Definition of Key Terms

Andragogy	Defined as the Adult Learning Theory introduced by Malcolm Knowles
Graduate Students	Defined as students enrolled in a graduate program at either a certificate, master's or doctoral level
Information Literacy	Defined as "the set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning". (ACRL, 2016, p. 8).
Learning Management System	Defined as a web-based tool through which online courses are administered
LibGuide	Defined as an online web-based tutorial that can contain information about the library, its resources, and information literacy skills
Online Program	Defined as a program delivered fully online asynchronously
Self-Efficacy	Defined as a student's belief that they are competent enough to complete quality work in graduate school

Summary

Information literacy is vital to student success in college, especially for graduate students who will be involved more heavily in writing and research at the graduate level**.** These adult students are coming in with a variety of information literacy skill levels and are in a time of transition. Ensuring that they have the best start possible equipped with basic college level information literacy skills should help them acclimate to graduate school easier and faster along with the confidence that they are ready for this challenge.

CHAPTER II: REVIEW OF THE LITERATURE

This case study looks at the information literacy knowledge and self-efficacy held by incoming online graduate students at a medium-sized public institution in the American Southeast. The study examines the impact of a set of online information literacy modules presented at the onset of participants' degree programs upon student success.

Nearly all of the prospective graduate student participants are adult learners in an online program, therefore this review of the literature will start with learning theory, adult learning theory, online learning theory, Schlossberg's Transition Theory, and motivation and self-efficacy. I will then review the most relevant literature about the history of instruction in academic libraries and classrooms, the birth of information literacy and the current standards, different methods of instruction, knowledge testing, and online digital learning objects.

Online Graduate Learners

Online graduate learners are adults. According to the NCES (2022), at public colleges and universities, of the graduate students who enroll full-time 38% are under age 25, 36% are 25-29, 19 % are 30-39, and 7 % are 40 and over. In contrast, of those who attend part-time, 12 % are under age 25, 28% are ages 25-29, 34% are ages 30-39, and 26% are 40 and over. In a recent survey of online graduate students at MTSU, Hebert et al. (2023) reported that of those students who responded, approximately half of them were part-time and half were full-time. Their age range was between 21 and 80 years old, with an average age of 37.15. When asked about the length of time since their last academic experience, answers ranged from less than one year to over 20 years. For over 35% of them it had been over 5 years since they had last been enrolled in school, and more than 20 years for over 20% of respondents.

Erikson's Theory of Psychosocial Development

Adult learners have different needs than younger learners, but the study of adult development and learning is relatively new, not having been studied in earnest until the 1960s (Merriam, 2018). Erikson's Theory of Psychosocial Development is often mentioned in research with babies, children, and adolescents, but the three later stages of Intimacy vs. Isolation, Generative vs. Stagnation, and Integrity vs. Despair that occur during adulthood can apply to graduate students as they span all three later life stages (Killem & Degges-White, 2017). Early Adulthood, characterized as Intimacy vs. Isolation, occurs in the 20s and 30s as students find partners and begin the process of settling down and having children. Middle Adulthood characterized as Generative vs. Stagnation comes next during a person's forties, fifties, and early sixties when family, career development, and striving for growth predominate. Lastly, the Integrity vs. Despair stage in a person's later sixties and beyond is often a time to take stock and look at one's own mortality (Aanstoos, 2023). Each of these stages is markedly different than earlier stages of development and implies that graduate students have different needs and motivations than younger students. Even within these later three stages, there can be vastly different sets of priorities and motivations as graduate students from different generations work through their programs together (Killem & Degges-White, 2017).

According to several studies using Erikson's Theory of Psychosocial Development, graduate students should be approached differently. Selke & Wong (1993) discuss graduate students and advising. Benshoff, Cashwell, & Rowell (2015) discuss mental health services for online graduate students. According to Kelly (2007), graduate students have different concerns due to their various life stages. Halifax (2010) and Jalongo (2013) both specifically mention the stagnation vs generativity stage being an impetus in furthering one's education later in life.

Gonzales, Whetung, Kruchten, & Butts (2020), in a study on intergenerational housing with graduate students. So, there can be many ways that the needs of graduate students differ from undergraduate students.

Schlossberg's Transition Theory

Incoming graduate students, whether they are entering graduate school for the first time or for a subsequent degree, are also in a period of transition. Since this study is looking only at incoming online graduate students, Schlossberg's Transition Theory is also another relevant theory to consider. Schlossberg (1981) proposed a model of transition that was comprised of three parts: "1) the characteristics of the transition, 2) the characteristics of the pre-and post-transition environments, and 3) the characteristics of the person experiencing the transition" (p. 5). According to Barlcay (2017), Schlossberg believed that people going through a transition can be helped by concentrating on "taking stock" and analyzing the context using the Four Ss: situation, support, self, and strategies (p. 25). How well people navigate through these transitions can set them up for success or failure.

There have been several studies using Schlossberg's Transition Theory with graduate students. In 2001, Dowdy published their dissertation about career transitioning among first year graduate students that utilized Schlossberg's Transition Theory extensively in sources from the 1980s through the 1990s. This study didn't include distance students, although Dowdy did mention that they had been left out of the study. In 2011, Poronsky completed a doctoral study about nurse practitioner students using Schlossberg's Transition Theory to discuss the transition of Registered Nurse students in becoming Family Nurse Practitioners. In 2012, Stiles concluded that orientation sessions for graduate students were a helpful boost during this transition time for these students. Another dissertation (Brown, 2014) completed a study focusing on military

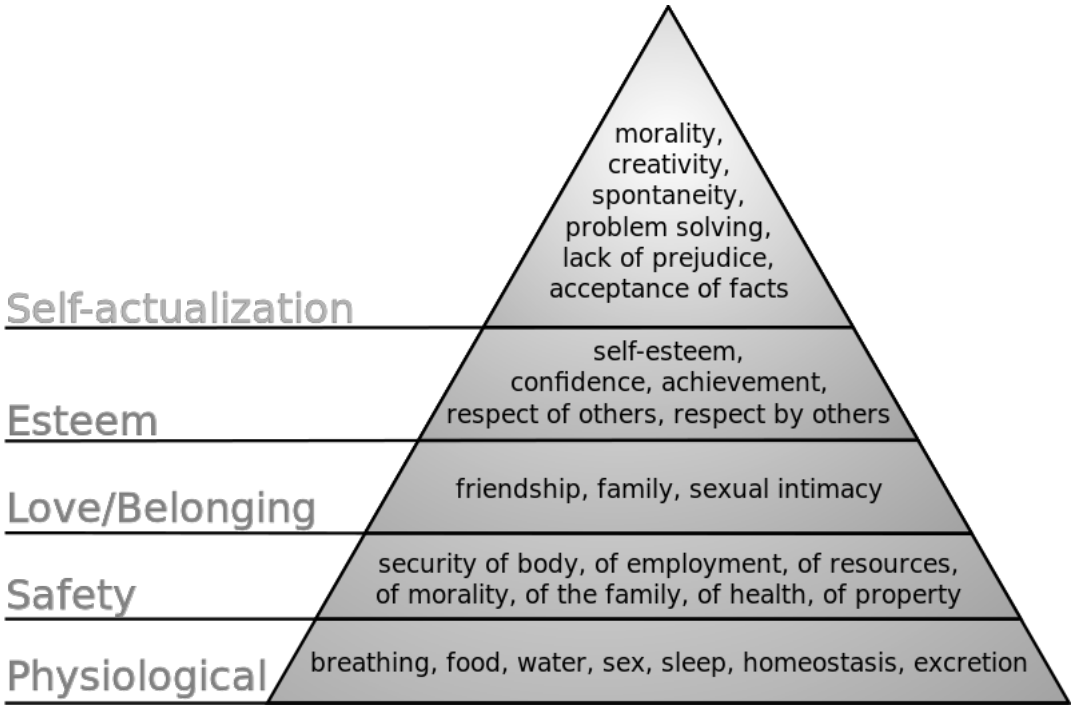
personnel who were deployed while in graduate school and looked at how support from the university and others was critical during that time of transition for those students. In 2016, Zhang explored the experiences of Chinese doctoral students transitioning to graduate school in the United States through a qualitative study that highlighted beneficial supports to those international students. Ziegenfuss (2020) explored developing an online learning community geared towards research in order to help new graduate students during COVID when the pivot to online occurred. Lastly, Pascale, Gregg, & Buenano (2021) used transition theory when discussing the identities of student athletes who use their new role as graduate students to transition out of athletics; however, this research didn't mention online learners.

Maslow's Hierarchy of Needs

In looking at students who are undergoing a transition in their lives, the supports they receive help them stay motivated. In looking at motivation and self-efficacy, we first need to look at students' basic needs. Abraham Maslow (1954) introduced the hierarchy of needs which explains the different levels of needs that must be met for people to realize self-actualization: (1) physiological need, (2) safety need, (3) need of love, affection, and belongingness, (4) need for esteem, and (5) need for self-actualization (Simons, et al., 1987). Assuming that graduate students have the first levels met more or less, Maslow's (1954) view that esteem and the need for achievement, mastery and competency, confidence, and independence certainly applies to graduate students who are looking to complete a higher degree. Therefore, mastery and competence in information literacy skills are important. The highest need for self-actualization according to Maslow's belief that people desire "to become everything that one is capable of becoming" (p. 91). Graduate students are hopefully attaining a position where this is true and, as Maslow says, what they are "fitted for" (p. 90). See Figure 2.

Figure 2

Diagram of Maslow's Hierarchy of Needs



Note: Finkelstein, 2006, J. Finkelstein, CC BY-SA 3.0.

Stiles (2017) connected Maslow's hierarchy of needs to graduate students when looking at orientation programs aimed specifically at graduate students. It was assumed that the lower level physiological and safety needs of the students were met "through prior life experiences and events" (p. 105) (Malek-Ismail & Krajnik, 2018). Stiles found that students were able to reach the higher levels of "belongingness, esteem, and self-actualization" through the orientation and gained a higher level of satisfaction with the institution as a result.

Malek-Ismail & Krajnik, (2018) used Maslow's hierarchy to gain insights into how graduate students in an occupational therapy program transitioned into their program and how their needs were met. They found differing levels of attainment among the students in their study. According to Malek-Ismail & Krajnik (2018), "Educators should expect that lower-level needs

are likely present and unmet initially in graduate students, at least for a period of time, as students begin a new graduate degree program." Although students were not found to be self-actualized, they did express a desire to be so.

Another qualitative doctoral study by Caspers (2020) on doctoral students' persistence and maintenance of personal relationships found that doctoral level programs took a toll on student's relationships with their friends and family, but those that persisted were able to realize a doctoral work-life balance. Support came also from dissertation chairs, cohorts and classmates who helped provide a sense of belonging and esteem.

Motivation and Self-Efficacy

Bandura (1997) defines self-efficacy as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" and that unless people believe they can do something, they will lack motivation to do it (p.3). Further, self-efficacy beliefs can determine how much effort a person will put into an activity and for how long they keep trying even when encountering difficulties along the way. At advanced levels of academic pursuits, such as entering a graduate program, Bandura believes that self-efficacy is even more vital given that the situation is more complex and requires students to be self-directed. In addition, scholarly activity often involves the critique of others. He states that "in cultivating scholarly careers, mastery experiences, modeling of research strategies, and supportive feedback should be structured in ways that build a robust sense of efficacy as well as technical competencies" (p. 23).

Kurbanoglu (2003) made the connection between information literacy and self-efficacy along with Neely (2002), and Grassian and Kaplowitz (2001). She concluded that in addition to students acquiring information literacy skills, this connection should be studied further and that

methods should be developed to build up self-efficacy in students. In 2004, Kurbanoglu, et al. (2006), developed the Information Literacy Self-Efficacy Scale (ILSES) for use with students. Rosman et al. (2015) explored using the combination of self-efficacy scales and knowledge tests and concluded a relationship between self-efficacy assessment and knowledge tests. Wendekier (2015) used the ILSES with undergraduate nursing students and concluded that it was a "valid tool for collecting student data" (p. iv). Geary (2019) also used the ILSES for undergraduate students in a mixed methods study similar to this one. Sommer et al. (2021) investigated the validity of the ILSES scale on undergraduates at one university and found it lacking, suggesting a need for an overhaul or at least an update to the scale. Liu (2023) built their own information literacy self-efficacy scale informed by Colborn's Motivation Triangle (2013) and the ACRL Framework (2016) for use with graduate students at one university in China. Liu found that students were strong in information literacy self-efficacy, preferred faculty who were experienced with IL, and in person courses over online learning. Tang and Tseng (2013) in a study of distance education students at Jacksonville State University using a library skills self-efficacy tool informed by Dunn (2002) and Van de Vord (2010) found that when students can be confident in their ability to use their information literacy skills, they will tackle more information problems and become self-regulated learners. Another information literacy self-efficacy scale is the Students' Perceptions of Their Information Literacy Skills Questionnaire (SPIL-Q), which uses a 5-point Likert-type scale, was developed by Michalak and Rysavy (2016). Hebert (2018) and DaLomba et al. (2020) have used the SPIL-Q in studies with graduate students. In 2019, Doyle, Foster, and Yukhymenko-Lescroart from California State University – Fresno developed the Perception of Information Literacy Scale (PILS) which aligns to the Framework and used it first with graduate students.

Table 1

Information Literacy Self Efficacy Scales

Name	Date	Items and Scale	Sample	Reliability	Validity	Notes
Dunn	2002	10 items; 10-point scale	Used in the United States	Field Tested	Field Tested	(Dunn, 2002).
ILSES	2004	28 item; 7-point scale	Used in at least 8 countries Adapted into English, Turkish, and Bengali	Cronbach's a = 0.92	"Face validity by experts; construct validity by item analysis, item discrimination indices, principal components analysis and varimax rotation; discriminant validity for subscales; concurrent validity by correlating with knowledge test"	(Kurbanoglu, 2006; Mahmood, 2017).
IL-HUMASS	2010	26 item; 9-point scale	Used in Spain and Portugal	Cronbach's a = 0.936	Four dimensions of internal validity, Face, instrumental, construct, and content.	(Pinto, 2011).

Van de Vord	2010	12 item; 7-point scale (with 12 additional items on skepticism in advertising	Used in the United States	Not mentioned	Not mentioned	(Van de Vord, 2010).
Tang and Tseng	2013	12 item; 5-point scale	Used in the United States	Not mentioned	Not mentioned	Adapted from Van de Nord. and Dunn. (Tang and Tseng, 2013).
SPIL-Q	2016	6 item; 5-point scale	Used in the United States with International graduate students	Not mentioned	Inter-rater reliability	(Michalak and Rysavy, 2016; Michalak, et al., 2017)
PILS	2019	36 item; 7-point scale based on ranking skill level rather than agreement or frequency	Used in the United States with graduate students.	Cronbach's a = 0.94 to 0.97	Convergent and discriminant validity	Aligned with Framework
LUI	2023	36 item; 5-point scale Divided into 3 parts: Motivation, self-efficacy, and perceptions	Used in China	Cronbach's a = 0.969	Not mentioned	Geared toward IL SE in a Specific IL Course (Lui, 2023)

Learning Theory

The study of how humans learn has long been a matter of discovery that continues today. The way information is processed and presented is important knowledge that informs the basis of

modern education and instructional design. The prominent learning theories that evolved during the last century form the basis of current learning theory as applied to education today. In this section, Behaviorism, Cognitivism, Bloom's Taxonomy, and Social Constructivism will be introduced.

Behaviorism

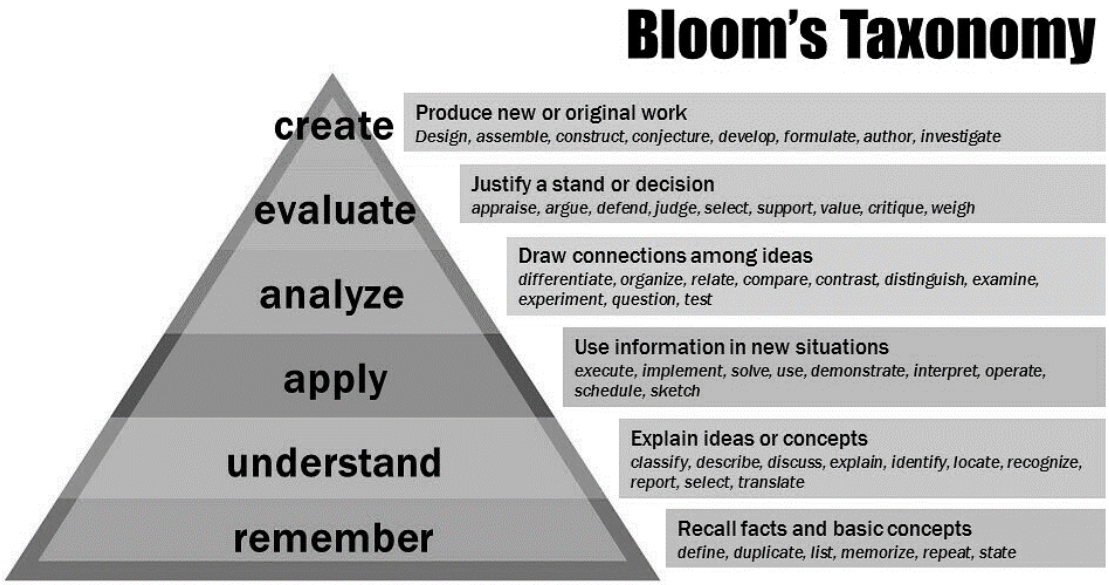
According to Picciano (2017), Behaviorism is familiar to many because of Pavlov and his studies on the stimulus response in dogs. The basis of behaviorism is that learning is related to cause and effect, and it is observable. According to Ertmer and Newby (2013) "the goal of instruction for the behaviorist is to elicit the desired response from the learner who is presented with a target stimulus" (p.50). John Watson, who was a follower of Pavlov's work, coined the term *Behaviorism* (Picciano, 2017). Building on Pavlov's experiments, B. F. Skinner introduced both positive and negative reinforcements to illicit a certain behavior which he called operant conditioning. Behaviorism gave rise to many of the learning strategies we see today that are evident in assessment and testing.

Cognitivism

Cognitivism aimed to correct what was lacking in behaviorism, namely the cognitive aspects of learning. Benjamin Bloom (1956) and his colleagues set out to build a taxonomy of educational objectives. They settled on six levels: knowledge, comprehension, application, analysis, and synthesis, and established an order or hierarchy for them. Although Bloom never created a visual of his taxonomy, the pyramid that is familiar to most educators and students as seen in Figure 3 has been adapted and created over the years to represent the hierarchy (Anderson, 2017).

Figure 3

A representation of Bloom's Taxonomy



Note: Center for Teaching Vanderbilt University, 2016, CC BY 2.0 DEED

Robert Gagne

later built upon Bloom's Taxonomy and created a nine-step process that became the foundation for cognitive structural design as shown in Figure 4.

Figure 4

Gagne's Nine Events of Instruction

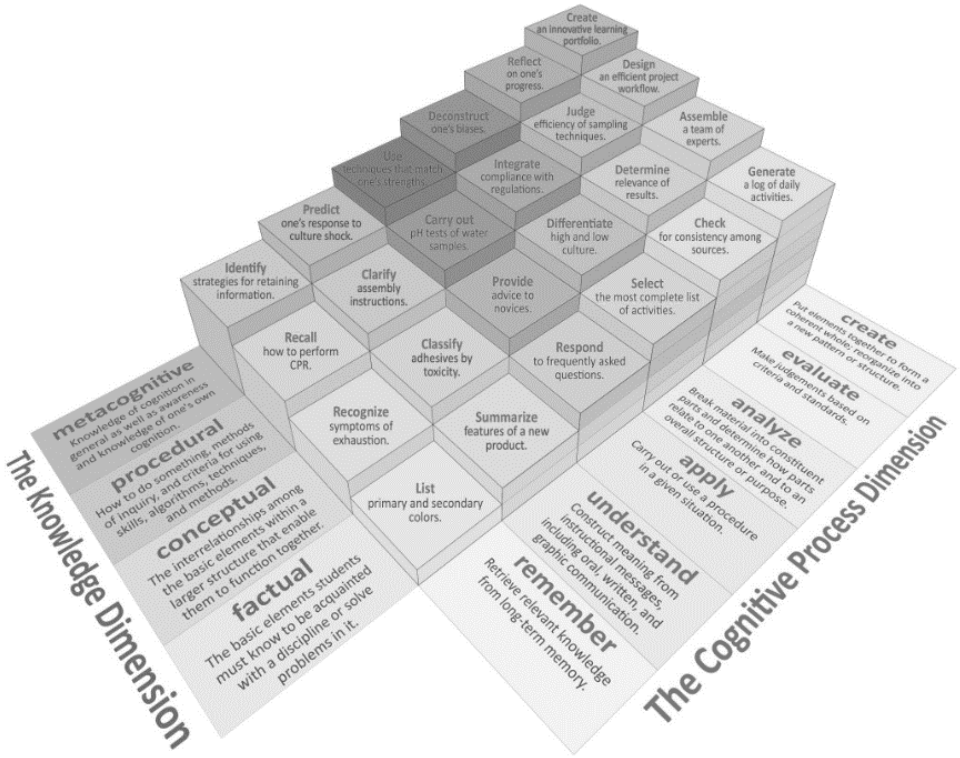
1. **Gain attention:** Use media relevant to the topic.
2. **Describe the goal:** Provide clear objectives to the overall course goals.
3. **Stimulate prior knowledge:** Review previously presented material and concepts and connect them to the material to be addressed in the current module.
4. **Present the material to be learned**: Readings, presentations, demonstrations, multimedia, graphics, audio files, animations, etc.
5. **Provide guidance for learning:** Discussions to enable learners to actively reflect on new information in order to check their knowledge and understanding of content.
6. **Elicit performance:** Activity-based learning such as group research projects, discussion, homework, etc.
7. **Provide feedback:** Immediate, specific, and constructive feedback is provided to students.
8. **Assess performance:** Assessment activity such as a test, research project, essay, or presentation.
9. **Enhance retention and transfer:** Provide opportunities for additional guided practice or projects that might relate learning to other real-life activities.

Note: (Picciano, 2017, p. 170). CC-BY-4.0

Anderson, et al. (2001) revised Bloom's Taxonomy adding complexity. In it there are 4 types of knowledge from concrete to metacognitive, and six cognitive processes: remember, understand, apply, analyze, evaluate, and create (Lynne, n.d.). See Figure 5.

Figure 5

A Model of Learning Based on Bloom's Taxonomy



A Model of Learning Objectives–based on A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives by Rex Heer, Center for Excellence in Learning and Teaching, Iowa State University is licensed under a CC BY-SA (Attribution-ShareAlike) 4.0 International License.

Social Constructivism

Lev Vygotsky, John Dewey, and Jean Piaget were the main educational theorists in early social constructivism which emphasized interactions between teachers and students. (Picciano, 2017). Reflective practice, which is used often in instructional design today, came from Dewey. At that time in the study of cognitive development, researchers focused mainly on children. Piaget's four stage model ended with the formal operative stage which he believed was achieved by age 11 (Thompson, 2019). Both Piaget and his contemporary, Jerome Bruner, were interested in how children learn. According to Steiner (1974), Piaget believed in cognitive structure, where Bruner thought that representation through media helped children construct their world. Steiner posited a synthesis between the two theories with the construction of representation-bound structures. Many people consider Vygotsky's social

context view of learning to be the opposite of Piaget who focused on the individual. According to Pass (2004), they were both interested in inquiry-based instruction which led her to enumerate twelve ideas between them where Piaget and Vygotsky would agree, comprising a Piaget/Vygotsky pedagogy which would encapsulate the best of both. David Ausubel's learning theory also dealt with cognitive structure, although he believed that subsumption or assimilation as he later called it, helped anchor new ideas so that they wouldn't be forgotten (Ivie, 1998).

Adult Learning Theory

The history of learning theory to this point has mainly focused on children and adolescents. As learning theories progressed, however, it became clear that adults differ in their learning needs. This section will cover Andragogy, Self-Directed Learning and Transformative Learning.

Andragogy.

Although most American credit Malcolm Knowles with the theory of andragogy, it was developed in Europe as early as 1833 and was named by a German, Alexander Kapp (Henschke, 2016). Knowles borrowed the term and made it famous in America. In 1970, he developed a set of premises for adult learners that he called 'andragogy'. The four premises are:

> "(1) adults are self-directed in their learning;
>
> (2) adults have much more personal experience that they bring to their learning;
>
> (3) adults are focused on the developmental tasks of their social roles; and
>
> (4) adults focus toward learning shifts from subject-centeredness to one of problem-centeredness" (Schlosser, 2006, p. 34).

By recognizing that adult learners' needs were different than children's learning needs, Knowles helped usher in adult learning theory as most educational research up until then had focused on children (Merriam, 2018). According to Picciano (2017), Knowles' contributions are important to higher education as many online and adult education programs have been built on the premise that adults learn differently, and their needs should be accommodated.

Self-Directed Learning.

Developing at roughly the same time as Knowles was the work of Alan Tough and his work with adults and self-directed learning (SDL) (Merriam, 2018). SDL is about the learner taking control of their learning, and this can happen in a higher education setting or outside of it. The adult learner is actively involved in their learning and plans for it. In a study by Torun (2019) about online learning readiness and academic achievement, it was found that self-directed learning was the most important factor of the students in online English as a Foreign Language (EFL) courses.

Transformative Learning.

The third foundational theory of adult learning according to Merriam (2018) is transformative learning which focuses on the "cognitive process of meaning making" (p. 86). Jack Mezirow was a Professor of Adult Education at Columbia University's Teacher's College which was the first graduate adult education program at the doctoral level (Mezirow, 2018). Transformative learning is much more than just learning new information: it uses an adult's experiences and challenges them through reflective thinking, leading to changes in their perspectives and beliefs (Merriam, 2018). The ACRL Framework was based on threshold concepts, which in turn are based on transformative learning. In a 2017 article, Ludovico discussed some of the controversary surrounding whether the Framework is actually

transformative or not. Ludovico believes that the Framework was ideally meant to be transformative but in practice is more informative.

Online Learning and Theory

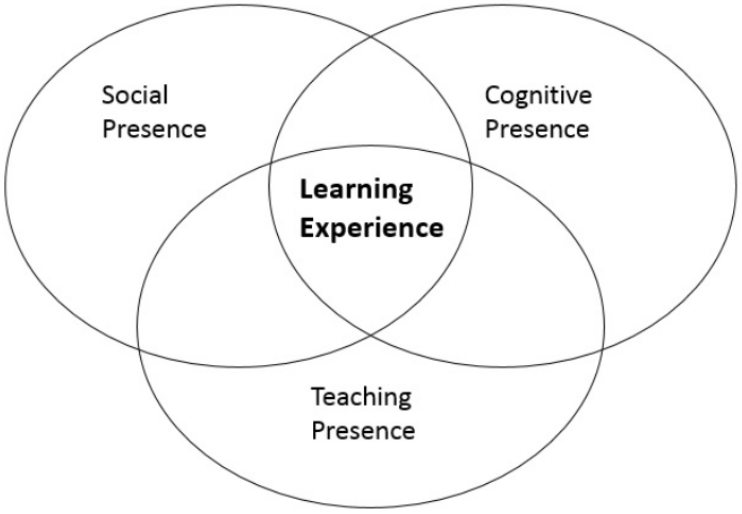
Adult Learning Theory was developing at the same time that distance education was undergoing major changes due to technological advances. Some casual observers might think that online learning started in 2020 with the pandemic, but as Sleator (2010) points out, distance education is not new and is in fact centuries old. The 1990s saw the beginning of online learning as the internet developed and Learning Management Systems (LMS) were created. Eventually this led to the development of online learning theory (Picciano, 2017).

Community of Inquiry (CoI)

The Community of Inquiry model was developed in 2000 by Garrison, Anderson, and Archer according to Picciano (2017). This model as shown in Figure 6 incorporates social interactions between teachers and students and each other into the learning environment. This model forms the basis of modern distance education and gave rise to discussion boards and other interactive learning experiences.

Figure 6

Community of Inquiry Model



Note: (Picciano, 2017, p. 174). CC-BY-4.0

Connectivism

George Siemens proposed the theory of connectivism, which contains eight principles, in 2005. These are:

1. Learning and knowledge rests in diversity of opinions.
2. Learning is a process of connecting specialized nodes or information sources.
3. Learning may reside in non-human appliances.
4. Capacity to know more is more critical than what is currently known.
5. Nurturing and maintaining connections is needed to facilitate continual learning.
6. Ability to see connections between fields, ideas, and concepts is a core skill.
7. Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
8. Decision making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision (Picciano, 2017, p. 175).

Utecht and Keller (2019) state that a major premise of connectivism is that, "Knowledge therefore is not a set of facts but rather a learner's ability to learn, unlearn, and relearn information quickly and be able to apply that new knowledge in an ever-changing information landscape" (p. 108). They believe that educators in both K-12 and higher education can capitalize on technology that facilitates connection and creation such as Wikipedia, Wikis,

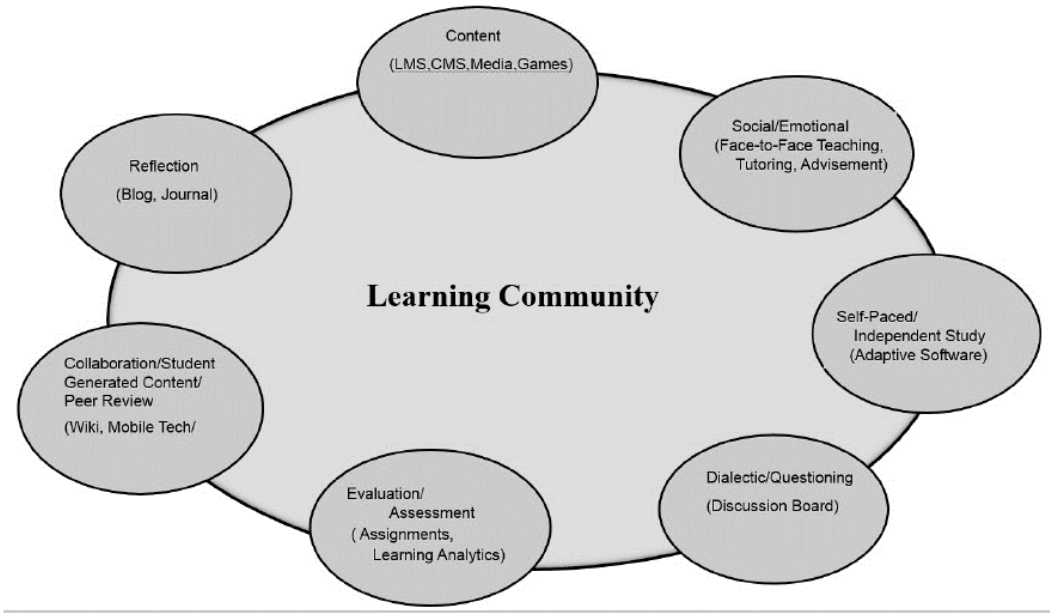
Google Docs, etc. Information changes so quickly that students must learn to be flexible and "learn, unlearn and relearn" (p. 117) These are important skills for information literacy learners.

Multimodal Model for Online Education

In an attempt to establish an integrated model for online learning that could incorporate blended learning as well as strictly online learning, Picciano (2017) proposed the Multimodal Model for Online Education as seen in Figure 7.

Figure 7

Picciano's Multimodal Model for Online Education



Note: (Picciano, 2017, p. 182). CC-BY-4.0

The Multimodal Model is flexible and can accommodate different types of online learning. Each individual part can be used or not used as the situation warrants. During the COVID pandemic, Meda and Waghid (2022) conducted a qualitative study with Special Educational Needs and Disabled (SEND) students using this model during a time of emergency remote learning (ERL).

SEND students were interviewed about their experiences and their preferred method of modality which was determined by their unique needs. They found that the Multimodal Model was flexible enough to not only accommodate face-to-face, blended, and online learning, but also with students with special needs and disabilities.

Instructional Design for Online Learning

So how does all of this inform instructional design? Ertmer and Newby (2013) stress the importance of learning theory in instructional design. They state that the "role of designers remains that of understanding the strengths and weaknesses of each learning theory in order to optimally select and implement strategies that support student learning in a variety of contexts" (p. 69).

Increasingly, online learning is delivered in part with the use of digital learning objects, such as videos, tutorials, websites, slide decks, podcasts, etc. These can be used together to create interactive online learning modules. These can be delivered inside of an LMS or outside, as part of a library website, for instance.

Shepard and Milewski (2021), in collaboration with faculty and librarians, created and piloted online information literacy modules in Canvas for both undergraduate and graduate social work students at the University of Tennessee-Knoxville. They were delivered early on in the program for maximum effectiveness.

Khailova, Guhde, and Bernstein (2023) give another example of online information literacy modules, in this case used asynchronously with graduate students at Georgetown University. They found that the collaboration of faculty and librarians and the adherence of shared pedagogical preferences resulted in embedded course content that was useful and provided a good solution for busy faculty and librarians. There are numerous other examples of

collaboratively-built online modules being used with graduate students in order to increase their information literacy skills and help increase student success. More examples will be offered in the following sections on the topic of information literacy.

Information Literacy

It can be argued that information literacy instruction has been around as long as libraries have existed in one form or another. Although called by other names, such as bibliographic instruction, and library instruction, librarians have always helped users locate and use information. Indeed, at an early meeting of the American Library Association in 1909, John Cotton Dana, one of the early presidents, gave a speech on book using skill in higher education. He bemoaned the fact that most colleges didn't offer any instruction in how to use books, and that the knowledge of college students was sadly lacking. Cotton said, "In the development of our business we were led to lay stress on the technique of book storage and book-control" and therefore emphasized that over how to use books (1909, p. 195). In 1917 apparently not much had changed as college librarians "have reported a very small percentage of students who can use even the simplest of library tools. Many colleges must take the time to teach the use of catalog and reference books before entering students can do the necessary work of their classes" (Mendenhall, 1917, p. 219).

According to academic library historians Hardesty & Tucker (1989), academic library history up until that time could be partitioned into four segments starting with the period of 1880-1900 where librarians began to see the need for library instruction, 1901-1940 which saw a period of trial and error in developing instruction, and 1941-1960 that saw years of increasing use of instruction and meaning making.

In the 1960s, what is considered the modern library movement (Hardesty & Tucker, 1989), librarians began to take an active role in information literacy instruction thanks to the pioneering efforts of Patricia Knapp, a librarian at Monteith College which was a college in what is now known as Wayne State University (Knapp, et al., 1967; Worrell, 2002). During this time, Knapp (1967 developed an early library skills competency test and created assignments with names like, "Using surface clues to evaluate books" (p. 66). She found, as librarians still find today, that "students tend to be uncritical in their choices of sources of information" and are happy with finding something on the subject, no matter how good or bad the source (p. 41).

In 1974, the term 'information literacy' was born when Paul G. Zurowski, president of the Information Industry Association said that an information literate person "is anyone who had learned to use a wide range of information sources in order to solve problems at work and in his or her daily life" (Grassian & Kaplowitz, 2011, p. 4). Zurowski reported to the National Commission on Libraries and Information Science (NCLIS) that same year. By his estimation, only approximately one-sixth of the population was information literate. He advocated that NCLIS should focus on a strong national program to achieve 100% information literacy in America by 1984 (Zurowski, 1974). The period from the 1990s to the present has seen expanded use of computers and technology which has influenced the way information is created and stored as well as how it is accessed (Grassian & Kaplowitz, 2001).

Information Literacy Standards

Along the way, there was the beginning of formalization in the structure of information literacy standards. By 1989, the Presidential Committee on Information Literacy: Final Report was released, and the definition of an information literate person had evolved to "someone who has the ability to recognize an information need, and can locate, evaluate, and use information

effectively" (American Library Association, 1989, para. 3). In 1992, Eisenberg and Brown looked comprehensively at four models of information literacy developed in the 1980s by Kuhlthau, Eisenberg & Berkowitz, Irving, Pitts, and Stripling, looking for commonality. They found that the common themes of the models showed that an "IL individual recognizes a need for information, engages in information seeking behavior, explores, access, and locates material, interacts with the information to formulate hypotheses, synthesizes, interprets and organizes the information, and finally evaluates the results" (Grassian & Kaplowitz, 2011, p. 6).

In 2000, the *Information Literacy Competency Standards for Higher Education* were finalized. These standards were objectively oriented and straightforward. According to these standards, an information literate person can:

1. Determine the extent of information needed
2. Access the needed information effectively and efficiently
3. Evaluate information and its sources critically
4. Incorporate selected information into one's knowledge base
5. Use information effectively to accomplish a specific purpose
6. Understand the economic, legal, and social issues surrounding the use of information, and access and use information ethically and legally (ACRL, 2000).

Since then, the standards have been updated. The most current broadly accepted definition of information literacy in the United States was created in 2016, with the adoption of the *Framework for Information Literacy for Higher Education* by the Association of College & Research Libraries (ACRL) arm of the American Library Association (ALA). It states, "Information literacy is the set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of

information in creating new knowledge and participating ethically in communities of learning" (p. 8) This new way of looking at information literacy is expanded by the inclusion of the metaliterary concept that draws learners into the conversation and allows them to participate collaboratively instead of being passive consumers of information.

This change in focus highlights one of the tensions found in teaching information literacy, which is whether to focus on mechanics or concepts. The ACRL Framework of 2016 brought this tension to the forefront because the standards in this version are highly conceptual.

The Framework consists of six frames:

1. Authority is Constructed and Contextual
2. Information Creation as a Process
3. Information Has Value
4. Research as Inquiry
5. Scholarship as Conversation
6. Searching as Strategic Exploration. (ACRL, 2016).

Although the evolution of the standards to a conceptual model was embraced by librarians, there has been a period of adjustment as the standards are somewhat more difficult to interpret and it wasn't immediately clear how they should be used. After any standards are updated, there is always a period of adjustment; however the 2016 ACRL Framework required more acclimation than usual since the change was large. Books and articles came out on the heels of the new standards seeking to explain how best to use them. One series was the *Framing information literacy: Teaching grounded in theory, pedagogy, and practice* series published by ACRL, which published a separate book for each Frame (Oberlies & Mattson, 2018). Another book from 2018 was *Implementing the information literacy framework : A practical guide for librarians,* written

by a librarian and a classroom instructor which attempted to bridge the gap between the 2000 and 2016 standards (Harmeyer & Baskin, 2018). In this book, the authors explained that information literacy is much broader than knowing how to find library resources, and that the change in the standards from "clear cut, yet somewhat fixed concepts" to a "sort of gestalt concept — sometimes referred to as "metaliteracy" is necessary in the twenty-first century. (p. 2). This change towards a more theoretical framework was meant to apply to all disciplines and meet the need of any inquiry of information. Furthermore, the Framework was intended to foster collaboration between the library and the faculty (Harmeyer & Baskin, 2018; ACRL, 2016). The Framework has not been without controversy, however, and has been debated for many years (Foasberg, 2015; Katz et al., 2018). It opened up a further rift between 'philosopher librarians' and 'practical librarians' with librarians on each side arguing pros and cons. (Bombaro, 2016, p. 556). These difficulties stem from the ease of application of the information literacy standards framework of 2000, which to some was diminished with the adoption of the 2016 Framework. See Table 2.

Table 2

Information Literacy Standards Comparison

ACRL Standards 2000	ACRL Framework 2016
The information literate student determines the nature and extent of the information needed.	Authority is Constructed and Contextual
The information literate student accesses needed information effectively and efficiently	Information Creation as a Process

The information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system.	Information has value
The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose.	Research as Inquiry
The information literate student understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally.	Scholarship as Conversation

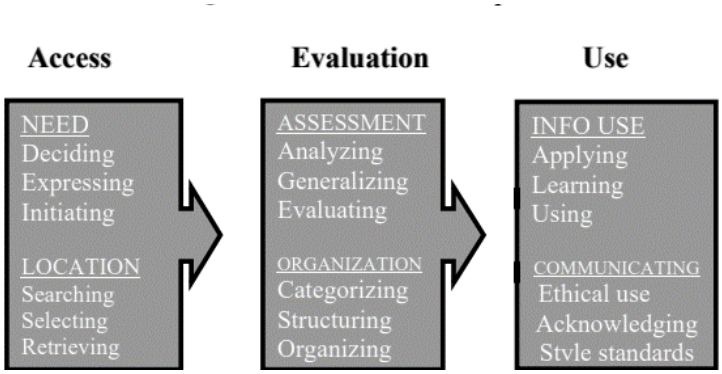
(Adapted from Foasberg, 2015).

It should be noted that outside of the United States, there are various standards of information literacy throughout the world. For instance, in the UK in 2018, the Chartered Institute of Library and Information Professionals (CILIP) began to promote a new expanded definition that is aimed at not only information professionals but can also be used in everyday life. “Information literacy is the ability to think critically and make balanced judgements about any information we find and use. It empowers us as citizens to develop informed views and to engage fully with society” (CILIP, 2018, p. 3). The Open Test of Information Literacy (OTIL) was developed in line with the new CILIP IL definition in 2019 (Hollis et al., 2019a).

The International Federation of Library Associations and Institutions (IFLA) has members from around 150 countries in all regions of the world (IFLA, n.d.). Figure 8 shows The International Federation of Library Associations and Institutions (IFLA) guidelines that were established in 2006 and are made of three parts: access, evaluation, and use (p. 18).

Figure 8

IFLA Information Literacy Guidelines



Note: IFLA, 2006. CC BY 4.0

Thes various standards around the world have the same main principles of understanding an information need, and then identifying, finding, analyzing, organizing, applying, and using sources of information.

Information Literacy Instruction

For most of recent history, what we now see as information literacy was taught heavily as a set of skills and sometimes called “bibliographic instruction”, library research skills”, etc. Students were taught how to use an index in a book, how to find a journal article in the library, and how to cite sources and so on. From the time of Knapp in the 1960s until now library instruction, even though it has evolved, in many ways it has stayed the same.

Over the years, librarians have employed several methods of instruction for information literacy including bibliographic information sessions delivered in one-shots (where the librarian meets with students for an hour to learn how to access journal articles in specific databases), standalone courses in information literacy, workshops, and deploying embedded librarians into online courses. As distance education slowly evolved into online learning which is now offered either asynchronously or synchronously, library instruction has changed to meet the demand. The 1990s brought expansion of the World Wide Web, the digitization of information sources, and increasing numbers of distance education students. Academic libraries began to shift some of their resources to serving these remote users. Erazo & Derlin (1995) mention the use of CD ROM databases, electronic interlibrary loan, multimedia instruction, and the beginnings of online tutorials by way of library websites. Pival & Tuñón (2001) discuss the use of remote meeting software (NetMeeting), early streaming services, and course management systems (WebCT) for delivering bibliographic instruction at Nova Southeastern University. As learning management systems (LMS) improved, more information literacy instruction migrated to these systems as part of a natural progression.

Information Literacy Knowledge Assessment

Over time there have been several assessments devised to measure information literacy knowledge. Many of these have been home grown at colleges and universities and have never been published. In Neely's 2006 book, *Information Literacy Assessment*, she included a bibliography with over seventy assessments that had been gathered from all over the country.

There are several known assessments in use today, some of which are free and some which require payment to use. One of the earlier tests was the iSkills™ assessment created and administrated by the Educational Testing Service (ETS) in 2001, and it currently appears to be

defunct. Two studies, one in 2008 and one in 2009 used it on undergraduate students. Somerville, Smith & Macklin (2008) used it to inform problem-based learning curriculum at Purdue University. Snow and Katz (2009) used student interviews to help add validation to the test. Project SAILS (Standardized assessment of information literacy skills) has been in use since 2006 and is aligned with the ACRL 2000 Information Literacy Competency Standards for Higher Education (Rumble & Noe, 2009). In 2007, the Information Literacy Test (ILT) was developed at James Madison University and assessed four of the five standards from 2000 (Cameron, Wise, & Lottridge). It is available for a fee. The Beile Test of Information Literacy for Education (B-TILED) was developed in 2005 and has since been used for both undergraduate and graduate students (Beile, 2005). Zhao, et al. (2023) used this instrument in a study of graduate students at the University of Windsor. Michalak and Rysavy (2016) developed the Information Literacy Assessment (ILA) in 2015 for use with international graduate business students who happened to be mainly IT students. The study combined the ILA with the SPIL-Q scale. Findings showed that students overestimated their information literacy abilities. In 2019, researchers in London, UK, developed the Open Test of Information Literacy (OTIL) and provided it free for educators to use (Hollis, et al., 2019b).

Table 3

Information Literacy Knowledge Tests

Name	Date	Test	Sample	Validity	Reliability	Notes
The iSkills™	2001	15 item simulation-based tasks	Used in the United States	Cronbach's alpha 0.88	Cronbach's alpha 0.88	Cost involved (Katz, 2007).

B-TILED	2005	22- 24 multiple choice content questions	Used in the United States and Canada	Construct, content, criterion-related validity, and factor analysis	Stability and internal consistency procedures	Free (Beile, 2005; Zhao, 2023).
Project Sails	2006	Individual, cohort, and build your own tests. 45-50 multiple choice questions.	Used in the United States a	External validation Cronbach's alpha > 0.80	Rasch software, Winsteps, inter-rater reliability, correlation 0.98 between versions	Cost involved
ILT	2007	60 item multiple choice questions	Used in several countries	Construct and content validity. Cronbach's alpha 0.74, Ferguson's delta 0.97. (Podgornik et al., 2016)	Internal consistency	Cost involved Created in coordination with the ACRL (Swain, et al., 2020).
ILA	2015	60 item multiple choice test	Used in the United States with international graduate students	Not mentioned	Inter-rater reliability	Free (Michalak and Rysavy, 2016; Michalak, et al., 2017)
OTIL	2019	Three separate tests of 22 multiple choice questions	Used in the UK and US	Face validity	For future development	Free (Hollis et al., 2019b)

Online Learning Modules

Turning to the implementation of more structured online learning modules, there are many examples, ranging from general to discipline specific content built for online graduate students. Ladell-Thomas (2012) describes the implementation of self-directed online learning modules at Central Michigan University built specifically for graduate students who needed instruction on writing literature reviews. In addition to one-shot instructional sessions, librarians had already created research guides using LibGuide website software, so building on that foundation they used the ADDIE (analyze, design, develop, implement, and evaluate) method of instructional design to expand the module to include videos and other types of multimedia and self-assessments. In 2012, Pintz & Posey (2013) created online learning modules for graduate nursing students at George Washington University to help with persistence and decrease the attrition rate. More recently, Shepherd & Milewski (2021), social work faculty and librarians at the University of Tennessee Knoxville, collaborated to create online learning modules for beginning social work students at the undergraduate and graduate level to introduce foundational skills at the beginning of the program.

Graduate Students Need for Information Literacy Instruction

In addressing the need for information literacy for graduate students, the literature suggests that graduate students still need information literacy instruction as it can't be assumed that they are knowledgeable and skilled enough to successfully navigate their course of study without further instruction. Several articles spanning the last two decades show that information literacy instruction for graduate students is still needed. As early as 1998, Jiao and Onwuegbuzie identified that graduate students, even with all of their earlier schooling, still can have library anxiety which they found is related to perfectionism. In a later study, Jiao, Onwuegbuzie, and

Bostick, (2006) found that library anxiety differs among students of different races, at least when it comes to African American and white students. African American students were found to have lower levels of anxiety, but further research is needed to understand why.

Library anxiety was also evident among Master of Occupational Therapy (MOT) students. Moghimi and Rickelman (2021) found that consulting with a librarian about research increased their confidence level and their comfort in using the library. Even doctoral students can benefit from information literacy training. Tunon and Ramirez (2010) studied the problem of Ed.D. students who struggled during the dissertation process and were in danger of ending up ABD. They found that a library training program at that critical time helped students. Several studies have looked at graduate library science students, who might be assumed to have better information literacy skills than other students. Lamb (2017), Hebert and Duet (2017), and Hebert (2018) found that this was not the case as Master of Library Science students still needed help with information literacy skills and sometimes overestimated their abilities. In a study at Rutgers University, Fong (2019) found that graduate students were eager to take part in a "Boot Camps for Graduate Student Success" which included higher level literature research skills. Xie & Savory (2022) worked with graduate engineering students on library instruction in search strategies, citation management, literature review, evaluations of sources and avoiding plagiarism with the goal of students completing a satisfactory literature review.

Information Literacy in the Online Environment

Students have always needed instruction in how to determine their information need, search for, identify sources and evaluate sources, use them in a paper and correctly cite them in a finished product be it in print, oral, visual, or multimedia. However, studies have shown that with the advent of online sources, identifying and evaluating them has become more difficult, mainly

because different types of sources tend to look the same online. In the past, students could identify types of sources by looking at the physical container it came it. It was easy to distinguish between a book, a newspaper, and an academic journal. However, with online sources these distinguishing characteristics are not always readily apparent, and they keep changing due to technology. In 2004, OCLC published a report that discussed the loosening of formats and containers as online sources became more prolific which gave rise to a new problem as containers were less recognizable and content became more important than how it was housed. The Researching Students' Information Choices (RCIS) Project funded by a grant from the Institute of Museum and Libraries Services (IMLS) in 2015 is credited with coining the term "container collapse" which describes the breakdown of students being able to distinguish between types of sources easily and correctly (Buhler, et al., 2019; Buhler, et al.,2023; Cyr, et al., 2021; Cyr 2022). During this project, researchers studied students ranging from elementary school to graduate students and how they selected and evaluated sources. Graduate students were able to identify the correct containers 63% of the time with the average among all participants being 51%. Elementary students were able to identify 37% of the containers correctly. Findings showed that the students could not use simple methods to identify containers and required time to explore the sources and think carefully about them, since using just the URL and visual appearance was not helpful (Cyr et al., 2021; Cyr, 2022). Connaway (2018) and Cyr et al. (2021) recommend that librarians and teachers focus more on the concepts of container and genre to aid in correct identification. Andersen (2008) felt that librarians should employ the use of genre theory more and that it would aid in the understanding of different types of information sources.

Summary

This literature review covered topics pertaining to the study of information literacy skills and self-efficacy among beginning online graduate students. Starting with an overview of the online graduate student as a learner then moving on to theoretical frameworks of Erickson's Psychosocial Development Theory, Schlossberg's Transition Theory, Maslow's Hierarchy of Needs, and Bandura's work in motivation and self-efficacy in relationship to these learners, the focus then shifted to learning theories, including adult learning theories and online learning theories and instructional design. The last section covered the history of information literacy, including standards, methods, assessment, and the need for information literacy skills.

These topics are all relevant to beginning online graduate students ranging in age from their early twenties to retirement age, and who are in a time of transition as they begin a new graduate program which will require them to use high level research skills. Since they are all entering with different academic backgrounds and time between degrees, giving them an information literacy orientation in the way of online modules at the beginning of their program will hopefully set them up for success.

CHAPTER III: METHODOLOGY

It is often assumed that graduate students already possess all the information literacy skills that they need in order to succeed at the graduate level. Excluding subject specific knowledge and skills that come as students progress through their graduate coursework, the basics of research and information literacy skills are thought to have been taught during their undergraduate coursework. However, since students come to graduate school with different undergraduate experiences and varying time between degrees, there is often a need for basic information literacy instruction to get everyone up to speed (Hebert, 2018; Lamb, 2017; Saunders et al., 2015; Geary, 2022; Stiles, 2012; Hebert et al., 2023). As stated in Chapter I, the purpose of this study was to examine the information literacy skills and self-efficacy of incoming online graduate students to determine if online modules introduced as a self-guided orientation to graduate research are helpful for student success and increase their information literacy knowledge and self-efficacy. To capture a more comprehensive understanding of this issue, a mixed methods design was chosen to bring more depth to the research than either a purely quantitative or qualitative study could have done (Creswell & Creswell, 2018).

This chapter discusses the three main areas of the methodology. First, the research design and rationale, setting and context are explained in detail including information about the population, and sample. Next, the data collection procedures and analysis methods are mentioned at length. Lastly, the ethical considerations, as well as the limitations and delimitations are considered.

Research Questions

The following research questions were crafted with the intention of capturing what would be feasible to learn from this mixed methods study of incoming online graduate students.

RQ 1. What levels of information literacy knowledge do incoming online graduate students at MTSU possess and can they be improved through participation in voluntary information literacy modules?

RQ1a How does participation in IL Modules impact level of information literacy knowledge?

RQ1b Which information literacy areas of the 2016 ACRL Framework are most affected by participation in IL Modules?

RQ 2. What levels of information literacy self-efficacy beliefs do incoming online graduate students at MTSU possess and can they be improved through participation in voluntary information literacy modules?

RQ2a How does participation in IL Modules impact level of information literacy self-efficacy?

RQ2b Which information literacy self-efficacy areas of the 2016 ACRL Framework are most affected by participation in IL Modules?

RQ 3. How do incoming graduate students describe their experience with the information literacy modules?

RQ 4. How do incoming online graduate students feel about their competency to handle graduate level research going forward?

Research Design and Rationale

This study followed an explanatory sequential mixed methods design where quantitative data is collected and analyzed first and is used to inform the subsequent qualitative phase (Creswell & Creswell, 2018). Approval was supplied by the Institutional Review Board (IRB). See Appendix A. This method was chosen in order to gain a more robust understanding of the problem than could be found using only qualitative or quantitative data. The qualitative data was then used to provide more explanation from the results of the quantitative data. In this study, quantitative data was collected first from a survey instrument that included seven demographic questions, the OTIL information literacy knowledge test (Hollis, et al., 2019a) and the ILSES information literacy self-efficacy scale (Kurbanoglu, et al., 2006). Students then completed a series of six instructional information literacy modules in D2L, the university's LMS. Next, the students were given a post-test consisting of the same OTIL information literacy knowledge test and the ILSES information literacy self-efficacy scale. Lastly, students who consented were invited for individual interviews where qualitative data was collected. Combining self-efficacy scales and knowledge tests is not a new idea. Wendekier (2015) used this type of design using the ILSES and a different knowledge test with undergraduate nursing students. Geary (2022) used this method in their dissertation study with undergraduates in South Carolina. See Figure 9.

Figure 9

Geary's Flow of Research Design

This study used a similar design, only with beginning online graduate students. The logic of the research design including the research questions, data collected and planned means of data analysis are shown in Table 4.

Table 4

Logic of Research Design

Research Question	Data Collected	Data Analysis Technique
RQ 1 What levels of information literacy knowledge do incoming online graduate students at MTSU possess and can they be improved through participation in voluntary information literacy modules?	Project survey items # 7-28	Descriptive Statistics and Paired Samples T-Test
RQ 2 What levels of information literacy self-efficacy beliefs do incoming online graduate students at MTSU possess and can they be improved through participation in voluntary information literacy modules?	Project survey items # 29-57	Descriptive Statistics and Paired Samples T-Test
RQ 3 How do incoming graduate students describe their experience with the information literacy modules?	Interviews	Inductive In Vivo, Descriptive and Process Coding
RQ 4 How do incoming online graduate students feel about their competency to handle graduate level research going forward?	Interviews	Inductive, In Vivo, Descriptive and Process Coding

Research Context

This study was conducted at Middle Tennessee State University, which is the second largest public school in the state (MTSU, 2017a), in the Fall 2023 and Spring 2024 terms. This institution has a Carnegie Classification of R2 and enrolls over 20,000 students, including nearly 3,000 graduate students. (MTSU, 2023a). In 1997, MTSU launched their first online courses which consisted of 53 students in seven classes (MTSU, 2017b). Since then, it has expanded and the College of Graduate Studies now offers more than 100 graduate programs and 15 online graduate programs (MTSU, 2023b).

Population and Sample

Online graduate students are the focus of this study, so to capture the information literacy and self-efficacy beliefs that these students have when starting their graduate program, a full sample of the incoming online graduate students for the Fall 2023 and Spring 2024 terms were invited to participate. According to the College of Graduate studies who assisted in identifying beginning online graduate students, in Fall 2023, there were a total of 398 incoming online graduate students at MTSU who were starting online graduate programs. In Spring 2024, there were 214 incoming online graduate students. This study included only students whose program was fully online. This means that any student who was an incoming graduate student who was enrolled in a hybrid or on-ground program was excluded. All 612 of these incoming online students were invited to participate in the pre-test survey, the six online information literacy modules, and the post-test survey. They were also given an opportunity to indicate if they were willing to participate in follow-up interviews. An information literacy badge was created in D2L and students who completed the study received a badge as an incentive. The initial plan was for a

stratified purposeful sample of 6-10 students whose information literacy knowledge and/or self-efficacy beliefs changed the most from pre to post test would be chosen for individual interviews (Creswell & Creswell, 2018; Creswell & Poth, 2018). However, since only 37 students completed the study, and only ten of those consented to an interview, all of the students who consented to an interview were invited, resulting in ten interviews being completed.

Information Literacy Modules

Six information literacy modules were created in a course shell in D2L by the researcher for this study. The modules included 1) The research process, 2) Types of information sources, 3) Finding sources, 4) Evaluating sources, 5) Citing and incorporating sources, and 6) Extra library resources. These modules included links to informative websites, written articles, videos, interactive activities, and handouts. Two interactive H5P activities were built for this purpose: one was a short quiz on the research process, and the other was a drag and drop activity showing the proper order of a journal entry citation. They were both designed to be used multiple times and to show correct and incorrect answers. The modules were situated between links to the pre-survey and the post-survey and were locked to the students until they completed the pre-survey which unlocked the modules. The modules were designed to take approximately two hours to complete including the pre-survey and post-survey. The information literacy badge was created in D2L and awarded to participants who completed the pre-survey, modules, and post-survey. The badge is designed to stay with the student for the duration of their degree.

Data Sources

Quantitative data came from three sources: OTIL knowledge test (Hollis et al., 2019a), the ILSES self-efficacy scale (Kurbanoglu et al, 2006), and seven demographic questions. They are described more in detail here.

OTIL Knowledge Test

The OTIL test includes three sets of multiple-choice questions that can be used for multiple purposes. For this study, questions from test one were used for both the pre and post surveys. See Appendix B. In this set of questions, there are twenty-two questions, twelve general information literacy questions and ten geared towards higher education. The multiple-choice questions all have four possible answers, including "I don't know". They are categorized into five areas of information literacy as seen in Table 5 (Hollis et al., 2019a).

Table 5

OTIL Subscales based on CILIP

Categories	**Questions**
Ability to discover and access information	GD1, GD2, HD1, HD2
Critical thinking ability	GC1, GC2, HC1, HC2
Ability to manage and store information effectively	GM1, GM2, HM1, HM2
Ability to use and create information	GU1, GU2, HU1, HU2
Ability to share and communicate information	GS1, GS2, HS1, HS2
Understanding of ethical issues surrounding information	GE1, GE2, HE1, HE2

Since the OTIL was created by researchers in London, the tests use British English spelling. In order to have the test fit users in the United States, the researcher asked permission from the creators of the OTIL to modify it for use in America which was approved. Together with librarians from the Walker Library at MTSU, the researcher amended the test questions to include American spellings and situations without changing the nature of the test. Examples of spelling changes are "neighbours" to "neighbors" and "specialised" to "specialized", and "centre" to "center". Examples of cultural references that were amended to fit an American audience include the change of "Museum of London" to "The National Archives Museum", the

reference to “Hyde Park” changed to “Central Park”, and “local council” changed to “local city council”. The OTIL outcomes produced ratio data.

ILSES Self-Efficacy Scale

The ILSES consists of twenty-eight questions on a seven-point Likert type scale with 1 = almost never true, 2 = usually not true, 3 = sometimes but infrequently true, 4 = occasionally true, 5 = often true, 6 = usually true, and 7 = almost always true. The questions are categorized into six categories as shown in Table 6 (Kurbanoglu et al, 2006).

Table 6

ILSES Subscales

Categories	**Questions**
Defining the need for information	A1
Initiating the search strategy	B2,3,4,
Locating and accessing the resources	C5,6,7,8,9,10,11,12
Assessing and comprehending information	D13,14,15,16,17
Interpreting, synthesizing, and using information	E18,19
Communicating Information	F20,21,21,23,24,25,26
Evaluating the product and process	G27,28

The ILSES was created originally in Turkish. In order for the scale to be used by English users, it was translated into English and tested by students at Hacettepe University (Kurbanoglu et al, 2006). Since the original English translation is unclear in parts, and due to the passage of time and the change in language and information retrieval practices, the researcher contacted Dr. Kurbanoglu and was given permission to amend the scale for contemporary American English

usage without changing the nature of the scale. See Appendix C. The following examples are a sample of the changes made to the scale. Question 7 was amended from "Use electronic information sources" to "Use online information sources". Questions 13 was amended from "Use many resources at the same time to make a research" to "Use many resources at the same time while researching". Question 28 was amended from "Criticize the quality of my information seeking process and its products" to "Critique the quality of my information seeking process and the end product". The full scale can be seen in Appendix D. The ILSES questions provided ordinal data that can be treated as interval data (Carifio & Perla, 2008).

Because both the OTIL and ILSES were created using different standards, an attempt was made to create a crosswalk and to include the 2016 ACRL Framework in Table 7.

Table 7

Crosswalk Between Instruments and Framework

OTIL	**ILSES**	**Framework**
Not Included	Defining the need for information	Research as Inquiry Searching as Strategic Exploration
Ability to discover and access information	Initiating the search strategy Locating and accessing the resources	Searching as Strategic Exploration Research as Inquiry Authority is Constructed and Contextual
Critical thinking ability	Assessing and comprehending information Interpreting, synthesizing, and using information	Research as Inquiry Authority is Constructed and Contextual
Ability to use and create information Ability to share and communicate information	Communicating Information	Information Creation as Process Scholarship as Conversation Information Has Value

Understanding of ethical issues surrounding information		
Ability to manage and store information effectively	Not Included	Information Creation as Process
Not Included	Evaluating the product and process	Information Creation as Process

Demographics

Seven demographic questions were asked at the end of the pre-survey. They included nominal data such as race, gender, which graduate program they were enrolled in, the level of their last degree (bachelor, master, etc.), and what subject area their last degree was in. Then there were two questions that included ratio data: their age and the number of years since they completed their last degree.

Matching

In order to match pre-survey and post-survey responses for comparison, a single point of identification was needed to ensure that results were matched properly. To this end, students were asked to provide their official university email address on the pre-survey and again on the post-survey so that pre-survey and post-survey responses could be matched using Excel and then SPSS. Once responses were matched, email addresses were removed, and students were assigned a case number to ensure anonymity.

Qualitative

Qualitative data came from individual interviews with ten of the study participants who consented to be interviewed after completing the post-survey. Students who consented to

interviews were emailed and invited to a thirty-minute interview which was conducted via Zoom. The interviews were recorded with the student's permission for transcription purposes. The individual interviews were semi-structured and focused on student's experiences with the modules and their feelings about their preparedness for conducting graduate level research. The interview protocol was approved by the IRB and can be seen in Appendix E. Transcripts were downloaded from Zoom and uploaded to ATLAS.ti for analysis.

Data Collection Procedures

The pre- and post-surveys comprised of the OTIL, ILSES, and demographic questions that were built in Qualtrics during the Summer 2023 term and distributed right before the start of the Fall 2023 and Spring 2024 semesters in order to catch students at the beginning of the semester, as they were first starting their courses. See Appendices A and B. Eligible students were manually loaded into the course shell containing the modules with the help of the LMS administrators. An invitation to participate in the study was sent out via email to all incoming online graduate students with help from the graduate office three days before the start of the Fall 2023 term and one week before the Spring 2024 term. The email included a link to the D2L Modules which directed students to begin with a link to the pre-test. In addition, the modules could be seen when the students logged into their D2L. The course shell was set up so that in order to view the modules, students had to complete the pre-survey, which unlocked the modules. There were instructions about the modules in the email and at the end of the pre-test survey. After students worked through the modules, they were given a link to the post-test. At the end of the post-test, students indicated their willingness to participate in the interviews as they complete the post-test. Students who responded as potentially being interested in participating in

an interview were contacted via email about participating in the interviews via Zoom. Interviews were recorded by consent for transcription purposes.

Data Analysis Methods

Quantitative

The data from the pre-surveys and post-surveys were downloaded from Qualtrics into Excel where the responses were matched according to student's email addresses. Responses with incomplete answers to the OTIL and ILSES were excluded. OTIL scores had to be transformed from the answer choice number to '0' for an incorrect answer and '1' for a correct answer. Scale data from the ILSES showing answers from 1-7 were uploaded into SPSS for analysis. These data were then uploaded into SPSS for further analysis.

To ensure normal distribution, Q-Q Plots were run on the OTIL pre-survey and post-survey results. Normal distribution is shown in Figures 10 and 11.

Figure 10

Distribution of Q-Q Plot data for OTIL Post-Survey

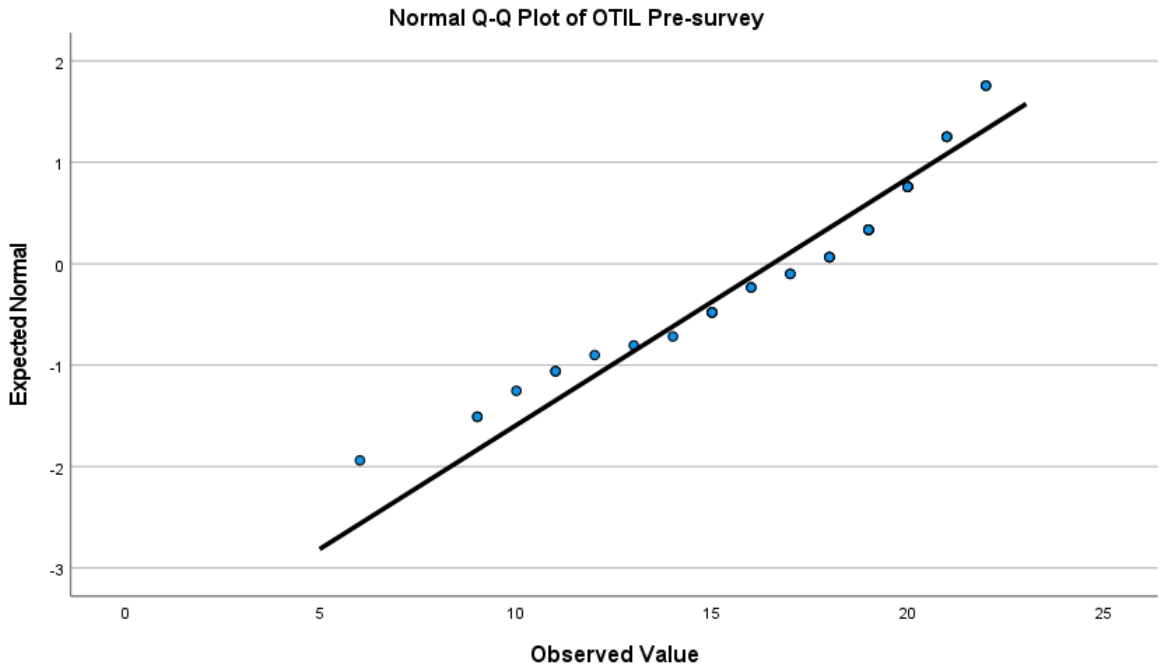
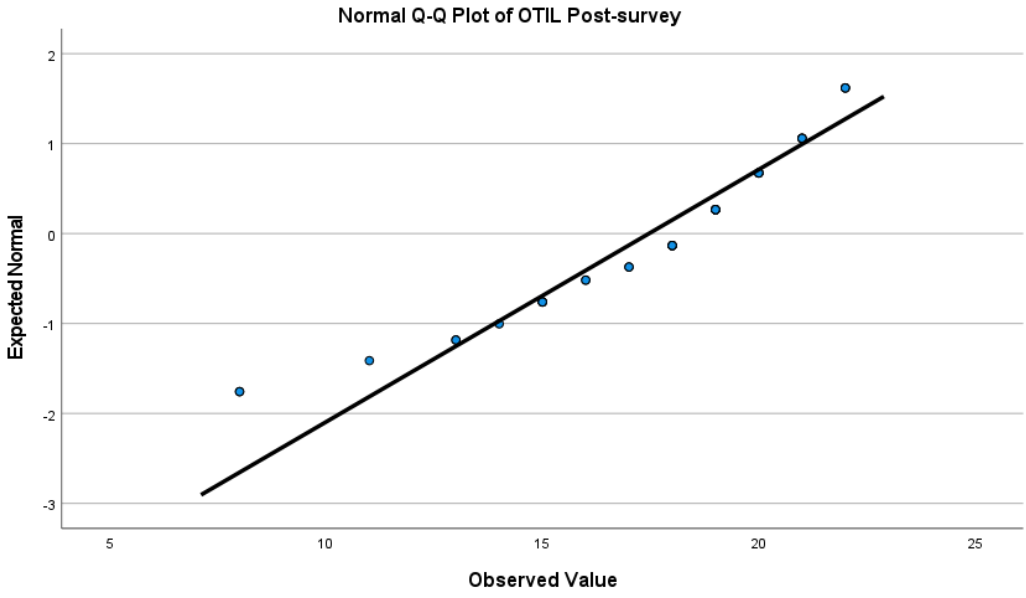


Figure 11

Distribution of Q-Q Plot data for OTIL Post-Survey



To ensure normal distribution, Q-Q Plots were run on the ILSES pre-survey and post-survey results. Normal distribution is shown in Figures 12 and 13.

Figure 12

Distribution of Q-Q Plot data for ILSES Pre-Survey

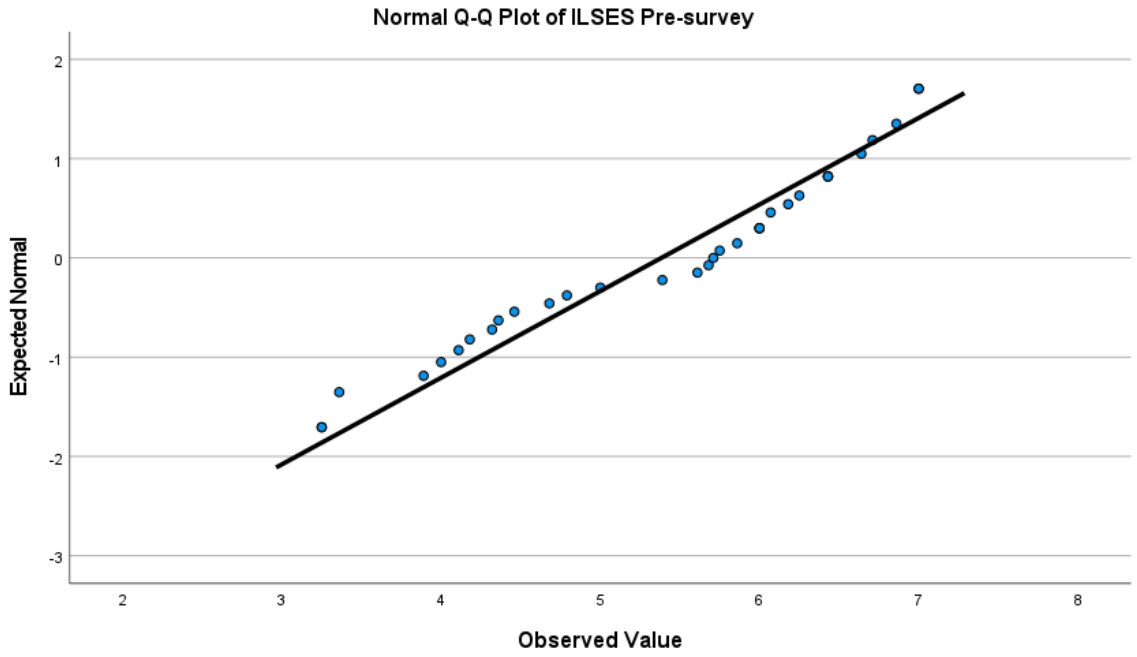
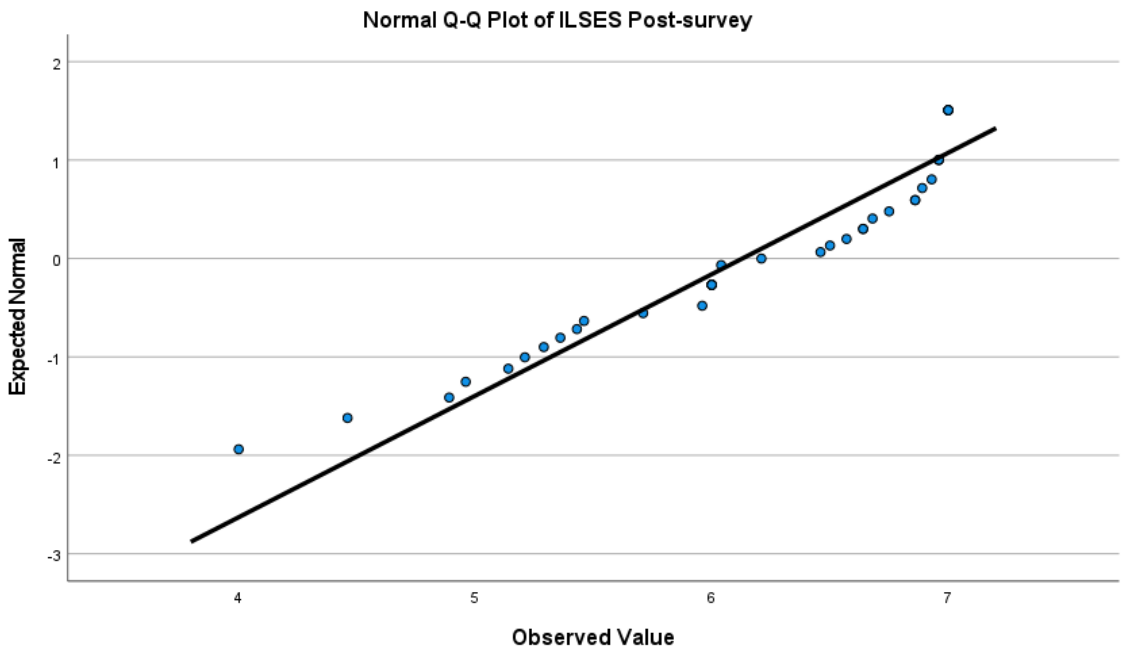


Figure 13

Distribution of Q-Q Plot data for ILSES Post-Survey



In order to answer the questions that focused on how the student's information literacy knowledge and self-efficacy scores changed after the intervention, first the data from the OTIL and ILSES were analyzed using descriptive statistics including frequency, means, and range. Then, aggregate data from the OTIL and ILSES were analyzed for differences using a Paired Samples T-Test. Then, in order to understand which Frames of Information Literacy (ACRL) were most affected by competing the modules, further analysis was performed using descriptive statistics. The demographic data from the pre-survey was analyzed for frequency and means using Excel and SPSS.

Qualitative

The qualitative data collected via the Zoom interviews was uploaded into ATLAS.ti to aid with analysis. See Appendix F. The researcher used an inductive approach to explore the qualitative data from the interviews. This approach informed the presentation of the findings.

The process the researcher used resembled a *Data Analysis Spiral* which includes "managing and organizing the data, reading and memoing emergent ideas, describing and classifying codes into themes, developing and assessing interpretations, and representing and visualizing the data" as introduced by Creswell & Poth (2018, p. 186). Interview data was coded first using In Vivo coding, then the data was into categories by applying codes. From there, the data was reduced again into themes which provided a framework for representing the data (Saldana, 2008). While the qualitative data analysis was completed individually by the researcher, the Chair was consulted along the way to check the process.

Issues of Trustworthiness

The validity and reliability of any mixed methods study is dependent on the validity and reliability of the quantitative and qualitative methods independently. In this explanatory sequential mixed methods case study, qualitative data helped inform the quantitative data and provide a more complete picture. The triangulation of data came from the survey, interviews, and the analytic memoing used throughout the project.

Validity and Reliability

In this study, the quantitative data comes from seven demographic questions, the OTIL knowledge test questions and the ILSES scale. Both the OTIL and the ILSES have been validated multiple times by other researchers as noted in the literature review. The ILSES had an original Cronbach Alpha of 0.92 and has been used in several studies (Kurbanoglu, 2006; Wendekier, 2015; Geary, 2022; Mahmood, 2017; De Meulemeester et al., 2018; Spisak, 2023). Geary (2022) used both the OTIL and the ILSES in her mixed-methods study on undergraduate students which closely parallels this study on graduate students. Reliability was also established for each instrument and calculated again during this study.

OTIL

The OTIL was created by Hollis et al., and face validated by a panel of library experts (2019a). Further analysis was never done by the originators, however several other studies have used this instrument and provided reliability statistics. Geary (2022), who was one of the experts who participated in the face validation of the OTIL found that the knowledge test showed a Cronbach's Alpha score of .74, which falls in the acceptable range according to Manerikar and Manerikar (2015). In this study, Cronbach's Alpha was higher, showing a score of .82 on the 22 question OTIL. according to Manerikar and Manerikar (2015), scores between 0.8 and 0.9 are categorized as good.

ILSES

Although the ILSES has been validated and shown to be reliable in other studies, when the creators of the scale gave permission to use it, they also expressed the need for it to be updated into modern American English which was corroborated by Sommer et al. in their 2021 study. This was done in a pilot study directly prior to this one using Summer 2023 online graduate students. Internal consistency and reliability can be evaluated using the Cronbach's Alpha test. The Cronbach Alpha was calculated again using the new amended version of the scale with the results showing a Cronbach's Alpha of .976, which ranks as excellent according to Manerikar and Manerikar (2015) which categorizes anything over .90 as excellent.

Qualitative Data

The qualitative data followed used an in vivo and descriptive coding process that included triangulation, peer examination, and clarification of researcher bias (Saldana, 2008; Creswell & Creswell, 2018).

The researcher took care to use the same sample of students for both the quantitative and qualitative phases of this study. Analytic memos were kept during the qualitative process to provide opportunities for reflection.

Summary

This explanatory sequential mixed methods case study on the information literacy knowledge and self-efficacy beliefs of online graduate students explored the use of online information literacy modules introduced in the orientation phase of a student's first semester and whether they had any effects on students. Analysis of the pre and post survey data were completed. In addition, descriptive statistics were used to compare the subscales within the OTIL and ILSES. Results were then cross walked with the ACRL Framework. Qualitative data from interviews was analyzed to help further explain the qualitative results, enhancing the overall picture.

CHAPTER IV: FINDINGS

This study looked at a sample of incoming online graduate students in the Fall 2023 and Spring 2024 terms to determine the information literacy skills and self-efficacy of incoming online graduate students and to determine if self-guided online orientation modules can help increase self-efficacy and information literacy knowledge. Quantitative and qualitative data were collected in order to answer the four research questions:

- RQ1 What levels of information literacy knowledge do incoming online graduate students at MTSU possess and can they be improved through participation in voluntary information literacy modules?
- RQ2 What levels of information literacy self-efficacy beliefs do incoming online graduate students at MTSU possess and can they be improved through participation in voluntary information literacy modules?
- RQ3 How do incoming graduate students describe their experience with the information literacy modules?
- RQ4 How do incoming online graduate students feel about their competency to handle graduate level research going forward?

This chapter will discuss the four research questions and their sub questions starting with the analysis and findings first of the quantitative data from the pre and post surveys and then the qualitative data from the follow-up interviews.

Quantitative Analysis and Findings

Quantitative data were collected from pre and post surveys that were offered to incoming online graduate students at the beginning of the Fall 2023 and Summer 2024 terms. A total of 612 students were identified as beginning online graduate students by the College of Graduate Studies and invited by email to participate in the study, 398 in Fall 2023 and 214 in Spring 2024. A total of 112 responses (18%) were collected for the pre-survey between the two terms. For the post-survey, 39 responses were recorded. Two post-survey responses were unable to be matched

with the pre-survey, resulting in 37 complete matched responses which is a 33% completion rate from the 112 who started the study, and a 6% completion rate overall.

Demographic Data

Seven demographic questions were asked of the students. Of the 37 matched respondents, one declined all the demographic data, leaving a total of 36 responses for each of the seven demographic questions except for age, which had 35 responses because one student declined to answer that question. Students were asked which program they were currently enrolled in. Table 8 shows the breakdown of master's level and doctoral programs represented by the respondents.

Table 8

Current Program Enrollment of Respondents

Degree	Number	Percentage
Ed.D. Assessment, Learning, and Student Success – Higher Education	3	8.3
Ed. S Administration and Supervision – Higher Education	1	2.8
M.B.A Business Administration	9	25.0
M.C.J. Criminal Justice Administration	3	8.3
M.Ed. Administration and Supervision	1	2.8
M.Ed. Curriculum and Instruction	2	5.5
M.L.S. Library Science	2	5.5
M.M. Music	1	2.8
M.P.S. Professional Studies	6	16.7
M.S. Finance	1	2.8
M.S.N. Nursing	6	16.7
M.S.W. Social Work	1	2.8
Total	36	100.0

The representative numbers in Table 8 corresponded with enrollment numbers for the different graduate programs. Health Sciences, Business, Education, and Professional Studies programs had higher enrollment than other graduate programs overall.

Students were asked about the level of their last degree. Five students (13.9%) reported that their last degree was a master's degree and 31 (86.1%) stated that their last degree was at the bachelor's level (n = 36). Next, students were asked which subject area their last degree was in. Students reported degrees in 21 different subject areas, the most common being nursing, which accounted for 6 (16.7%) of the responses (n = 36). Table 9 shows the breakout of subject areas.

Table 9

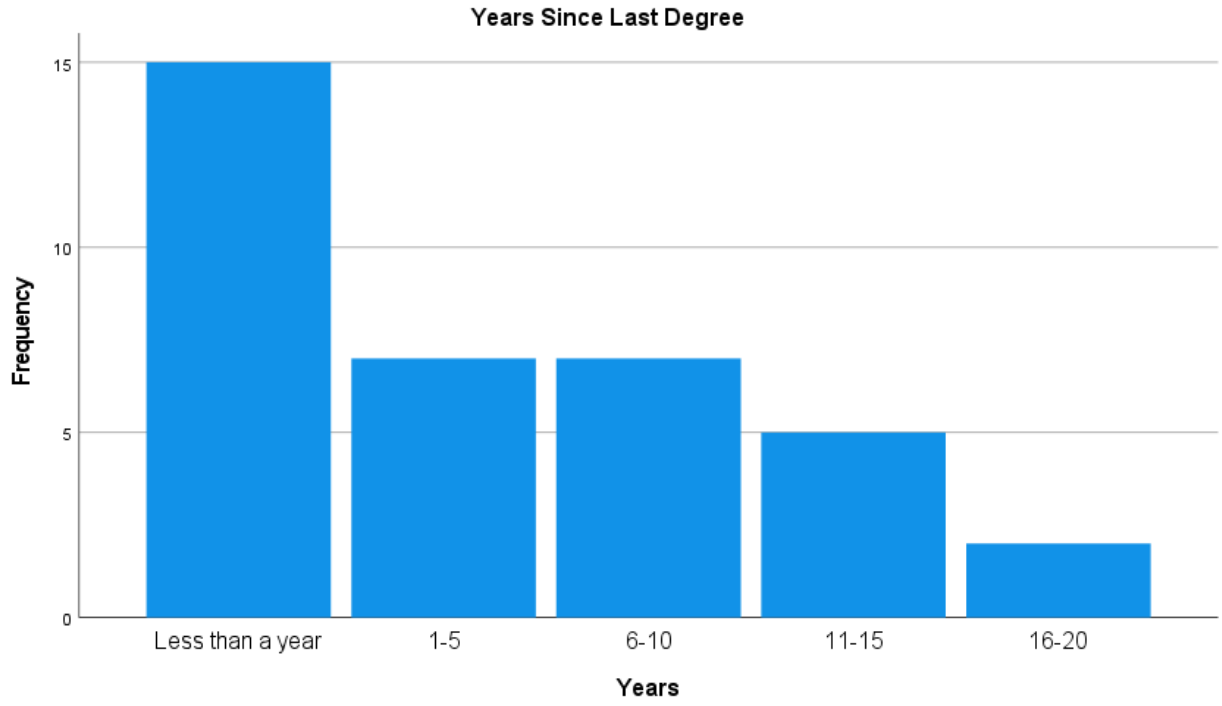
Last Degree Earned

Degree	Number	Percent
Accounting	2	5.5
Audio Production	1	2.8
Biochemistry	1	2.8
Business	3	8.3
Communication Studies	1	2.8
Criminal Justice	2	5.5
Finance	1	2.8
Health	4	11.1
History	1	2.8
Integrated studies	3	8.3
Liberal Studies	1	2.8
Management	1	2.8
Neuroscience	1	2.8
Organizational Leadership	2	5.5
Nursing	6	16.6
Interdisciplinary Studies	1	2.8
Music	1	2.8
Education	1	2.8
Social Work	1	2.8
Theatre	1	2.8
Training and Development	1	2.8
Total	36	100.0

Next, students were asked how many years it had been since they completed their last degree. Out of the 36 students, 40% (15) reported having been out of school less than a year (n = 36). The full breakdown of responses is shown in Figure 14.

Figure 14

Number of years since last degree

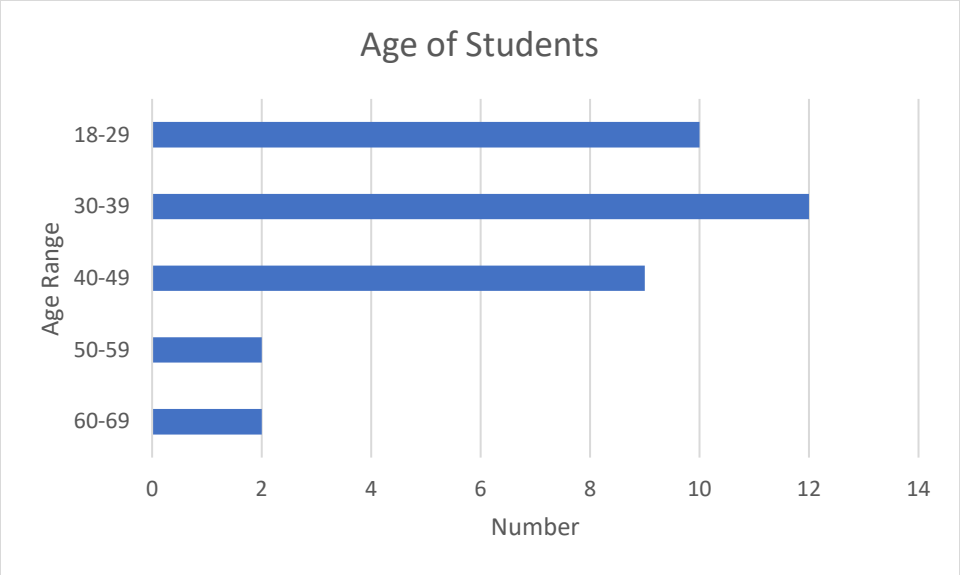


Responses by gender showed that 28 (75.7%) identified as female and 8 (21.6%) identified as male (n = 36). According to university data, of the graduate students enrolled in the 2022-2023 academic year, 63.5% of graduate students identified as female and 36.5% as male (MTSU, 2023d).

Figure 15 shows the reported age range of student respondents. The average age of all respondents was 36.5 years (n = 36).

Figure 15

Age of Respondents (n = 35)

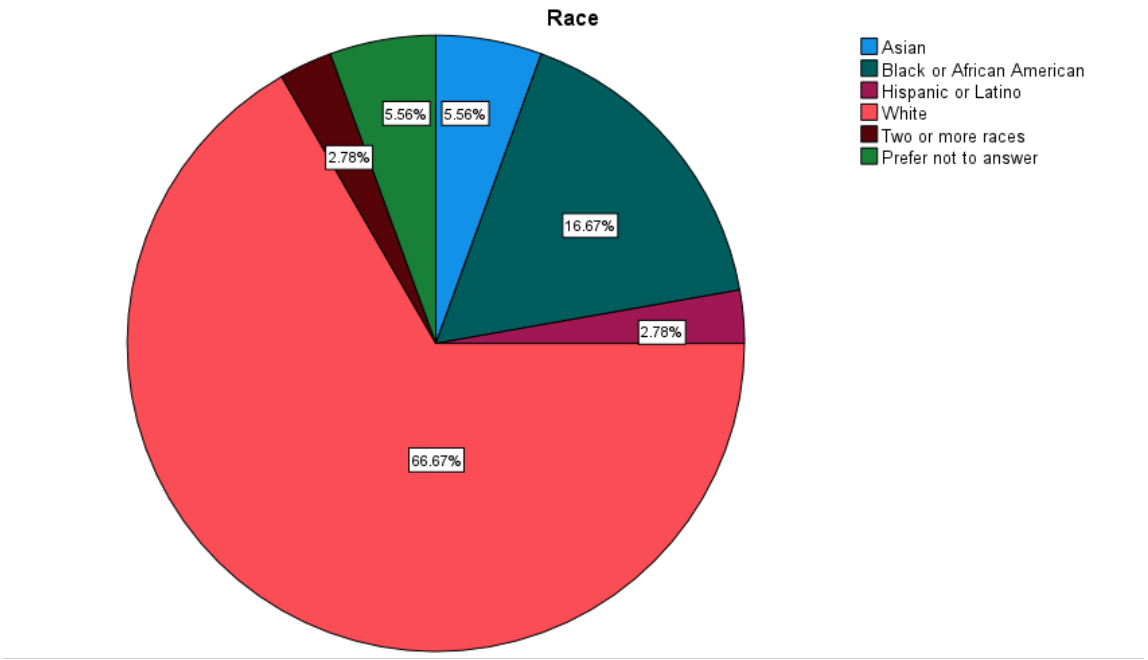


According to university data, 20.6% of graduate students enrolled in 2022-23 were under the age of twenty-five and 79.4% were age twenty-five or older (MTSU, 2023d).

The last of the demographic questions had to do with race. Three students preferred not to answer this question. The largest group of students 24(66.7%) identified as white (n = 34). The full breakdown can be seen in Figure 16. University data for graduate students enrolled in the 2022-2023 academic year show similar percentages.

Figure 16

Respondents by Race



The demographic data for respondents who completed the study showed similar demographics to graduate students at the university, especially in the area of race, gender, age, and the programs represented by students. Data regarding the length of time since last degree, subject area of last degree, and level of last degree at the university level was not readily available.

Quantitative Research Questions, Data, and Analysis

RQ 1. What levels of information literacy knowledge do incoming online graduate students at MTSU possess and can they be improved through participation in voluntary information literacy modules?

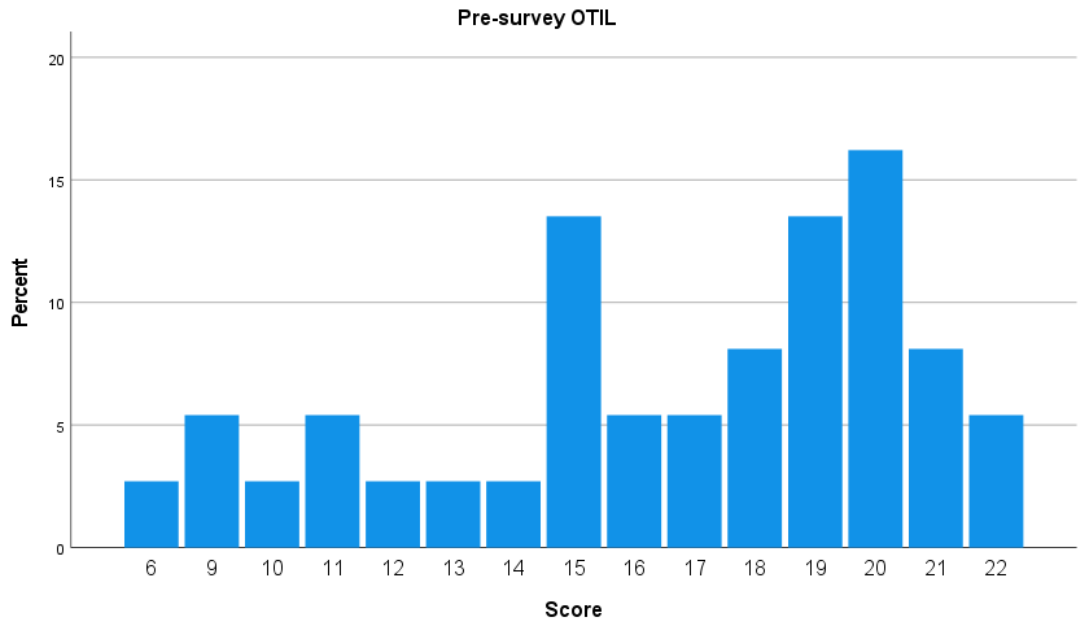
RQ1a How does participation in IL Modules impact level of information literacy knowledge?

RQ1b Which information literacy areas of the 2016 ACRL Framework are most affected by participation in IL Modules?

To answer this first research question, first the pre-instruction scores represented by the OTIL knowledge test pre-survey scores were analyzed using descriptive statistics to show the baseline information literacy knowledge incoming online graduate students showed in the OTIL. The OTIL test includes 22 questions, with a total possible score of 22. The pre-survey scores ranged from a low of 6 (27%) to a high of 22 (100%). The mean score was 16.54 (75%) (n = 37). The median score was 18, and the standard deviation was 4.114. The scores can be seen in Figure 17.

Figure 17

Pre-survey OTIL Scores



Post-instruction scores represented by the post-survey scores were then calculated in the same way. The post-survey scores ranged from a low of 8 (36%) to a high of 22 (100%). The mean score was 17.46 (79%) (n = 37). The median score was 18, and the standard deviation was 3.564. The scores can be seen in Figure 18.

Figure 18

Post-survey OTIL Scores

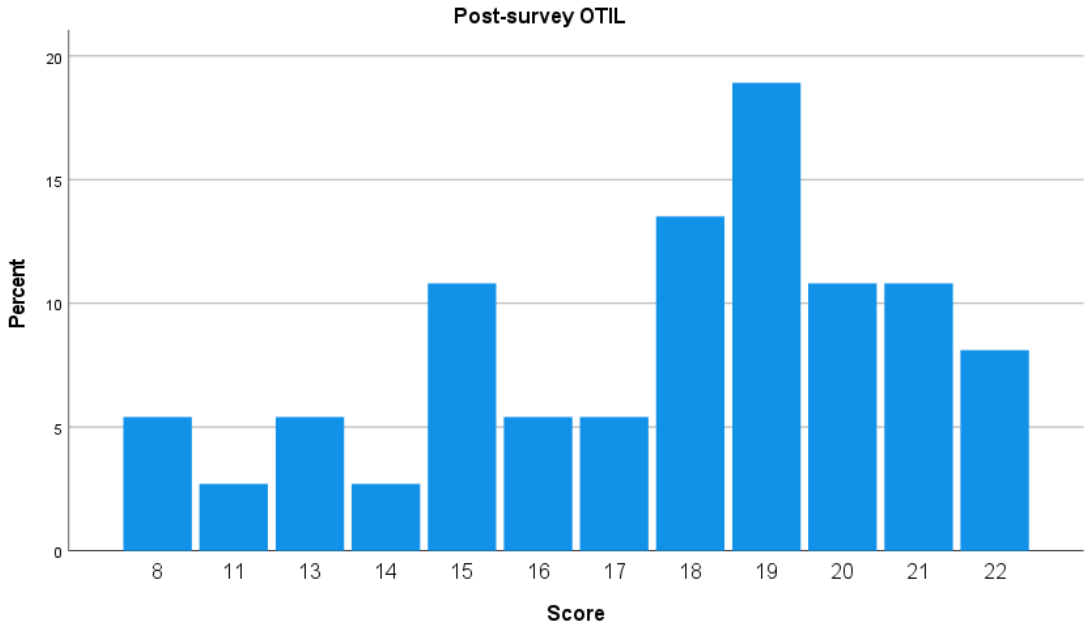


Table 10

Pre-survey OTIL Scores by Question

Question	Pre-survey Mean	Pre-survey Std. Deviation
Question 1	.35	.484
Question 2	.65	.484
Question 3	.84	.374
Question 4	.70	.463
Question 5	1.00	.000
Question 6	.84	.374
Question 7	.54	.505
Question 7	.84	.374
Question 9	.84	.374
Question 10	.78	.417
Question 11	1.00	.000
Question 12	.70	.463
Question 13	.57	.502

Question 14	.65	.484
Question 15	.81	.397
Question 16	.76	.435
Question 17	.89	.315
Question 18	.76	.435
Question 19	.86	.347
Question 20	.86	.347
Question 21	.76	.435
Question 22	.51	.507

A *paired samples T-Test* was performed to evaluate whether there was a difference between the pre-survey and post-survey OTIL scores. The results indicated that the post-survey scores (M = 16.54, SD = 4.114) were significantly higher than the pre-survey scores (M = 16.54, SD = 4.114), t (36) = -2.077, p = .045. A Cohen's d test was performed to determine effect size. The d = 3.41 indicates a small to moderate effect according to Cohen's effect index (Cohen, 1988). Therefore, we reject the null hypothesis, and conclude that participation in the IL Modules positively impacted the level of information literacy knowledge.

Next, the OTIL scores were calculated by question in order to learn which questions students scored lowest and highest on and in which areas they showed the most improvement. Table 10 shows the mean of correct answers for each question on the OTIL.

Table 11

OTIL Difference from Pre-survey to Post-survey by Question

Question	Pre-survey Mean	Post-survey Mean	Difference	Percent Increase	IL Category
1	0.35	0.43	0.08	23.08	Ability to discover and access information
2	0.65	0.78	0.14	20.83	Ability to discover and access information
3	0.84	0.81	-0.03	-3.23	Critical thinking ability
4	0.70	0.84	0.14	19.23	Critical thinking ability

5	1.00	1.00	0.00	0.00	Ability to manage and store information effectively
6	0.84	0.86	0.03	3.23	Ability to manage and store information effectively
7	0.54	0.57	0.03	5.00	Ability to use and create information
8	0.84	0.92	0.08	9.68	Ability to use and create information
9	0.84	0.89	0.05	6.45	Ability to share and communicate information
10	0.78	0.84	0.05	6.90	Ability to share and communicate information
11	1.00	0.97	-0.03	-2.70	Understanding of ethical issues surrounding information
12	0.70	0.70	0.00	0.00	Understanding of ethical issues surrounding information
13	0.57	0.62	0.05	9.52	Ability to discover and access information
14	0.65	0.76	0.11	16.67	Ability to discover and access information
15	0.81	0.86	0.05	6.67	Critical thinking ability
16	0.76	0.68	-0.08	-10.71	Critical thinking ability
17	0.89	0.84	-0.05	-6.06	Ability to use and create information
18	0.76	0.84	0.08	10.71	Ability to use and create information
19	0.86	0.81	-0.05	-6.25	Ability to share and communicate information
20	0.86	0.97	0.11	12.50	Ability to share and communicate information
21	0.76	0.89	0.14	17.86	Understanding of ethical issues surrounding information
22	0.54	0.57	0.03	5.00	Understanding of ethical issues surrounding information

On the pre-survey, students scored the lowest on question 1 which was about Boolean operators (M = .34). Two other questions which both scored M = .54, was question 7 about creating a new information source, and question 22 about plagiarism. The questions that students initially scored highest on were questions 5 which dealt with sorting into categories and question 11 which was about plagiarism and were both answered correctly by all students. The scores that showed the most increase between pre- and post-instruction were question 2 about using an index in a book (an increase of .14), question 4 about opinions (an increase of .14), and question 21 about citing sources (an increase of.14). Questions 5 and 22 showed no increase because they

were already answered 100% correctly. Question 12 about who owns the copyright to a picture also showed no increase. Although the total scores increased from the pre-survey to the post-survey, it should be noted that in 5 of the 22 questions (3, 11, 16, 17, 19), students scored lower on the post-survey than on the pre-survey.

When looking at the scores by the subscales set by the OTIL creators (See Table 6) questions can be grouped into 6 subscales. Tables 12-17 show scores by category.

Table 12

Ability to Discover and Access Information

Question	Pre-survey Mean	Post-survey Mean	Difference	Percent increase/decrease
1	0.35	0.43	0.39	23.08
2	0.65	0.78	0.72	20.83
13	0.57	0.62	0.59	9.52
14	0.65	0.76	0.70	16.67
Total	.55	.65	0.09	17.53

Table 13

Critical Thinking Ability

Question	Pre-survey Mean	Post-survey Mean	Difference	Percent increase/decrease
3	0.84	0.81	-0.03	-3.23
4	0.70	0.84	0.14	19.23
15	0.81	0.86	0.05	6.67
16	0.76	0.68	-0.08	-10.71
Total	0.78	0.80	0.02	2.99

Table 14

Ability to Manage and Store Information Effectively

Question	Pre-survey Mean	Post-survey Mean	Difference	Percent increase/decrease
5	1.00	1.00	0.00	0.00
6	0.84	0.86	0.03	3.23
Total	0.92	0.93	0.01	1.61

Table 15

Ability to Use and Create Information

Question	Pre-survey Mean	Post-survey Mean	Difference	Percent increase/decrease
7	0.54	0.57	0.03	5.00
8	0.84	0.92	0.08	9.68
17	0.89	0.84	-0.05	-6.06
18	0.76	0.84	0.08	10.71
Total	0.76	0.79	0.03	4.83

Table 16

Ability to Share and Communicate Information

Question	Pre-survey Mean	Post-survey Mean	Difference	Percent increase/decrease
9	0.84	0.89	0.05	6.45
10	0.78	0.84	0.05	6.90
19	0.86	0.81	-0.05	-6.25
20	0.86	0.97	0.11	12.50
Total	0.84	0.88	0.04	4.90

Table 17

Understanding of Ethical Issues Surrounding Information

Question	Pre-survey Mean	Post-survey Mean	Difference	Percent increase/decrease
11	1.00	0.97	-0.03	-2.70
12	0.70	0.70	0.00	0.00
21	0.76	0.89	0.14	17.86
22	0.54	0.57	0.03	5.00

Total	0.75	0.78	0.03	5.04

Pre-instruction in the OTIL pre-survey, students scored lowest in the Ability to discover and access information with a mean score of .55. The two areas they scored the highest was in *ability to manage and store information effectively* (M = .92) and the *ability to share and communicate information* (M = .84). The category in which students increased their IL knowledge between the pre-survey and the post-survey the most was in the *ability to discover and access information* (17.53%). The smallest increase was in the *ability to manage and store information effectively* (1.61%).

RQ 2. What levels of information literacy self-efficacy beliefs do incoming online graduate students at MTSU possess and can they be improved through participation in voluntary information literacy modules?

To answer this first research question, first the ILSES pre-survey scores were analyzed using descriptive statistics to show the baseline information literacy self-efficacy incoming online graduate students showed in the ILSES. The ILSES scale includes 28 questions on a seven-point scale, with a total possible mean of 7 if the student chose a 7 or the highest self-efficacy level for each question. The ILSES Likert type scale values are 1= almost never true, 2 = usually not true, 3 = sometimes but infrequently true, 4 = occasionally true, 5 = often true, 6 = usually true, and 7 = almost always true. The pre-instruction pre-survey scores ranged from a low of 3.25 to a high of 7.00. The mean score was 5.38 (n = 37). The median score was 5.68, and the standard deviation was 1.096. Figures 19 and 20 show a histogram for the pre-survey and post-survey responses.

Figure 19

Pre-survey ILSES Scores

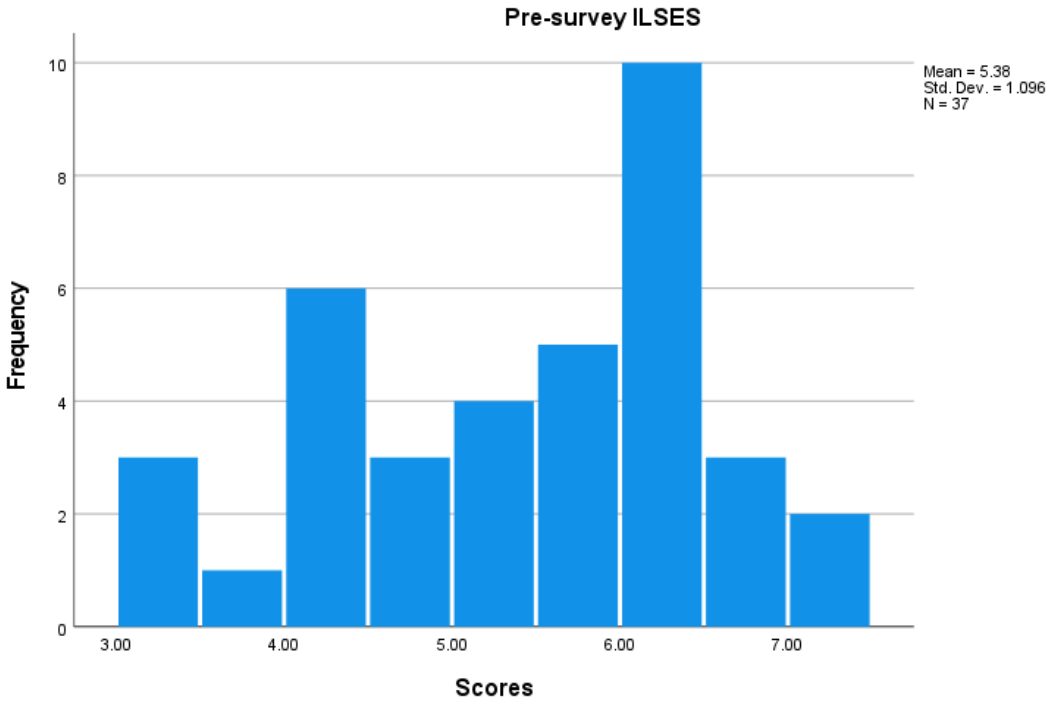
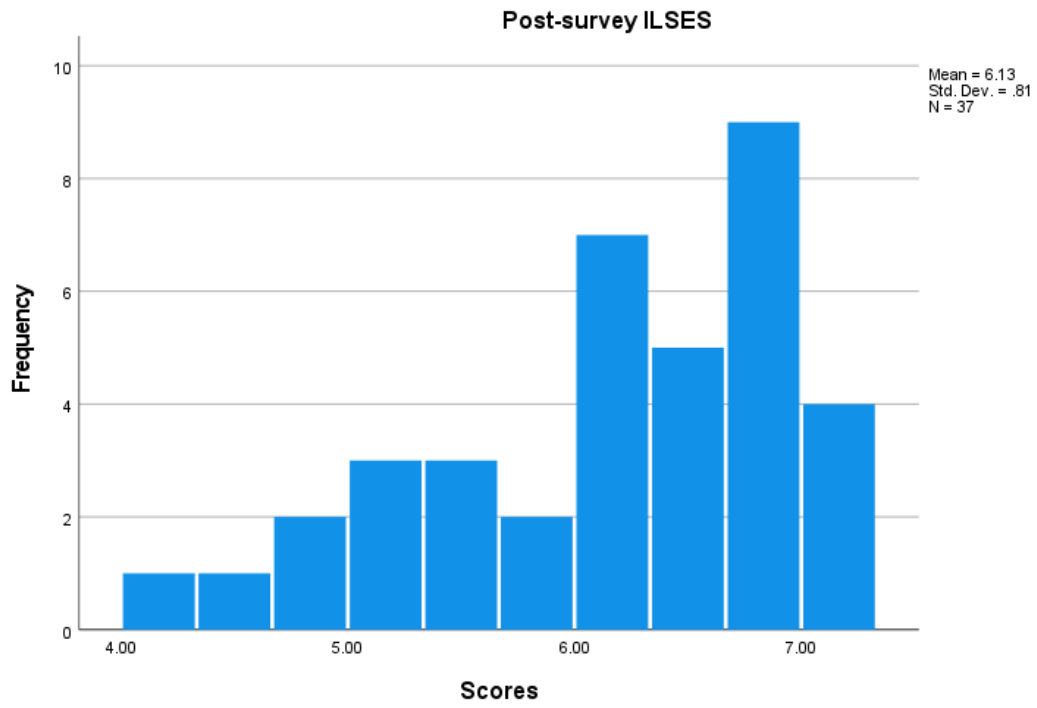


Figure 20

Post-survey ILSES Scores



The baseline pre-instruction self-efficacy levels from the pre-survey are shown in Table 18 (n = 37).

Table 18

Pre-survey ILSES Scores by Question

Question	Mean	Std. Deviation
1	5.68	1.107
2	5.54	1.238
3	5.54	1.120
4	5.00	1.509
5	5.41	1.040
6	5.43	1.501
7	5.92	1.090
8	4.97	1.771
9	4.70	1.854
10	4.59	1.964
11	6.19	.845
12	4.78	1.766

13	5.49	1.609
14	5.46	1.538
15	5.62	1.139
16	5.43	1.405
17	5.59	1.142
18	5.43	1.237
19	5.54	1.304
20	5.27	1.347
21	5.65	1.252
22	5.05	1.615
23	5.05	1.527
24	5.08	1.570
25	5.30	1.579
26	5.59	1.235
27	5.73	1.097
28	5.51	1.216

RQ2a How does participation in IL Modules impact level of information literacy self-efficacy?

A *paired samples T-Test* was performed to evaluate whether there was a difference between the pre-survey and post-survey ILSES scores. The results indicated that the post-survey scores (M = 6.13, SD = .81009), were significantly higher than the pre-survey scores (M = 5.38, SD = 1.096), t (36) = -4.587, $p < .001$. A Cohen's d test was performed to determine effect size. The $d = .99$ which indicates a large effect size since it is more than .80 (Cohen, 1988). Therefore, we reject the null hypothesis, and conclude that participation in the IL modules positively impact level of information literacy knowledge.

RQ2b Which information literacy self-efficacy areas are most affected by participation in IL Modules?

Next, the ILSES scores were analyzed by question in order to learn which questions students scored lowest and highest on and in which areas they showed the most improvement. Table 19 shows the mean level of self-efficacy for each question on the ILSES.

Table 19

ILSES by Question

Question	Pre-survey Mean	Post-survey Mean	Diff	Percent Increase	Subcategory by ILSES
1	5.68	6.19	0.51	9.05	Defining the need for information
2	5.54	6.24	0.70	12.68	Initiating the search strategy
3	5.54	6.19	0.65	11.71	Initiating the search strategy
4	5.00	6.32	1.32	26.49	Initiating the search strategy
5	5.41	6.19	0.78	14.50	Locating and accessing the resources
6	5.43	6.16	0.73	13.43	Locating and accessing the resources
7	5.92	6.32	0.41	6.85	Locating and accessing the resources
8	4.97	6.00	1.03	20.65	Locating and accessing the resources
9	4.70	5.81	1.11	23.56	Locating and accessing the resources
10	4.59	5.89	1.30	28.24	Locating and accessing the resources
11	6.19	6.41	0.22	3.49	Locating and accessing the resources
12	4.78	5.76	0.97	20.34	Locating and accessing the resources
13	5.49	6.08	0.59	10.84	Assessing and comprehending information
14	5.46	6.11	0.65	11.88	Assessing and comprehending information
15	5.62	6.30	0.68	12.02	Assessing and comprehending information
16	5.43	6.05	0.62	11.44	Assessing and comprehending information
17	5.59	6.19	0.59	10.63	Assessing and comprehending information
18	5.43	6.16	0.73	13.43	Interpreting, synthesizing, and using information
19	5.54	6.22	0.68	12.20	Interpreting, synthesizing, and using information
20	5.27	6.08	0.81	15.38	Communicating Information
21	5.65	6.19	0.54	9.57	Communicating Information

22	5.05	5.95	0.89	17.65	Communicating Information
23	5.05	5.97	0.92	18.18	Communicating Information
24	5.08	5.89	0.81	15.96	Communicating Information
25	5.30	6.16	0.86	16.33	Communicating Information
26	5.59	6.22	0.62	11.11	Communicating Information
27	5.73	6.30	0.57	9.91	Evaluating the product and process
28	5.51	6.30	0.78	14.22	Evaluating the product and process

When looking at the scores by question, the total scores increased from the pre-survey to the post-survey, on all 22 questions. On the pre-survey, students scored the lowest on questions 8, 9, 10, and 12, all of which asked questions about their competency and confidence in using the library (*Locate information sources in the library, Use the library catalog, Locate resources in the library using the library catalog, and Use different kinds (types) of libraries*). The self-efficacy levels for these questions were in the 4 = occasionally true range. The next lowest pre-instruction self-efficacy score (M = 5.00) was for question 4 which asked if they felt competent and confident to *initiate search strategies by using keywords and Boolean logic* (using and, or, not). The question that students scored highest on pre-instruction (M = 6.19) was question 11 which asked if they felt competent and confident to use internet search tools such as search engines (Google, Firefox, etc.). Question 4, a question about initiating search strategies by using keywords and Boolean logic (using and, or, not), demonstrated a 26.49% increase and represented a dramatic increase in the number of students reporting "6=usually true" after instruction. Similarly, questions 8, 9, 10, and 12 were all questions which demonstrated large increases post-instruction. Each of these questions experienced a 20% improvement in self-efficacy scores pre- to post-instruction. Question 10 which asked if they felt competent and confident to *locate resources in the library using the library catalog* showed the biggest increase (28.24%) from pre-instruction (M = 4.59) to post-instruction (M = 5.89).

When looking at the scores by the categories set by the ILSES creators (See Table 5) questions can be grouped into 6 categories. The first question in the scale, *I feel competent and confident to define the information I need* was a standalone question with a pre-survey level of 5.68, a post-survey level of 6.19 and a 9.05% increase. Tables 20-25 show scores by category.

Table 20

Initiating the Search Strategy

Question	Pre-survey Mean	Post-survey Mean	Difference	Percent increase
2	5.54	6.24	0.70	12.68
3	5.54	6.19	0.65	11.71
4	5.00	6.32	1.32	26.49
Average	5.36	6.25	0.89	16.96

Table 21

Locating and Accessing the Resources

Question	Pre-survey Mean	Post-survey Mean	Difference	Percent increase
5	5.41	6.19	0.78	14.50
6	5.43	6.16	0.73	13.43
7	5.92	6.32	0.41	6.85
8	4.97	6.00	1.03	20.65
9	4.70	5.81	1.11	23.56
10	4.59	5.89	1.30	28.24
11	6.19	6.41	0.22	3.49
12	4.78	5.76	0.97	20.34
Average	5.25	6.07	0.82	16.38

Table 22

Assessing and Comprehending Information

Question	Pre-survey Mean	Post-survey Mean	Difference	Percent increase

13	5.49	6.08	0.59	10.84
14	5.46	6.11	0.65	11.88
15	5.62	6.30	0.68	12.02
16	5.43	6.05	0.62	11.44
17	5.59	6.19	0.59	10.63
Average	5.52	6.15	0.63	11.36

Table 23

Interpreting, Synthesizing, and Using Information

Question	Pre-survey Mean	Post-survey Mean	Difference	Percent increase
18	5.43	6.16	0.73	13.43
19	5.54	6.22	0.68	12.20
Average	5.49	6.19	0.70	12.81

Table 24

Communicating Information

Question	Pre-survey Mean	Post-survey Mean	Difference	Percent increase
20	5.27	6.08	0.81	15.38
21	5.65	6.19	0.54	9.57
22	5.05	5.95	0.89	17.65
23	5.05	5.97	0.92	18.18
24	5.08	5.89	0.81	15.96
25	5.30	6.16	0.86	16.33
26	5.59	6.22	0.62	11.11
Average	5.29	6.07	0.78	14.88

Table 25

Evaluating the Product and Process

Question	Pre-survey Mean	Post-survey Mean	Difference	Percent increase
27	5.73	6.30	0.57	9.91
28	5.51	6.30	0.78	14.22

Average	5.62	6.30	0.68	12.06

In the pre-survey ILSES, students indicated that the subscales they felt the lowest self-efficacy was in *Locating and accessing the resources* and *Communicating Information*. The two areas they felt the highest self-efficacy was in *Defining the need for information* and *Assessing and comprehending information*. The three categories in which students increased their self-efficacy between the pre-survey and the post-survey the most was in *Initiating the search strategy*, *Locating and accessing the resources*, and *Communicating Information*. The smallest increase was in *Defining the need for information*.

Qualitative Data and Analysis

RQ 3. How do incoming graduate students describe their experience with the information literacy modules?

Ten interviews about the students' experiences with the IL modules were completed via Zoom. Descriptive information about these students can be found in Table 26. Each student was given a pseudonym to protect their identity.

Table 26

Demographics of Interviewees

Pseudonym	Age	Gender	Race	Years Since Last Degree	Level	Current Program
Alisha	30	F	W	6-10	Master	M.L.S. Library Science
Ryan	33	M	W	6-10	Master	M.B.A Business Administration
Dylan	29	F	W	6-10	Master	M.Ed. Administration and Supervision - Higher Education

Jasmine	43	F	W	Less than a year	Master	M.S.N. Nursing - Advanced Practice: Family Nurse Practitioner (FNP)
Aaron	39	M	W	Less than a year	Doctoral	Ed. D Assessment, Learning, and Student Success - Higher Education
Emily	43	F	W	6-10	Master	M.Ed. Curriculum and Instruction
Heather	36	F	W	Less than a year	Master	M.Ed. Curriculum and Instruction - Non-Licensure Online
Sherry	48	F	W	Less than a year	Master	M.P.S. Professional Studies - Training and Development
Kelly	35	F	W	1-5	Postgraduate	E.Ds. Administration and Supervision - Higher Education
Rebecca	43	F	W	11-15	Doctoral	Ed. D Assessment, Learning, and Student Success - Higher Education
Totals	Age Range 29-48 Average Age = 37.9	F = 8 (80%) M = 2 (20%)	White = 10 (100%)	Less than a year = 4 1-5 years = 1 6-10 years = 4 11-15 years = 1	Doctoral = 2 Master = 7 Postgraduate = 1	Five different subject areas represented: Education, Nursing, Business, Professional Studies, and Library Science.

The ten students who agreed to be interviewed were a good representative sample of those who completed the study in every area except for race. The two doctoral students, seven master's students and one post graduate student all ranged in age from 29-48, were a mix of male and female, were enrolled in five different subject areas and had spent varying amounts of time away from school before enrolling in their current program. Three of the students, Emily, Rebecca, and Kelly, were teachers themselves of either college or high school students. At least one student, Ryan, was new to MTSU having earned his previous degrees at other institutions, while a few of the others either earned previous degrees at MTSU or currently work at MTSU.

In Vivo Coding

Transcripts of the ten interviews were uploaded into ATLAS.ti for analysis. The research read through each interview and referred back to the recording when the transcription was unclear to correct any errors. After the interview transcriptions were corrected, open coding was started using In vivo coding for the first round of coding using the words and phrases of the participants. Initial codes included phrases such as "go back", "Boolean", "narrow down" "refresher", "helpful", "practice", "videos". After the first initial round of codes, 135 codes were created. Simultaneously, the researcher began highlighting interesting quotes for use later during the analysis (Saldana, 2021; Creswell & Poth, 2018). The researcher then went back through the codes and began to merge similar codes. Codes such as 'helpful' and 'useful' were merged into one code 'helpful'. Similarly, 'thankful' and 'grateful' were merged into 'grateful'. This merging reduced the number of codes down to 73. Examples of this merging of initial codes can be seen in Table 27.

Table 27

Merging Initial Codes

Merged Code	Initial Code	Initial Code	Initial Code
Positive	Grateful	Thankful	Happy
Go back	I can go back	Go and look at	Refer to it
Narrow down topic	Narrowing the topic	Narrowing things down	Narrow down a topic
Practice	Put the information to use	Further repetition	Practicing
Citation	Quote something	APA guidelines	Formatting of citations

Axial and Selective Coding

Next, the researcher started to look for categories of codes and started arranging them into groups in ATLAS.ti which resulted in 14 groups: Initial reaction to modules, Already knew, Didn't know, Experience of modules, Improvements, Module 1: Research steps & topic, Module 2: Types of Sources, Module 3: Search Strategies, Module 4: Evaluating Sources, Module 5: Citing and plagiarism, MTSU Extra library resources, Research needs, and Use.

Selective coding

After the initial groups were formed, the researcher started selective coding by choosing the main categories of responses and the subcategories that would fit under them. Table 28 shows the selected categories with codes.

Table 28

Selected Groups and Subsequent Codes

Group	Code	Code	Code
Initial reaction to modules	Positive	Opportunity	Gap in School
Experience of modules	Chunking	Videos	Practice

Module 1: Research steps & topic	Narrow down topic	Developing a research question	Steps of Research
Module 2: Types of Sources	Different types of sources	Identifying Scholarly Journals	Databases
Module 3: Search Strategies	Boolean	Advanced Google	Using phrases
Module 4: Evaluating Sources	Evaluating sources	Media Bias Chart	Reverse Image Search
Module 5: Citing and Plagiarism	Citations	Paraphrasing	Cheat sheet
MTSU Extra Library Resources	Using MTSU Library	Databases	Asking for help
Use	Print	Bookmark	Go Back
Research Needs	Don't know	Overwhelming	Time

Analysis of Categories

This next section will report the findings for each of the nine main categories and subsequent codes showing what the students had to say about each one using quotes from the interviews.

Initial reaction to Modules.

Students discovered the modules by either logging into the LMS and seeing the orientation module alongside of their class shells or from the email that was sent inviting them to participate in the study. Even though the modules were unexpected, all ten of the students interviewed had a positive reaction to the modules, ranging from mild curiosity to excitement. Heather's first reaction was one of curiosity, "I wasn't really sure, kind of, what it was

about…And I was like, you know what? I'll give it a try." She then thought, "I was telling myself. I wish I would have had this during my bachelor's because it would have made my life so much easier." Similarly, Aaron saw the modules as an opportunity, "I think my first reaction was like, well, here's a free opportunity…I'm not gonna turn down a refresher course." Dylan also expressed a recognition of the need for a 'refresher' and had a stronger reaction when she discovered the modules. She said,

> "I first I was really excited because I said, I've been out of school for so long that, like I was, I was always a very put together, student. You know I was always really good at writing papers and things like that. But it is a little like riding a bike, but it is not a lot like riding a bike."

Several students mentioned that since it had been a while since they had been in school, that they were interested at least partly because of the gap in their schooling and what that might mean for their research skills. Because of the gaps in her schooling, Sherry felt that her research skills might be lagging behind other students. She said,

> "Well, I was excited to see this project in the first place, because one thing I felt through the prior two semesters, which I had had like 4 years off of college. And I mean I'm 48. It's been a 29-year process to graduate. I've been secretly wishing they would just even have a course just on research and citations, you know, citing your work because it's there's so much more to it."

Alisha also mentioned her gap in schooling and that she was grateful for the modules. She recognized them as an opportunity for a refresher and also something she could refer back to. She stated,

> "I haven't been in school for 8 years, like on the student side of things. And so, I was very grateful to see that there was some sort of like refresher, and just kind of like a resource there that I could go to and look at, for when I'm writing papers and things."

Rebecca, who had been out of school for the longest in the group, finished her last degree in 2009 also mentioned her gap in schooling as being part of the reason she wanted to complete the modules. Her reaction was, “I’m absolutely doing this because I need it.”

Experience of Modules.

In addition to students being positive about the modules, all ten students indicated that the modules were helpful to them in some way even if it took them a while to see their usefulness. Shiloh was one who wasn’t sure how helpful the modules would be until she worked her way through them. She said,

> “I really appreciate that it was there. I didn't realize again how much I didn't know until I started looking through it. And I don't know how successful I would have been, especially on my first few assignments of researching if I didn't have that. So, thank you… I really appreciated, like some of the practice things that were in there where, like, I was like putting in the right order how to cite certain things.”

Some students mentioned that although they already knew a lot of the material, that the process of going through the modules encouraged them to feel more confident and ready to start their graduate program. Kelly said,

> “I think it made me feel a little better about jumping into another program cause in my mind somewhere. I was like, Okay. I'm still current on at least a base understanding of research which I know I'm gonna learn way more that I'm prepared for right now, but at least knowing I felt comfortable with some of that baseline stuff, I think, gave me a little bit of motivation.”

Jasmine added, “I thought it was very well put together and easy to use… the library links and things. I knew those. But it was good to, to kind of review all those things.” Emily appreciated being able to review the material without any pressure. She said, “So, it was nice to, to do this in a non… like a low stress or non-impact situation. I wasn't getting graded…and so that was

helpful to me to just go through how it works without being worried about my grades or am I missing anything.

When asked about how the modules could be improved, several students said they couldn't really think of anything. Kelly, like Emily, appreciated that it was low stakes and that she could go at her own pace. She said,

> "I guess I wasn't looking through it like a critical lens at all. I enjoyed it. I enjoy kind of this, the pacing of it. I like it because it's online and I could walk away from it, which is part of the reason I love online school. But yeah, I like the pacing just like as you get through each module. It kind of addressed each section well, so there was never a point where I thought it was confusing or didn't make sense like I think it flowed really well".

A few students commented on how the modules were structured and the level of information they contained. For instance, Ryan added,

> "This little refresher on research is kind of like a bridge from one side to the other. You know, it's like, I think it would really be good for the people like me, or the people who even been out longer…I thought they were structured really well. They were informative. They covered a lot of information. They did a good job of kind of gradually escalating in complexity and level of detail."

A couple of students did have specific suggestions for improvement, like Dylan who said, "I wish there was some more like little like test quiz type things more throughout, just because for me I like to hear about it, and then do a little pop up something just to help me know that I actually did understand what I just listened to or read." Similarly, Rebecca thought that the activities were a good addition. She appreciated the quiz on the steps of research more than the drag and drop citation activity which, she thought was clunky. The videos were mentioned several times during the interviews. Students especially appreciated that they were short and under five minutes each. While Ryan appreciated the videos, he thought that at least one of the modules contained almost too much information. He said,

> "Yeah, I think that some of the things that were most useful were kind of the shorter form videos that summarized information. Really concisely so, having more of those, maybe at the beginning, before, it got more detailed. Those could be, that could be a good way to gradually introduce people to the concepts. One starts off with just a lot of information and a lot of specific information in a lot of detail. It can be a little bit overwhelming or discouraging."

Not all students felt that there might be too much information at once. Heather indicated that going through the modules didn't feel like it took very long. She said,

> "I finished it pretty quick. So, all the modules and stuff. But I loved it. I was excited like I said. I wish I would have had this during my bachelor's. It would have made life easier… I wish this was something that every student could take at the very first of their undergrad."

Module 1.

Module I included information on the steps of research, narrowing the topic, and writing a research question. The content included a link to an informative website, a short video, a short interactive quiz in H5P, and a link to a downloadable worksheet. A few students mentioned already knowing some of the content in this module. Alisha mentioned that, "I guess narrowing down a topic was something I had already kind of learned about." Dylan agreed saying, "I feel like I knew the basics of a lot of this." Kelly said, "I feel like. I had a good baseline understanding of most everything, just from the history of doing research and just finishing my master's like 2 years ago."

However, knowing about the content didn't necessarily mean that they had mastered it. Sherry mentioned that the content on narrowing the topic and formulating a research question was still sometimes a struggle. She said,

> "So, for module one narrowing the topic. That's something I've struggled with. And I did struggle with it… going over the 5 steps of research and, and more information on how to narrow the topic and how to write the research question was helpful. Also, the topic planning worksheet… yeah, like, I'm not a concise person like the times that I need to be concise and narrow. That's not me. So, it's a

> little…It was a challenge. And then I'm like, well, how do I narrow down a topic, and coming up with the topic."

Rebecca's attention was immediately caught by the content on the steps of research and narrowing down your topic. She stated, "this section here on the actual process itself was very helpful. …How do you better narrow down your questions, so you know what you're looking for?"

Module 2.

Module 2 included information on the different types of information sources including scholarly sources. It also included information on peer review, authority, and choosing an appropriate source. There were links to two short videos and four links to explanatory websites. Students didn't comment often on the content in Module 2. Some like Sherry, were already familiar with the concepts and felt comfortable finding good sources. She stated, "I've had about three library classes or what not, so I'm familiar with finding peer review sources." Ryan also mentioned that he knew how to "find appropriate references and resources', but that it was good to have a refresher. Others, like Alisha, mentioned content that was new to her. She said, "And then, like the different types of resources. And like what scholarly journal titles mean and things like that. Those were the 2 that really stick out to me that I was like. I did not… I did not know that." Going back to the fact that some of these students had been out of school for years showed up again when discussing this module and online resources. Dylan expressed the changes through the years this way, "When I was in school people were only just starting to have laptops of their own. And it wasn't a super common thing for everybody to have all these web sources and stuff when I was in school." Even if they knew how to find appropriate resources then, electronic resources continue to evolve and change.

Module 3.

Module 3 included information on searching for and finding sources. Boolean operators, phrasing, advanced Google searching, and keywords vs subject searching were mentioned. Again, this module included a mixture of short videos and links to explanatory websites. Students had more to say about the content in this module, especially about finding sources. Heather expressed that she wished she had come across this content earlier in her schooling. She said,

> "I guess that was my biggest thing is how to go about finding the sources. I didn't even know about the whole Google thing. I was like, where? And I messaged someone else that was actually in my bachelor's program. I was like, Oh, my gosh! This would have been great, and some of it she knew about. I was like you should've told me. I was like I didn't even know this was a thing you know how, just, just how to research things. I didn't know how to go about researching."

Likewise, Jasmine mentioned her struggle with finding sources. She added, "The biggest issue I've had is just being able to find the articles quickly that are useful to me. And what I'm trying to achieve." Alisha mentioned using the search strategies that she had just learned in the modules already during her first semester. She said, "Definitely like the stuff that stuck, like being able to refine my searches…I've already started using that." When asked which content was new to him, Aaron said,

> "So, some of the things I didn't know was like the advanced Google searching stuff. Yeah, I didn't really know advanced Google at all like the site for, like searching the Edu sites and stuff. I did not know that whatsoever and that could have saved me a lot of time in the past. Yeah, I had to use Boolean searches before. I think this one was a little bit more extensive; I think. Before, I just really learned about 'and' and 'or' and that was like the extent of it."

Dylan also mentioned the advanced search feature in Google and added, "And then there's the advanced Google like the phrasing and things like that. Yeah, that was super helpful, too.

“Sherry said, “…the Boolean searches. Those are still a bit confusing at times that the ‘and’ ‘or’ ‘but’ ‘not this and that’ that I swear I want…I think somebody needs like, I need multiple classes on that, like to really practice that.” Rebecca agreed about the Boolean searching saying, “I knew you needed them, but I couldn't remember where they went in particular. And so that was that was really helpful.” Ryan mentioned already knowing about search strategies and added, “A lot of it was things that I felt familiar with from my undergrad. but overall, I found it useful.”

Module 4.

Module 4 included a mixture of videos and links to explanatory webpages on how evaluate sources using a variety of methods, namely the SIFT method and lateral reading, using the Media Bias chart, and how to use reverse image search. This section was another one that didn’t get mentioned as much as the others. Sherry mentioned that she was familiar with most of this information and had learned it in her recent undergraduate degree. The Media Bias Chart was mentioned by two students, Sherry, and Rebecca, both of whom were familiar with it. Rebecca stated, “I actually use that media bias chart in a lot of my classes. So that was something that I was pretty familiar with, but I thought it was a helpful inclusion.” Three students mentioned the reverse image search, two were already familiar with it and one was not. Dylan said, “I even, like I took the time to like, try the reverse image searching thing that Google was showing, and all that. I had no idea about any of that.” The tools for evaluating sources were mentioned by two students who both said they were familiar with different tools like SIFT and CRAAP and lateral reading.

Module 5.

Module 5 included information on citing sources, using in-text citations, the different citation styles, copyright, and plagiarism. In this module, the researcher had created a drag and drop activity on how to cite a journal article in addition to the videos and links to other websites with explanatory content. Students had quite a bit to say about the content in this module. Some students already were familiar with the content but appreciated the refresher, such as Jasmine, who stated, "I think some of the APA guidelines and information like that I already knew some of that, the library links and things. I knew those. But it was good to kind of review all those things." Aaron also was familiar with the content but added,

> "I hate to say that those things weren't so useful, you know, but they were still useful. They'd still get your brain going and getting back in that mode which. even if even if it was something that oh, you know, I remember that there's certainly some part of information that I didn't remember that it helped me recall, you know."

Not all students felt they had mastered citing sources. For instance, Emily acknowledged that citing can still be a challenge for her. She stated,

> "Well, the thing that is always a challenge for me is, like navigating between the different formats for bibliographies and citing sources. There's just always so much to remember. And then minutiae gets really important. So, like, where do I put the period, or is there a parentheses here like that?"

Rebecca also mentioned the difficulty navigating the different kinds of citation styles. She said, "But you know, taking this program, it's APA…I've lived in MLA citations for the better part of 10 years, and so reminding myself of like, no, APA is a little different." Dylan mentioned that the content on in-text citations and avoiding plagiarism was important to her. She stated, "And how do you know what is considered paraphrasing and what is plagiarism and all of that, like, I feel like I understood the basics of it all. But I couldn't, I couldn't explain it well, if that makes

sense" Throughout the interviews, students mentioned that they appreciated the ability to practice using some of the content, such as citing sources. Alisha commented that these activities were important to her, especially in this module. She said,

> "I really appreciated, like some of the practice things that were in there, where like, I was like putting in the right order how to cite certain things, because, you know, that's something where I know that when I get into doing that myself. I'm going to have to go back and reference that because Microsoft Word does have a reference tab, and allows you to enter things, but it doesn't always get it right."

She also mentioned sites that help with citations. She stated, "I'm familiar with OWL. New to me through this was the Noodle tools that seems pretty cool." Two students, Heather, and Sherry mentioned content that was not included in the module that they wish had been. They both mentioned wanting to know how to cite nested sources, also called secondary sources in APA style, which was something that wasn't included in the modules. About that, Heather said,

> "I guess it's when I want to quote something in a paper, but they have quoted it. I don't really know how to work that. So that was the only thing that another one that I was really hoping to learn is how to quote something that's already been like quoted in that paper that I'm trying to quote, I'm like, well, do I quote that paper, or do I quote the original source? That was the only thing that I was one of the things that I was kind of hoping to learn."

In a similar vein, Sherry also wanted to know about how to cite nested sources and expressed confusion about what to do in those situations. Neither student knew the terminology for what they were describing which seemed to frustrate them. Sherry said it this way,

> "Sometimes a source is easy to cite. But then there's the ones that like, okay, that are just oddball, miscellaneous things that are difficult to sort so site. And then one question I've been having, and I've seen some of my professors use their citations. They're really good at citing, but they're citing like a combination of their work, plus where they got their info from. So, it's like the most confusing citation I've seen. And I'm like. Okay, I come across material I want to use, but that material includes the citation already. I don't know how to do that. That would be helpful. I don't recall seeing that advanced level in here."

Extra Library Resources.

While other modules had included some content from the Walker Library, this module focused solely on four resources that were built specifically by Walker Library faculty for distance students and graduate students, including several 'how to' videos. At the end of this module was a reminder for students that the staff in the Walker Library and the Writing Center are there to help them and that they are happy to help. Several students mentioned that this was very helpful to them, especially to those who were new to the university. Ryan, who earned his last degree at another university, mentioned,

> "I think just familiarizing myself with all the resources that are available at MTSU, being comfortable, asking for help, and who you get in touch with and who to reach out to if I have questions. And so far, all of that has been explained appropriately to me. And I feel like I have the support systems in place."

Emily added, "I wasn't sure about the library system, how it was going to work for me as an off campus, like strictly off campus individual. I'm hoping that using the library will allow me to more time, I guess, instead of trying to find it all myself." Heather also mentioned not being confident with using the library and said,

> "And I really didn't know how to use, you know, go about with the library. How to, you know, go to all the different databases and all of that. So, you taught me all about that as well because, you know, like I said, I didn't even know, I didn't even know really how to use the library website properly."

A common theme among students and really most people, is that they often don't like to ask for help. This is also true of students being reluctant to ask for help in the library. Dylan brought up asking for help in the library and stated it this way,

> "And that you can ask a librarian, and that's what it set up the end of almost all the videos like - and ask a librarian. I was like, oh yeah, that's true. That seems like something that should be so…that you should just know off the back top of your head. Like oh, I don't know where to look, let me ask a librarian. But it's so easy this day and age like oh, I don't know, I guess I'll just move on, you know."

Content Use.

Students were asked how they might use the information in these modules going forward. One of the first in vivo codes came from this concept that surfaced almost immediately and was tied to this phrase ‘go back’. Several students mentioned in various ways that this material was not something they wanted to view just once, but that they were glad they would be able to go back and review it when they needed it. Alisha said, “So that if it's like, oh, wait a minute, I know that I learned about that. And there's a resource. I can go back and, like, you know, delve into it even more when I'm trying to do it like parallel, if that makes sense." Students also mentioned having gone back already during the semester between the time they initially completed the modules and the interview. For instance, Heather said,

> *“*Oh, I mean, ever since, ever since I've learned about it, that's all, that's what I've done. I've actually gone back in, some just to kind of I was like, wait, I know, watch the video on that. So, I'm actually going back in to watch another video, trying to research it. I've used it in every one of my papers…Because, like I said, I've gone back in several times.”

Students mentioned several ways to ‘go back’ including printing, bookmarking, and going back to the orientation modules. Alisha talked about referring back to the content as well. She added,

> “But then, also, like I was saying before, like as a resource where if I needed more detail about something I can go back and look at it when I'm writing my research papers and things like that… But as far as like the resources and things it was really nice to be able to like go to the links and then like bookmark them, so that now I have this folder like citations, and how to do that, and I can go back to the websites”.

Rebecca also mentioned bookmarking several of the sources, some for herself and some for the students that she teaches, which she immediately put to use in her class. Kelly added, “And I was like, that's actually kind of encouraging to know that there's like this just kind of random, open resource waiting for you if you need it.” Some students, like Aaron, had already printed some of the sources. He said,

> "I printed off just about everything that I could print off… There was a nice little layout, you know, even though I know how to write a paper, I'm not a perfect paper writer, so it's always nice to have those things on hand. And there was a layout of how to write a research paper. Some of the stuff on how to come up with a research idea, I printed up a lot of that stuff. It's actually in my folder over there and but I'm going to use it for sure, like I said, I'm not going to put a hand up to free assistance."

Similarly, Sherry added, "And that's why I saved a lot of, you know, the videos and the links to benefit me down the road." Ryan was a student who wasn't sure he would go back and use it again, but added,

> "Yeah, I might go back through them if I was running longer papers where we need to be really detailed about citing references and there was like a different format that I needed to use. I think it's useful to have on hand. And it's probably something that most students should have to go through. And yeah, I think it'd be it'd be nice to retain access to it."

In summary, students who completed this study felt positive about the orientation modules and found them useful. They all seemed to take something different from the modules and the concepts that they reported knowing or not knowing was different for all of them. The short videos were appreciated, as were the activities and the ability to practice information literacy skills such as citations. One theme that kept reoccurring was that they could 'go back' and use the resources at their point of need, whether they bookmarked them, printed them, downloaded them, or were just happy the modules were staying in the LMS all semester and possibly longer.

RQ 4. How do incoming online graduate students feel about their competency to handle graduate level research going forward?

As mentioned already in RQ 3, students felt that even if the information offered was already known to them, that the act of refreshing their memory and realizing what they

already knew was a confidence boost to them. Those students who learned new concepts also felt more confident after completing the modules. When asked if she felt more confident after going through the modules, Dylan replied,

> "I do. I think so for the most part, I mean I don't think I'll do it perfect on the first try, but I feel like leaps and bounds further ahead than I did when I before all of this before, when I started listening to it all, I was like, oh, maybe I don't know anything."

This was borne out by the quantitative data as well. After completing the post-survey, the quantitative data show an increase for students in every subscale of the ILSES with an overall increase of M 5.38 to M 6.13 which shifted student's self-efficacy from between 5 = often true to 6 = usually true, to 6 = usually true to 7 = almost always true. This left them at a fairly high level of self-efficacy overall.

Trying to nail down and answer to what they felt they needed going forward proved harder to quantify. During the interviews, when asked about their research needs as beginning graduate students, a common answer was that they 'didn't know what they didn't know'. Since they hadn't gotten very far in their studies yet, it was hard to say. Heather said, "gosh, I don't really know my biggest needs." Dylan added to that by saying,

> "I feel like that's such a hard answer question for me to answer as being so new on it, because my answer wants to be 'everything'. I feel like I don't know anything, and I need to know everything, so I don't even know that I could give you a very good response right now, only because the thought of being in grad school is overwhelming at all to me right now."

Others, however, were able to articulate some of their needs as beginning online graduate students. For example, Emily was concerned about planning her time. She said, "that's the thing that I'm most concerned about, that I'm not going to give myself enough time to find the right research." Others, like Jasmine mentioned skills that she still struggled with saying, 'Just being

able to find articles that are the type that I need." In another nod to repetition and practice, Ryan added, "I think just further repetition. Just kind of practicing ahead of time and getting familiar with getting familiar with the library getting from the catalogs we have access to that will all be useful."

Overall, students felt optimistic about their graduate research skills going forward. While they acknowledged the fact that they were just beginning their graduate program journey, and that there were uncertainties about they would actually need going forward, they felt better equipped than before they worked through the modules. From the quantitative data, it was evident that their self-efficacy increased from pre-survey to post-survey. They articulated that the modules helped boost their confidence in what they knew and how they could use their skills going forward.

Summary

The results of the quantitative and qualitative analysis indicate that beginning online graduate students who participated in online information literacy modules at the start of their first semester showed significant increases in information literacy knowledge and self-efficacy. The Paired Sample t-test on the pre-survey to post-survey OTIL scores showed a small to moderate effect. When looking at the OTIL subscales, the lowest initial mean scores were in the *ability to discover and access information* subscale. The highest initial mean scores were in the *ability to manage and store information effectively* subscale. When looking at increases from the pre-survey to post-survey, the greatest increase in mean scores was shown in the *ability to discover and access information* subscale. The lowest increase in mean scores was in the *ability to manage and store information effectively* subscale. The Paired Sample t-test on the pre-survey to

post-survey ILSES scores showed a large effect. When looking at the ILSES subscales, the lowest initial mean scores were in the *locating and accessing the resources* subscale. The highest initial mean scores were in the *evaluating the product and process* subscale. When looking at increases from the pre-survey to post-survey, the greatest increase in mean scores was shown in the *initiating the search strategy* subscale. The lowest increase in mean scores was in the *assessing and comprehending information* subscale.

The qualitative findings from the student interviews indicate that students were grateful for the information literacy modules and that they found them to be helpful. Their experience with the modules indicated students appreciated the short videos, interactive activities, and the ability to practice their skills which increased their confidence. Students found the content on search strategies, using the university library, and citing sources the most helpful, which matched the findings of the quantitative measures. Even when students were already familiar with the content in the modules, they consistently stated that it was a 'good refresher'.

CHAPTER V: DISCUSSION AND CONCLUSIONS

The purpose of this study was to examine the information literacy skills and self-efficacy of incoming online graduate students and to determine if online modules introduced as a self-guided orientation to graduate research was helpful for students and increased their information literacy knowledge and self-efficacy. This chapter will include a discussion of the findings, implications for practice, limitations, and suggestions for further research.

Summary of Findings Section

The findings of this mixed methods study of beginning online graduate students in Fall 2023 and Spring 2024 showed a significant increase both in information literacy knowledge and information literacy self-efficacy after students viewed the orientation modules. The qualitative piece of this study, which included ten interviews with participants bolstered the quantitative findings and added more depth to understanding how students experienced the modules. In addition, the interviews highlighted their thoughts on what they need as beginning graduate students and how the modules could be helpful to them, not only now, but in the future.

Discussion Section

Information Literacy Knowledge

When comparing the results of the pre-survey OTIL to the post-survey answers, the results showed significance with a small to moderate effect (Cohen, 1988). When looking at the subscales, scores increased in every area. Of interest, is that scores on five questions (3, 11, 16, 17, 19) decreased from pre-survey to post-survey. It's hard to know why that happened, except that possibly either the student's second guessed themselves the second time or certain content in the modules made them rethink their first answer which resulted in a wrong answer the second time. Since students weren't given the results of the pre-survey, they wouldn't have known if they answered correctly or not the first time. These decreases were scattered across the *Critical thinking ability, Understanding of ethical issues surrounding information, Ability to use and create information, and the Ability to share* and *communicate information* subscales. When looking at the subscales compared to each other, the *Ability to discover and access information* subscale had the most increase from pre-test to post-test. This subscale included questions on Boolean operators, using an index in a book, search strategies for finding similar articles, and

ordering sources from the least specialized to the most specialized. In looking at this subscale from the ACRL Framework lens, as seen in Table 7, the researcher proposes that this subscale most correlates with the frames of Searching as a Strategic Exploration, Research as Inquiry, and Authority is Constructed and Contextual. Student scores on the *Ability to manage and store information effectively* subscale questions increased the least. There were only two questions in this subscale, question 5 on organizing files, and question 6 on storing information for easy retrieval. All students answered question 5 correctly and they answered question six 86% of the time on average. Since students scored highly in this area to begin with there wasn't much room for improvement. The results of lower scores in areas such as using Boolean operators has been noted in previous studies, such as Pival, et al., (2021) that found that just over 50% of students answered correctly.

Information Literacy Self-efficacy

When comparing the results of the pre-survey ILSES to the post-survey answers, the results showed significance with a large effect size (Cohen, 1988). When looking at the subscales, scores increased in every area. The lowest pre-survey scores were on questions 8, 9, 10, & 12 which were about their competency and confidence in using the library which were the only questions where the mean scores were less than 5 which indicated 'often true'. These questions were part of the *Locating and accessing the resources* subscale which also showed the second highest increase from pre-survey to post-survey when comparing the results from all of the subscales. It is interesting to note that although students felt the least confidence in this category overall, they felt the highest confidence in question 11 which was how confident and competent they felt about using internet search tools (such as search engines (Google, Firefox, etc.)) where the pre-survey average was 6.19. When it comes to locating and accessing

information sources, students were more comfortable searching online resources outside of the library than inside of the library. The researcher proposes that this subscale most correlates with the frames of Searching as a Strategic Exploration, Research as Inquiry, and Authority is Constructed and Contextual in the ACRL Framework as does the subscale mention next. Students showed the biggest gains in self-efficacy in the questions that fell in the *Initiating the search strategy* category which included identifying potential sources of information, limiting searches by subject, language, and date, and initiating search strategies with keywords and Boolean logic. In the pre-survey, students reported the most self-efficacy in the areas of *Defining the information need* and *Assessing and comprehending information.* In the post-survey, students reported self-efficacy scores over 6 in every subscale saying that for each question it was usually true that they felt confident and competent in that area.

Student Reaction to the Orientation Modules

Student reactions to the modules were positive. There were no negative reactions in the interviews and no students requested that the modules be removed. It appears that situating them in the university LMS, D2L as an orientation shell at the beginning of the semester was successful. Although the response rate for completing the modules and the pre and post surveys was lower than hoped for, further analysis shows that 79% of students invited to the modules in Spring 2024 accessed them, and 86% of student in Fall 2023 accessed them, including 64 (15%) students who continued to access them in the Spring 2024 semester. While they might have not completed the study, they nonetheless initially accessed and, in several cases, continued to access the modules.

The students who were interviewed found the modules helpful and useful. A few students expressed being excited about the opportunity to go through the modules, and even if they

weren't too interested in them at first, as they completed them, they realized their value. Even for students who felt they already knew most of the content, they felt the modules were a good refresher and that opening them a few days before the start of the semester was good timing and helped them feel more confident. The students who had been away from school for several years or more mentioned that this 'refresher' was especially helpful since it had been a while since they had done research and if they had been gone long enough, they were concerned about how much research might have changed.

As for the way the material was presented, the students who were interviewed expressed that they liked that there were short videos, a variety of types of information, and opportunities to practice their skills in a couple of the modules. They liked that it was self-paced and that they could leave it and come back to it. Suggestions for improving the modules included adding more activities and making sure that there wasn't too much information given at one time, especially in text format. Early in the interviews, students mentioned going back to the information and how they either printed off some of the material to keep for later or bookmarked sites in their browser to refer back to. A few mentioned how they had already used the material either for an assignment or in some cases to share with students that they taught.

In looking at what students had to say about the content modules, it's easy to see that many of the same areas such as search strategies, and locating and accessing resources, came up in the OTIL and ILSES were also mentioned in the interviews. Other areas such as citing sources and plagiarism came out more in the interviews, but in looking back at the OTIL and ILSES scores in those areas there was some weakness found, although it didn't rise to the most mentioned scores. Most notably, the ILSES scores for questions 22, 23, and 24, which were about preparing a bibliography and creating full citations for different kinds of materials, were

the second lowest as a group post-instruction. Students reported the usual difficulties with citing sources and several mentioned being fluent in one citation style but having to learn a new one for their current program. Two students mentioned wanting to know about advanced citations, such as nested citations and expressed disappointment that those weren't included in the modules. They remembered those situations as being problematic and wanted to be able to cite those in the future. In the interviews, students mentioned all of the content modules and content they felt was helpful to them beginning with the steps of research and how to narrow down a topic which was mentioned several times. Although students didn't mention having trouble locating library resources, the low scores on the ILSES indicated that this was an area that students struggled in. In the interviews students did mention that they were happy to see the videos about how to use the library. At least one student mentioned that he had completed his other degrees at different universities, and he was glad to learn how to use the library at MTSU. Another student mentioned wondering how as an online student she would be able to access library resources. The idea that students could ask librarians in the library for help seemed to be a comfort to them. Overall, just knowing where they could find help whether it was to refer back to the modules or the references they had bookmarked or knowing that someone in the library was there to help them seemed to give them greater confidence in starting their graduate degree.

Students' Self-efficacy and Perceived Needs Going Forward

With a post-instruction ILSES mean of 6.13, students were mostly confident in their ability to succeed and felt ready to get started. The self-efficacy of beginning online students is important because it can determine how much effort a student puts in and how long they try (Bandura, 1997). Higher confidence can impact not only how well students start out in their graduate work, but also their level of success throughout. When asked what their biggest needs

were as beginning online graduate students, their answers were varied. The most common answer was that they weren't sure because they didn't know yet. This time of transition can be disorienting for students as they start their graduate work. They are in the process of 'taking stock' which, according to Schlossberg, includes analyzing 1) the situation 2) support 3) self, and 4) strategies (Barclay, 2017). A few students mentioned being able to manage their time well between school, work, and family. Since graduate students fall into stage six of Erickson's Theory of Psychosocial Development, where students are finding partners and settling down which often coincides with having children, or stage seven where students are in the midst of family life and possibly looking for a career change, this is to be expected (Degges-White, 2017). Two students mentioned practice using the library and finding the resources that they need.

Implications

This study has shown that information literacy instruction is important for graduate students, and not only for those getting a master's degree, but for doctoral students as well. Even at their advanced level, there can be gaps in what students learned in their previous schooling or have forgotten in the ensuing years. Information literacy knowledge and self-efficacy can be improved through instruction like that carried out in this study. This study should also capture the attention of graduate programs as well as they seek to improve the research quality output of student's work and how to best implement information literacy instruction in graduate programs.

Capitalizing on the timing seems important. Beginning graduate students are in a period of transition. Introducing information literacy instruction at the beginning of their first semester can help with Schlossberg's Four Ss: situation, support, self, and strategies (Barclay, 2017, p. 25). In essence, the students in this study did just that. They assessed their skills and their situation while finding support and learning strategies that could help them going forward. The

first semester of graduate school as described by Malek-Ismail & Krajnik (2018), is a time of 'rebalancing' and 'self-determination. In discussing beginning graduate student's needs, they stated that "Educators should expect that lower-level needs are likely present and unmet initially in graduate students, at least for a period of time, as students begin a new graduate degree program" (pg. 16).

Although instruction can take many forms, from one-shots to in-depth workshops, both in person and online, students in this study were interested in fixed content that was scaffolded and chunked and arranged so that they could access it in quick bites. They expected and anticipated referring back to the content over the course of their program as needed. As evidenced by students mentioning that they had already printed out or bookmarked the content showed that they saw an immediate need for it. This reiterated Knowles' idea of Adult Learning Theory as the students in this study liked the self-directed aspect of the modules, brought their previous research experiences into their learning, and were focused very much on problem solving (Schlosser, 2006). This on-demand content seemed especially important to the students. There are several benefits to on-demand content including capitalizing on student's desire to access online information as needed, the ability to anticipate content that students will need and create it in advance, and lessoning the barrier for students who are reluctant to ask for help by creating content that can be accessed on their own without help.

Having the modules situated in their LMS was convenient since they were already in the site when accessing their courses. As Shepard & Milewski (2021) found when they situated IL modules in their LMS, the biggest obstacle was getting around campus policies about situating non-course content in the LMS and the process for bulk onboarding of students. D2L was an easy, scalable solution for this study as it offered a readily available location that was designed

for instructional purposes which allowed for quick creation of the modules without requiring additional in-person instruction time. The location of where the IL instruction should be placed might not be as important as having it in a fixed location where the students know they can go back and find it. Whether housed on the library website or in the LMS, ensuring collaboration and cooperation between librarians is essential (Shepard & Milewski, 2021; Khailova et al., 2023; Feekery et al., 2021).

As far as content goes, the students all had different areas that they focused on in the modules and that they found helpful to them. Therefore, it shouldn't be assumed that students already know any particular area of IL, but rather give students the opportunity to focus on the areas that they find most meaningful. That students mentioned practice several times both while completing the modules and recognizing they would need practice in the future mastering certain research skills shows that this is an important piece of learning. This ties in very well with Kolb's Theory of Experiential Learning and the belief that learning is a process and not a passive act (Mackeracher,2004; Jaekel, 2017; Kolb, 2015). Practice should be a part of information literacy instruction and serves a dual purpose in helping students gain mastery and building their confidence levels.

Key features for graduate research orientation modules gleaned from this study include:

- Self-paced content
- Scaffolding and chunking of content
- Short videos
- Practice, practice, and more practice
- Including different modalities of learning resources such as print, video, audio, etc.
- Limiting amount of information to avoid overwhelm

A more in-depth look into the content of the modules and their use can be seen in Appendix G which includes an outline of the content and a librarian/teacher guide.

Lastly, unfortunately, even with all of the work that librarians and faculty do to show students how to use the library, this too cannot be ignored with graduate students. In both the OTIL and the ILSES, students scored the lowest on locating and accessing library resources. They have difficulty using the library catalog and locating resources in the library. While undergraduate work might be more forgiving of only using online resources, graduate students should be adept at also using print resources as they will need to perform more in-depth research and not just skim the easily available online resources. In this study students acknowledged that they didn't always think of asking librarians for help but were glad to be reminded they could find support in the library if they would only reach out. It seems important for librarians to be introduced in some way in the orientation phase of a graduate program so that students can recognize a friendly face and know where to ask for help. Faculty and librarians should work together to make sure that students have access to IL content and instruction right from the beginning so that students can get acclimated and feel more confident in their ability to do graduate work.

Revisiting the problem of incoming graduate students' uneven levels of information literacy skills and research readiness, online graduate research orientation modules can help bring students up to a good beginning level of graduate research knowledge and self-efficacy. At the same time, gaps in their knowledge or self-efficacy can be addressed so they are confident as they begin their graduate programs. This allows for the problem as noted by this study and earlier research (Bussell et al., 2017; Lamb, 2017; Tunon & Ramirez, 2010) to be addressed in a practical and lasting way.

Recommendations for Future Research

This study captured online graduate students at the beginning of their programs. In order to understand the impact of information literacy instruction offered to graduate students, a longitudinal study following these students from the beginning of their program to graduation would add to the body of knowledge in this area. Since this study focused only on online graduate students, broadening it to include on-ground students would show a more comprehensive understanding of the information literacy needs of graduate students.

The specific areas of IL in which students were the weakest in this study have been shown in several previous studies, although not always at the graduate level, and is not a surprise. For instance, implementing search strategies has been shown to be a troublesome area by several studies (Geary, 2022; Hebert, 2018, Saunders, 2015; Catalano, 2013). Since technology keeps evolving and AI changes are looming, IL instruction should continue to develop in this area with further research needed as search engines change. Despite librarians' never-ending efforts at helping students use the library, this has also shown to be a weak area for students (Geary, 2022; Catalano, 2013; Conway, 2011). Perhaps more qualitative research could be done in this area to determine barriers that students perceive.

Finally, further studies should look more in depth at locating information literacy instruction in a fixed area for students to refer back to during their studies and can supplement or replace other types of one-shot instruction. Particularly, exposing students to this content early in their studies and showing them how to go back to it at their point of need during graduate orientations and the perceived and real value should be explored.

Limitations

Every study has at least some limitations on its ability to draw inferences and conclusions; this study is no different. This study looked only at incoming online graduate students for Fall 2023 and Spring 2024 at a large public university in the Southeast. It includes only a snapshot of the student population and did not include the incoming graduate students who were entering on ground or hybrid programs. Additionally, the study did not capture the student's past experience with this institution. Specific limitations of this study include that students self-selected to participate which may have skewed the results in one way or another. Because students self-selected to participate, results cannot be generalized to the whole population. Students who were already confident about their research skills and information literacy knowledge might have just ignored the request. Students who might have benefitted from the modules might not have realized its value or understood that it might help. In addition, since the researcher is a faculty member who teaches in an online graduate program at this institution, she could have introduced an inherent bias especially during the qualitative phase although there was care taken to minimize this.

Summary

Information literacy instruction is important for graduate students. It can't be assumed that they received adequate instruction in their previous schooling. Even when familiar topics are reintroduced, many students are glad to revisit them if only to feel more confident that they do know a lot of the content and are capable of succeeding in their graduate programs. Research skills are not just learned once but need to be practiced and reviewed periodically. Research is like a muscle and must be used in order for it to work better. This study has shown one way that graduate students can benefit from information literacy instruction in the form of an orientation

at the beginning of the graduate program to improve their information literacy knowledge and self-efficacy.

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APPENDICES

Appendix A. IRB Approval Letter

Office of Research Compliance
2269 Middle Tennessee Blvd.
Sam H. Ingram Bldg (ING) Room 010A
Box 124
Murfreesboro, TN 37132
www.mtsu.edu/irb

Date: August 23, 2023
PI: Holly Hebert
Department: Womack Educational Leadership
Re: Initial - IRB-FY2024-28
Fall 2023 Online Graduate Student Information Literacy Knowledge and Self-Efficacy

The Middle Tennessee State University Institutional Review Board has rendered the decision below for the above referenced study.

Decision: Exempt
Category: Category 1. Research, conducted in established or commonly accepted educational settings, that specifically involves normal educational practices that are not likely to adversely impact students' opportunity to learn required educational content or the assessment of educators who provide instruction. This includes most research on regular and special education instructional strategies, and research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.
Category 2.(i). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:
The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects;

Please note that even though your proposed study is deemed exempt from further IRB review, the following apply to your approved study:

1. Any unanticipated harm to participants or adverse events must be reported to the Office of Compliance.
2. All modifications to the approved study must be submitted for review through Cayuse IRB for approval before their implementation. Adding new researchers constitutes a modification to the protocol. Per MTSU Policy, a researcher is defined as anyone who handles the data or interacts

with participants. Everyone meeting this definition for this project must have completed the required CITI training and received IRB approval prior to becoming actively involved in the project.

3. All research materials must be retained by the PI or faculty advisor (if the PI is a student) for at least three (3) years after study completion and then destroyed in a manner that maintains confidentiality and anonymity.
4. All approval letters and study documents are located within Study Details/Submission Details in Cayuse IRB.

We wish you a successful research project,

The Middle Tennessee State University Institutional Review Board

Appendix B. OTIL Questions

Questions adapted from the OTIL Test #1 found at
https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/ZWOGMR

Test 1

General Information Literacy Questions

Ability to discover and access information

GD1. You are looking for information on the benefits of meditation and mindfulness. You want to find webpages with information about either of these two practices. Which of the following search strings will produce the most relevant results?

a) Meditation benefits AND Mindfulness benefits.

b) (Meditation OR Mindfulness) benefits.

c) (Meditation AND Mindfulness) benefits.

d) I do not know.

GD2. You want to find out about King Arthur, and you have borrowed various books on the history of the British Isles from your library. Which of the following is the most effective strategy to find if the book contains what you want?

a) Look in the back of each book for an index, and if there is one look under A, and check the pages it says include Arthur.

b) Look for 'King Arthur' mentioned in the table of contents - if he is not then the book is not useful to you.

c) Read the introduction and first chapter of the book. If they don't mention King Arthur, then this is not the right book for you.

d) I do not know.

Critical thinking ability

GC1. Which of the following sources is most likely to contain outdated information?

a) Field Guide to North American Trees, published in 1980.

b) The Poems of Edgar Allan Poe, published in 1982.

c) Computer-based Instruction, published in 1983.

d) I do not know.

GC2. Which statement on GMO (Genetically Modified Organisms) is NOT the author's personal opinion?

a) GMO will bring about a global food crisis.

b) According to inventories, 15 new GMOs were registered in the US in 2013.

c) Most GMO researchers have been paid off by large corporations, such as Monsanto.

d) I do not know.

Ability to manage and store information effectively

GM1. You are organizing the photographs on your computer and you decide to put them into folders named Road Trips, Sports, Family, School Projects, and Parties. You are organizing by:

a) Location.

b) Category.

c) Hierarchy.

d) I do not know.

GM2. You have found various interesting articles online and you think they will be useful for you later. Which of the following ways of storing them will make it easier for you to find and read them later?

a) I download the articles, logically rename the files and assign them to folders according to the subject.

b) I keep the articles open as tabs in my browser.

c) I open a new file in a word processor and then copy-paste the parts of the article I find interesting in. I only save this file.

d) I do not know.

Ability to use and create information

GU1. Which of the following is NOT an original, new piece of information you could create?

a) A book review on the latest book you've read about horticulture.

b) A video of your neighbors showing their best gardening tricks.

c) A set of highlights from a thick gardening book.

d) I do not know.

GU2. You want to submit a poster to a competition run by your local city council, the topic is: Saving Water. Which of the following would be a subject for your poster that matches the topic and is suitable for this audience?

a) How the global water crisis is fueling conflict in the middle east.

b) Top tips for reducing water usage in your home.

c) The increasing costs of water rates over the past twenty years.

d) I do not know.

Ability to share and communicate information

GS1. You have taken some photographs at a National Archives Museum event that marked the centenary of women being given the right to vote, focusing on the Suffragists. Which of the following combination of tags should you apply to reach the maximum number of people interested in this subject?

a) Photograph, National Archives Museum, Special Event, Washington, D.C.

b) Suffragists, Votes for Women, National Archives Museum, Feminism.

c) Centennial, Event, Photo, Museum.

d) I do not know.

GS2. You were asked to speak at a local community center about your work experience. You will be addressing currently unemployed individuals looking to get into your area of work. How would you approach your presentation?

a) I would ensure that I avoid technical jargon or slang.

b) I would ensure that I include as much technical jargon as possible.

c) I would ensure that I use slang as much as possible.

d) I do not know.

Understanding of ethical issues surrounding information

GE1. Which of the following statements is the most accurate definition of plagiarism?

a) Plagiarism is the use of a copyrighted work without the permission of the original creator.

b) Plagiarism is using someone else's words and not quoting them.

c) Plagiarism is the use of another's ideas or words or other tangible work and passing them off as your own.

d) I do not know.

GE2. You have taken a photograph of your friend Jane posing by a fountain in Central Park. Who owns this photograph?

a) I do, because I am the one who took it.

b) Jane does, because it is a photo of her.

c) The New York City Department of Parks and Recreation does, because they own Central Park.

d) I do not know.

Higher Education Information Literacy Questions

Ability to discover and access information

HD1. You have read this article and you found it extremely useful:

Smith, P. (2017) The effects of cute kitten imagery on chocolate purchasing. *The Journal of Consumer Behaviour*, 5(1), pp.24-31.

Which of the following would NOT be a good strategy to find more similar articles?

a) Look at the reference list in the article, and try to find some of the articles cited.

b) Search for Smith as an author in the library catalog.

c) Search in other issues of *The Journal of Consumer Behaviour.*

d) I do not know.

HD2. Which of the following options lists the sources from least specialized to the most specialized:

a) Wikipedia entry on Economics / The Economist Newspaper / Economics Textbook / The Journal of Political Economy.

b) Wikipedia entry on Economics / The Journal of Political Economy / The Economist Newspaper / Economics Textbook.

c) The Economist Newspaper / Wikipedia entry on Economics / The Journal of Political Economy / Economics Textbook.

d) I do not know.

Critical thinking ability

HC1. Why can we NOT find everything we need for research by using Google?

a) It does not have a very good search engine and not everything on the web is searchable.

b) Not everything on the web is searchable and it does not always bring back reliable material.

c) It does not have a very good search engine and it does not always bring back reliable material.

d) I do not know.

HC2. You are searching for information on mobile technology and learning for a research paper. Which of the following sources below is a peer-reviewed, scholarly source?

a) An article from Journal of Educational Technology.

b) An article from Harvard Magazine.

c) A book review from the Journal of Aesthetic Education.

d) I do not know.

Ability to use and create information

HU1. Which of the following sources would produce a more accurate insight into the behavior of a potential audience?

a) Survey questionnaires and interviews.

b) Catalogs and magazines.

c) Textbooks.

d) I do not know.

HU2. You are asked to write a literature review on the abortion debate. What information would you include in your paper?

a) Research on the scientific advancements in abortion technology.

b) Research on the benefits of abortion and why the 'pro-choice' campaign should be supported.

c) Research on the benefits and detriments of abortion and directions for future research.

d) I do not know.

Ability to share and communicate information

HS1. What is the correct sequence of the elements in a research article?

a) Abstract / Bibliography / Introduction / Material and Methods / Results / Discussion / Conclusions.

b) Abstract / Introduction / Material and Methods / Results / Discussion / Conclusions / Bibliography.

c) Abstract / Conclusions / Introduction / Bibliography / Material and Methods / Results / Discussion.

d) I do not know.

HS2. An abstract is which of the following?

a) A list of all the sources cited in an article.

b) A list of acknowledgements of funding sources.

c) A summary of an article.

d) I do not know.

Understanding of ethical issues surrounding information

HE1. You read an article on your topic for a research paper. In which of the following instances are you NOT required to cite the material in your paper?

a) When you include a whole paragraph from the article in your paper.

b) When you re-write the information in the article in your own words.

c) When you read the information and decided it was not relevant to your research paper.

d) I do not know.

HE2. Read each of the following scenarios and decide which one would be considered plagiarism.

a) You find an article from the database Academic Search Complete. You skim about half of it and get some ideas. You include some of these ideas in your paper. You include a bibliography in your paper, but not this source.

b) You read an encyclopedia entry from Wikipedia and learn that John F. Kennedy was the fourth US president to be assassinated while in office. You place this fact in your paper but do not cite it anywhere.

c) You attend a museum exhibit on the history of western popular music. While at the exhibit you get inspired by what you see. You write about these ideas in your paper, but do not mention the exhibit anywhere in your paper.

d) I do not know.

Scoring

The following tables show the question categories, numbering, breakdown into test versions, and scoring for the OTIL and HE add-on subscale.

OTIL

Category	Question	Test	Correct Answer
Ability to discover and access information	GD1	1	b
	GD2	1	a
	GD3	2	c
	GD4	2	c
	GD5	3	a
	GD6	3	b
Critical thinking ability	GC1	1	c
	GC2	1	b
	GC3	2	a
	GC4	2	b
	GC5	3	b
	GC6	3	b
	GM1	1	b
	GM2	1	a

Ability to manage and store information effectively	GM3	2	b
	GM4	2	c
	GM5	3	c
	GM6	3	c
Ability to use and create information	GU1	1	c
	GU2	1	b
	GU3	2	a
	GU4	2	a
	GU5	3	b
	GU6	3	b
Ability to share and communicate information	GS1	1	b
	GS2	1	a
	GS3	2	a
	GS4	2	b
	GS5	3	b
	GS6	3	b
Understanding of ethical issues surrounding information	GE1	1	c
	GE2	1	a
	GE3	2	a
	GE4	2	c
	GE5	3	a
	GE6	3	c

HE add-on subscale

Category	Question	Test	Correct Answer
Ability to discover and access information	HD1	1	b
	HD2	1	a
	HD3	2	a
	HD4	2	a
	HD5	3	c
	HD6	3	c
Critical thinking ability	HC1	1	b
	HC2	1	a
	HC3	2	b
	HC4	2	c
	HC5	3	a
	HC6	3	a
Ability to use and create information	HU1	1	a
	HU2	1	c

	HU3	2	c
	HU4	2	b
	HU5	3	b
	HU6	3	b
Ability to share and communicate information	HS1	1	b
	HS2	1	c
	HS3	2	a
	HS4	2	b
	HS5	3	a
	HS6	3	b
Understanding of ethical issues surrounding information	HE1	1	c
	HE2	1	a
	HE3	2	a
	HE4	2	b
	HE5	3	c
	HE6	3	b

Appendix C. Kurbanoglu Permission

[EXTERNAL] Ynt: Request Permission to Use the ILSES in my Dissertation

SS SABRİYE SERAP KURBANOĞLU <serap@hacettepe.edu.tr>
To Holly S. Hebert

Reply | Reply All | Forward
Wed 4/3/2024 5:51 AM

Start your reply all with: Thank you! | Thank you so much! I really appreciate it! | Thank you so much! | Feedback

Dear Holly,

Yes, you can use the scale and yes you can modify it as you described.

Good luck.

Serap

Gönderen: Holly S. Hebert <Holly.Hebert@mtsu.edu>
Gönderildi: 12 Mart 2024 Salı 06:49:07
Kime: SABRİYE SERAP KURBANOĞLU
Konu: Request Permission to Use the ILSES in my Dissertation

Hello Dr. Kurbanoglu,

I am doing a dissertation study with beginning online graduate students, and I would like to use your IL Self-Efficacy Scale. Would it be possible for me to modify the wording a little? For instance, I would change WWW to 'internet' and change the spelling of catalogue to catalog, small things like that to fit a more modern American audience?

Thank you for your consideration,

Holly

Holly Hebert, MLIS, MSEd-OTL, COI
Assistant Professor & Program Coordinator, Master of Library Science Program
Womack Educational Leadership Department
College of Education

Appendix D. Information literacy Self-Efficacy Scale

Adapted from the English version (Kurbanoglu et al., 2006)

I feel confident and competent to

1. Define the information I need
2. Identify a variety of potential sources of information
3. Limit search strategies by subject, language and date
4. Initiate search strategies by using keywords and Boolean logic
5. Decide where and how to find the information I need
6. Use different kinds of print sources (i.e. books, periodicals, encyclopedias, handbooks, etc.)
7. Use online information sources
8. Locate information sources in the library
9. Use the library catalog
10. Locate resources in the library using the library catalog
11. Use internet search tools (such as search engines (Google, Firefox, etc.))
12. Use different kinds (types) of libraries
13. Use many resources at the same time while researching
14. Determine the authority, currency, and reliability of the information sources
15. Select information most appropriate to the information need
16. Identify points of agreement and disagreement among sources
17. Evaluate internet sources
18. Synthesize newly gathered information with previous information
19. Interpret visual information (i.e. graphs, tables, diagrams)
20. Write a research paper
21. Determine the content and form the parts (introduction, conclusion) of a presentation (written, oral)
22. Prepare a bibliography
23. Create full citations and organize the bibliography
24. Create full citations for different kinds of materials (i.e., books, articles, web pages)
25. Make in-text citations and use quotations within the text
26. Choose a format (i.e. written, oral, visual) appropriate to communicate with the audience
27. Learn from my information problem solving experience and improve my information literacy skills
28. Critique the quality of my information seeking process and the end product

Notes: This scale has been prepared to determine your level of efficacy on issues related with 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. Thanks for your cooperation.

Appendix E. Interview Protocol

Conducted via Zoom after the student completes the initial survey, the modules, and the second survey.

Introduction:

Hi _____, Thank you for meeting with me today. I'm looking forward to our conversation about information literacy and your experience as a graduate student beginning a new program. The purpose of this study is to explore the information literacy skills that beginning online graduate students have going into their program and how they feel about their ability to use those skills during their coursework. I'm very interested in hearing about your experience. Do I have your permission to record this interview? I have about 7-8 questions to ask and I'm anticipating our conversation to last about 35-45 minutes. Are you ready to begin?

Questions:

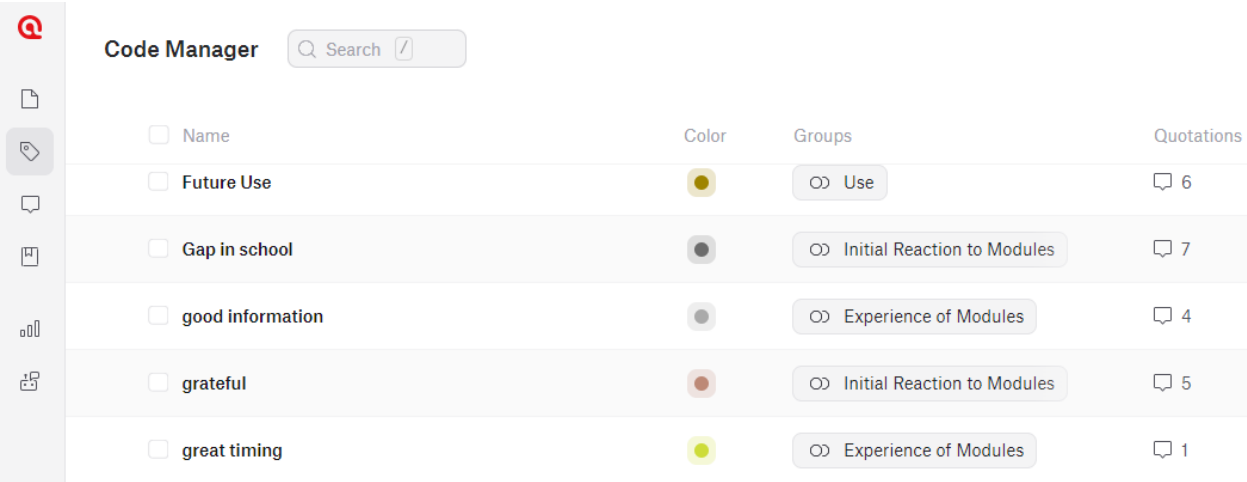
1. Can you tell me a little about your initial reaction to the information literacy modules?
2. Can you tell me about some concepts or strategies in the modules that you already knew?
3. Do you feel confident in your ability to carry out those things? Please explain.
4. Can you tell me about some concepts or strategies in the modules that you didn't know already?
5. Do you feel confident in your ability to carry out those things? Please explain.
6. How can you see using these modules during your coursework?
7. How do you think these modules can be improved for beginning graduate students like yourself?
8. What do you see as some of your biggest needs in regards to doing research during your graduate program?
9. Is there anything else you would like to add?

Conclusion:

Thank you so much for your time today, _____. I really appreciate your taking the time to participate in this study. I hope that the modules can continue to be useful to you as you go

through your coursework. May I contact you if I have further questions or need any clarification? Thank you so much. Have a great day.

Appendix F. Coding Example Using Atlas.ti



Appendix G. Modules Outline and Librarian/Teacher Guide

Outline

1. The Research Process
    a. Steps of Research
    b. Narrowing the Topic
    c. How to Write a Research Question
2. Types of Information Sources
    a. Scholarly vs. Popular Sources
    b. Journals/Periodicals – Volumes and Issues
    c. Peer Review
    d. Authority
    e. Choosing Appropriate Sources
3. Finding Sources
    a. Boolean Search Strategies
    b. Keyword and Subject Searching
    c. Using Library Databases
    d. Advanced Google Searching
    e. Developing a Good Search Strategy
4. Evaluating Sources
    a. Lateral Reading
    b. SIFT Method
    c. Methods such as CRAAP
    d. Media Bias Chart
    e. Reverse Image Search
5. Citing and Incorporating Sources
    a. Why is Citing Important? – Scholarly Discourse
    b. Citation Styles by Discipline
    c. How to cite journal articles, books, websites
    d. Common Difficult citations
    e. In-text citations
    f. APA, MLA, Chicago, etc.
    g. Copyright
    h. Plagiarism
6. Institutional Library Resources
    a. Library Resources for Online/Distance Students
    b. Library Resources for Graduate Students
    c. Research Guides
    d. “How To” Video Tutorials
    e. How to Ask for Help – Contact Information

Librarian/ Faculty Guide

Collaboration

- Librarians and faculty should be involved in creation and implementation of modules
- Modules should be offered in addition to other types of information literacy instruction, including librarian one-shots, research guides, videos, website content, etc., available from the library which are all valuable for their own purposes.

Location

- The graduate research orientation modules should be situated in a fixed location that is easily accessible to students and faculty
- Students should be directed to the location of the modules before beginning their first semester and shown their importance
- Faculty should be notified of the location and importance of the modules

Activities

- Create opportunities for students to practice in each module
- Use HP5 or similar tools to build interactive activities
- Include different types of activities such as: drag & drop, matching, short multiple choice & true/false quizzes, etc.
- Create or link to handouts/worksheets
- Build in feedback

Modalities

- Include different modalities of sources such as print, video, audio, etc., in each module

Length

- Keep videos short – under 5 minutes
- Limit number of resources for each module
- Choose print sources carefully so as not to overwhelm – avoid lengthy articles

Updating

- Decide who will update modules as needed
- Create timeline for updating
- Implement periodic evaluation of modules and their effectiveness
- Revisit librarian/faculty collaboration often