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The Relationship Between Metaliteracy Pretest, Posttest, and Metacognitive Strategies for Library Research Skills Scale: Creating a Metaliteracy Course for Online Ed.D. Students

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ABSTRACT

The purpose of this quantitative, quasi-experimental, exploratory study was to create a metaliteracy course for online Ed.D. students and determine if there was a relationship among the Metacognitive Strategies for Library Research Skills Scale (MS-LRSS), metaliteracy pretest, and metaliteracy posttest. Library literature is lacking on assessment of information literacy skills as determined by a new term, *metaliteracy*, and the goals and objectives associated with this new term. A course was created in the researcher's institution's learning management system, Canvas, using metaliteracy goals and objectives. The researcher developed a pretest and posttest using the goals and objectives of metaliteracy to assess students' knowledge of these concepts. The treatment was the researcher's development of video tutorials to explain metaliteracy concepts and skills that were watched after the pretest and before the posttest. A dependent *t* test revealed that there was a statistically significant difference between pretest and posttest. The results of the partial correlation to determine if a relationship existed between MS-LRSS and metaliteracy posttest after controlling for metaliteracy pretest were not significant. Similarly, the bivariate regression revealed that the MS-LRSS could not predict metaliteracy posttest. A forward regression model revealed that metaliteracy pretest could reliably predict metaliteracy posttest.

DEDICATION

This dissertation is dedicated to my mom, Nina Lorene Moore Hayes, and my husband, Robert Atkinson. My mom was a dedicated mother, teacher, friend, and my first and continuing example of a faithful Christian woman. My mom instilled in my sister and I a love of lifelong learning at an early age, and she never stopped pursuing knowledge of the truth in her faith and her academic learning. She passed away during my doctoral journey, but she will forever live on in my heart as an example to follow when pursuing truth, knowledge, and wisdom.

My husband, Robert, has been my encourager, confidant, supporter, and biggest ally from the beginning to the end of this exciting adventure. He made this journey possible with his love and dedication to me in my pursuit of knowledge and learning. I love you, honey, and I cannot thank you enough for your continuous unconditional love and devotion.

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CHAPTER 1 – INTRODUCTION

Background

Information literacy is a longstanding term used by librarians to describe the skills necessary for students to become proficient researchers. Before the term was used to describe instruction given to students by librarians to teach research skills, the term *bibliographic instruction* was used to describe instruction given to students to help them find what they needed in the library (Rader, 1990). Exploring the history of colleges and academic libraries is important in understanding how the term *information literacy* evolved through four centuries of information access, library instruction, and academic librarianship.

Colonial colleges did not begin with large library collections. Collections were small; as a result, professional librarians were not needed to organize, instruct, or take care of the collections as they do now (Shores, 1935). As colleges and the libraries within them developed, the need for more organization, instruction, and a profession that understood these needs developed. Instruction on how to find, access, and analyze information became important to professional librarians with the production of more books, scholarly journals, and new technologies introduced into academia (Shiflett, 1981). In 1876, the American Library Association (ALA) held an inaugural meeting as a professional organization for librarians working in various venues—public, academic, special, and school (Salony, 1995). Instruction had been a part of academic librarians' activities for decades, even offering instruction courses in how to use the library; however, the ALA was able to develop task forces and sections devoted to promoting and developing guidelines for instruction (Hardesty, Schmitt, & Tucker, 1986).

In 1974, Paul Zurkowski, President of the Information Industry Association, proposed the term in a report written for the National Commission on Libraries and Information Science (Behrens, 1994). Within 5 years, librarians embraced the term to identify specific concepts and skills that were important for learners to understand when finding, evaluating, and using information (Behrens, 1994). During the 1980s and 1990s, Breivik (1985, 1992) published several articles and books that included working definitions of the term *information literacy*, characteristics of *information literacy*, and how to incorporate specific skills into the curriculum (Breivik & Gee, 1989; Breivik & Senn, 1994). According to Breivik (1985), some characteristics of information literacy include "an integrated set of skills," the fact that it is "time and labor intensive," and that it is "need driven" (p. 723).

Since the introduction of the term, librarians have emphasized the skills necessary to find, evaluate, and use information under the term *information literacy* to denote the importance of the skills for students to become useful to society (Breivik & Gee, 1989). Breivik and Gee (1989) advocated for faculty and librarian collaboration to incorporate information literacy skills into undergraduate education for the promotion of lifelong learning since information is constantly evolving. Information literacy is used by librarians to bridge the gap between what is being assigned to students and what students will need to know when they leave college. Since the use of information literacy in librarianship, especially academic librarianship, librarians have placed a high priority on "learning and teaching information literacy" (Breivik & Gee, 1989, p. 12).

In 2000, the Association of College and Research Libraries (ACRL) used the term to publish the Information Literacy Competency Standards for Higher Education.

Changes in technology, higher education, and fundamental information creation issues that have arisen in the 15 years since publishing the standards prompted the ACRL (2016a) to create new standards for information literacy, now called the Framework for Information Literacy for Higher Education (ACRL Framework). The ACRL Framework incorporates metaliteracy principles to guide librarians to think about information literacy as a set of lifelong learning concepts rather than skills students only need while in college. Metaliteracy is a "unified construct" proposed by Mackey and Jacobson (2011) as a reframing of information literacy that "promotes critical thinking and collaboration" by "incorporating emerging technologies" in participatory environments (pp. 62-63). The Information Literacy Competency Standards and now the ACRL Framework provide academic librarians goals and objectives for planning and designing information literacy instruction in the form of courses and workshops, as well as a reference for assessing concepts and skills.

Academic librarians have been providing information literacy instruction in various forms, including courses, workshops, sessions, handouts, subject guides, quizzes, and tutorials, for on-campus students (Blummer, 2009; Ivanitskaya, DuFord, Craig, & Casey, 2008; McBride, 2011). Academic librarians have also provided information literacy instruction for distance students in various forms that have improved with the development of new internet programs that allow for different types of instruction (Courtney & Wilhoite-Mathews, 2015). Providing information literacy to distance (i.e., online) students mainly depends on the college or university library and the emphasis information literacy has on the campus culture.

In 2008, ACRL published the Standards for Distance Library Services (Standards for DLS), which include minimum requirements libraries should offer to distance students in institutions of higher education. Revised and expanded in 2016, the standards now include extension students (ACRL, 2016b). The overall purpose of the Standards for DLS is to provide the same or similar services to distance students as given to traditional on-campus students. The Standards for DLS include specific institutional and library requirements such as personnel, monetary support, resources, technology support, and services. The services requirement includes information literacy instruction and assessment as outlined in the ACRL Information Literacy Competency Standards and the ACRL Framework. Online students should receive as much instruction as traditional on-campus students, which is increasingly important with the growing number of online courses and programs offered at higher education institutions (Read & Morasch, 2016).

Various methods to assess information literacy skills have been used by librarians, including tools developed by companies that sell assessments to libraries. Standardized Assessment of Information Literacy Skills, Tool for Real-Time Assessment of Information Literacy Skills, and Research Readiness Self-Assessment are products that many libraries purchase to assess students' information literacy skills (Foo et al., 2013). Due to cuts in budgets in many universities in the last few years, many libraries and librarians have opted to develop their own assessment tools using a variety of formats (Courtney & Wilhoite-Mathews, 2015). This saves money and gives librarians the chance to tailor assessments to fit the needs of students.

Kumar and Edwards (2013) found that many graduate and doctoral students did not have confidence in their abilities to find information or use library databases from off

campus; even though they possessed "advanced technical skills," they lacked "recent experience with academic databases" (p. 6). Many graduate and doctoral students are nontraditional; efforts by many librarians include focusing on instruction and assessment of adult learners (Blummer, 2009; Read & Morasch, 2016; Roberts, 2017). Many universities realized the importance of information literacy instruction and assessment for graduate students as Blummer (2009) reported in his review of the literature. Read and Morasch (2016) assessed the amount of views received for tutorials placed at "point-of-need" in online courses for M.Ed. and Ed.D. students using a "research performance support" framework (p. 109). In Roberts' (2017) study, an assessment using a pretest and posttest given to nontraditional community college students before and after an information literacy workshop included metacognitive awareness principles. Assessments of graduate and doctoral students should consider both adult learning theories and best practices in instructional design (Read & Morasch, 2016).

Statement of the Problem

Librarians have instructed online students on the topic of information literacy using a variety of methods, including video tutorials, live instruction sessions (typically called webinars), embedment in a course, and for-credit or noncredit courses. Information literacy for online students has mostly focused on skills associated with research, such as identifying parts of a citation, using citation styles correctly, requesting materials through interlibrary loan services, and finding and evaluating resources in library databases. *Metaliteracy*, a concept thoroughly developed by Mackey and Jacobson (2011), broadens the information literacy concept, focusing on how technology, particularly social technology, impacts student learning and emphasizes metacognition as a critical lifelong

skill. Metaliteracy is concerned with who, what, when, where, and how students gain, create, and share information. As a relatively new concept in librarianship, a lack of research has been found using metaliteracy as an approach to the design of online information literacy courses and assessing metaliteracy concepts. The current study aims to create a noncredit information literacy course in a small, private university's learning management system (LMS; also called a course management system) for online Ed.D. students and compare pretest and posttest scores of metaliteracy concepts. An LMS allows instructors to manage courses in an online format and can include the syllabus; assignments; graded and nongraded quizzes, tests, and discussion boards for online classes only; blended classes; or as a supplement to on campus classes (Simonson, Smaldino, & Zvacek, 2015).

Research Purpose

The purpose of this exploratory, quantitative, quasi-experimental research study is to determine if implementing a noncredit information literacy course inside a small, private university's Canvas LMS for online graduate students using metaliteracy concepts can improve scores from pretest to posttest. Another purpose of this study is to determine if there is a relationship among the Metacognitive Strategies for Library Research Skills Scale (MS-LRSS), the metaliteracy pretest, and the metaliteracy posttest (Catalano, 2017). Specifically, can the MS-LRSS predict metaliteracy posttest after controlling for metaliteracy pretest or can the MS-LRSS and the metaliteracy pretest predict the metaliteracy posttest?

Significance of the Study

Online information literacy courses are offered to graduate students as a course for credit, a course for noncredit, an asynchronous or synchronous webinar session, a series of video tutorials, an embedded librarian in a course, or some combination of these methods. Some librarians have embraced their institution's LMS to design and deliver many of these information literacy offerings, leveraging the ease of use and the amount of use of the LMS by students and faculty (Courtney, & Wilhoite-Mathews, 2015; Gersch, Lampner, & Turner, 2016; Mune, Goldman, Higgins, Eby, Chan & Crotty, 2015; Shaffer, 2011). However, course or program information literacy instruction "is not the norm" (Kumar & Edwards, 2013, p. 5).

Shaffer (2011) reflected on the lack of research in information literacy instruction for graduate students and online graduate students. Academic librarians have often used the ACRL Information Literacy Competency Standards, and now the ACRL Framework to design and assess information literacy concepts and skills. The library literature frequently has included the development of various designs and assessments using these standards, but few studies have used metaliteracy principles to guide the development of an information literacy course, session, or tutorial.

Currently, the library utilized in the current study is using asynchronous webinars (recorded for synchronous viewing) for library instruction of traditional information literacy skills. While Courtney and Wilhoite-Mathews (2015) described the effectiveness of this type of instruction, professors and librarians at the researcher's institution prefer to create a course that effectively incorporates information literacy and critical thinking skills that are assessable. This study examines the development of a noncredit

metaliteracy course using the university's Canvas LMS. The four metaliteracy goals are be emphasized in four course modules as well as a traditional information literacy skills module and include a pretest and posttest measuring the metaliteracy goals and skills of online students.

Theoretical Perspective

The theoretical perspective for this study focuses on metacognition. Andragogy and connectivism, while not the main theoretical focus, are perspectives that inform the metacognitive aspects due to some similarities of theoretical concepts. Some of the main principles of andragogy focus on adult learners' self-directedness, life experiences, and intrinsic motivation (Flavell, 1979). Connectivist principles include "the ability to see connections between fields, ideas, and concepts" and the ability to learn and know more than what is currently known (Siemens, 2005, Principles of Connectivism section, para. 1).

Metacognition

Metacognition is being aware of one's own knowledge and abilities and reflecting on how to improve (Mackey & Jacobson, 2014). Metacognition is important to the principles of metaliteracy due to a shift of focus from an information literacy perspective—what a student can or cannot do—to a metaliteracy perspective—what a student knows he or she can or cannot do. Metacognition also illustrates the reflective behavior students use when searching for information based on their "previous experiences . . . and their feelings or beliefs about their [own] knowledge" (Mackey & Jacobson, 2014, p. 11).

Flavell (1979) described metacognition as related to “knowledge,” “experiences,” “goals,” “actions,” and “stored world knowledge” (p. 906). Information literacy instruction has previously relied on teaching students skills through short lectures, limited practice time, web-based library guides, and other methods that tend to lack the concepts and knowledge transferable to other aspects of learning. Critical thinking skills and self-directed learning should be the goal of information literacy instruction and metacognitive principles help guide students to apply general knowledge to a variety of contexts (King, 2011). Students have a variety of experiences outside the classroom where metacognitive principles can apply. Teaching students to apply what they learn in an academic setting to their personal lives and places of employment can enrich their experience and create lifelong learning mindsets (Roberts, 2017).

Brand-Gruwel, Wopereis, and Vermetten (2005) showed metacognition and self-knowledge to help students as they gathered information for processing to accomplish a task, which was an information seeking and synthesizing assignment developed by the researchers. Students who had previous knowledge and experiences with information gathering and knew how to process that knowledge to accomplish the task spent more time understanding the task, made more connections to the information in their final task, and spent more time on self-regulation (Brand-Gruwel et al., 2005). As librarians and instructors of information literacy, teaching metacognitive skills in research activities can help students develop critical thinking skills that can be used as a “toolkit” when applying those skills to other activities (Catalano, 2017, p. 182). Metacognition is an important component to metaliteracy as it relates to the lifelong learning and critical thinking skills students need to succeed in academics and beyond.

Andragogy

Adult learning theory, andragogy, which emphasizes that teaching adults is different from teaching children (pedagogy), is closely related to metacognition. Some of the main principles of andragogy focus on an adult learner's self-directedness, life experiences, and intrinsic motivation (Flavell, 1979). Malcolm Knowles (1984) examined andragogy as an alternative to pedagogy. Andragogy takes a different approach to instruction than pedagogy in that adult learners have more "experience," "self-concept (self-directedness)," "need to know," "readiness to learn," "orientation to learning," and "intrinsic motivation" that adds to learning (Knowles, 1984, pp. 55-61). Lindeman (1926) explained that learning does not end when schooling is done, but "education is life" and "life is also education" (p. 9). Adults' experiences inform learning in all aspects of their life. Adult learning is connected to psychological, social, and biological developmental stages and is different than the same stages in children or adolescents (Knowles, 1984). Since children and adults differ in developmental stages, how they learn and how they are taught should also differ. However, Knowles acknowledged that andragogy "is a system of alternative sets of assumptions" and "includes pedagogical assumptions" (p. 62).

Not only has andragogy been used to develop programs and courses designed for adult learners in higher education, but online learning courses, emphasizing lifelong learning concepts and self-directed learning, have also used andragogical principles. In the online learning environment, many learners are adult learners going back to school. The mean age of online graduate students in the United States in 2016 was 33 (Clinefelter & Aslanian, 2016, p. 11). Although this was a decrease from the mean age of 36 in 2015, the average age of an online graduate student is higher than the mean age of an online

undergraduate student in 2016, which was 29 (Clinefelter & Aslanian, 2016, p. 11). According to Clinefelter and Aslandian (2017), in 2017, the highest percentage of online graduate students was between the ages of 30-34 at 27%.

Halpern and Tucker (2015), Rapchak and Behary (2013), and Tieman and Black (2017) have used andragogical principles in developing and teaching information literacy tutorials, courses, and portions of courses. Halpern and Tucker developed tutorials that took into consideration adult online students' prior experiences and self-directedness by adding elements of self-reflection and allowing students to choose which tutorials would be the most helpful. Rapchak and Behary developed an online information literacy course using the andragogical concept of "need to know" by focusing on activities that students could apply directly to their field of study (Knowles, 1984, pp. 56). Tieman and Black also developed an information literacy instruction session as part of an established course and "fulfilling the need to know" principle by "giving research scenarios" relevant to the adult students' research interests (p. 201).

Connectivism

Connectivism is helpful when thinking of learning in online environments. Connectivism is a learning theory first developed by George Siemens (2005) that explains learning through connectedness of individuals and others, individuals and information, individuals and "non-human appliances," and individuals and knowledge (Principles of Connectivism section, para. 1). Connectivism emphasizes that learning takes place through an individual's connections with evolving technological tools. Students, especially online students, connect with technology daily through coursework, research, and discussion to create networks unique to their needs (Transue, 2013).

Information literacy instruction that uses a connectivist approach can lead students to "perceive connections and patterns between ideas" (Dunaway, 2011, p. 682).

O'Brien, Forte, Mackey, and Jacobson (2017) suggested that metaliteracy and connectivism have similar principles, including self-regulated learning and interaction with technology to create and form knowledge. While andragogy and connectivism were not specifically used to design the metaliteracy course, the principles and concepts behind the theoretical assumptions were used as a lens into metacognitive principles to develop the course used in this study.

Research Questions

RQ_1: Is there a statistically significant difference between metaliteracy pretest and metaliteracy posttest among online Ed.D. students at one university?

RQ_2: Is there a statistically significant relationship between the MS-LRSS and metaliteracy posttest in online Ed.D. students after controlling for metaliteracy pretest?

RQ_3: Can the MS-LRSS statiscially significantly predict metaliteracy posttest?

RQ_4: Can the MS-LRSS and metaliteracy pretest statistically significantly predict metaliteracy posttest?

Null Hypotheses

The null hypotheses follow:

H_{01}: There is no statistically significant difference between metaliteracy pretest and metaliteracy posttest among online Ed.D. students at one university.

H_{02}: There is no statistically significant relationship between the MS-LRSS and metaliteracy posttest in online Ed.D. students after controlling for metaliteracy pretest.

H_{03}: The MS-LRSS cannot statistically significantly predict metaliteracy posttest.

H_{04}: The MS-LRSS and metaliteracy pretest cannot statistically significantly predict metaliteracy posttest.

Delimitations and Limitations

Delimitations that impact generalization to a larger population of online Ed.D. students are the decisions to study a group of online students who are in one program (Ed.D.) at one university using a noncredit course as the treatment. Limitations include the sample size, which is not random, but a convenience sample of students in one program. Generalizations to larger online doctoral student populations would be limited, and further research should include a more diverse population randomly drawn from private and public institutions and perhaps include undergraduate students.

Definitions of Terms

The terms used in this study are defined below.

Academic librarians. Librarians who serve students at institutions of higher learning, including community colleges, 4-year colleges, and research institutions (ACRL, n.d.).

Andragogy. A learning theory that is different than pedagogy that considers how adults learn and should be taught (Flavell, 1979).

Association of College and Research Libraries (ACRL). An organization that is a division of the ALA that serves academic librarians working in various positions in institutions of higher learning (ACRL, n.d.).

Bibliographic instruction. The teaching of specific skills to find information in libraries including books, articles, and archival materials (Salony, 1995).

Connectivism. A learning theory that suggests that individuals are connected to information through emerging technologies which informs knowledge dissemination (Siemens, 2005).

Information literacy. The skills necessary for finding, evaluating, organizing, and using information in an ethical manner (Mackey & Jacobson, 2011).

Metaliteracy. A new concept of information literacy that recognizes that learning is lifelong by applying metacognitive principles to design and assessment of courses, workshops, and other teaching methods (Mackey & Jacobson, 2011).

Metacognition. The theory that a person reflects on his or her own knowledge and abilities to improve learning (Flavell, 1979).

One-shot instruction session. A one-shot instruction session in an academic library setting is when librarians teach basic research skills for a group of students in a class, often just once within their college career (Watson et al., 2013).

Scope of the Study

The scope of the study is to determine if any relationship exists between the noncredit course metaliteracy posttest and the MS-LRSS after controlling for metaliteracy pretest scores among university online doctoral students. The scope of the study also includes determining if the MS-LRSS can predict the noncredit course

metaliteracy posttest or if the noncredit metaliteracy pretest and the MS-LRSS can predict the noncredit course metaliteracy posttest. The noncredit course consists of an overall pretest created by the researcher (i.e., the MS-LRSS), five modules of treatment using videos created by the researcher, and an overall posttest that is the same as the pretest. The noncredit course is designed to take between 1 and 2 hours.

Summary

Information literacy has been a long-standing term to describe the instruction librarians give to students to prepare them for assignments in various courses throughout their college career. As technology and information have changed since the introduction of the terms *bibliographic instruction* and later *information literacy*, the focus from an assignment-based instruction has shifted to a lifelong learning approach. The term *metaliteracy* should be considered to describe the instruction necessary to prepare students for lifelong learning skills such as critical thinking, cognition, and self-reflection (Mackey & Jacobson, n.d.). Using metacognition as a theoretical lens emphasizes these lifelong learning skills and can be included in metaliteracy courses. Assessment of information literacy skills has been adequately presented in the literature; however, assessment of metaliteracy skills as presented in the goals and objectives developed by Mackey and Jacobson (n.d.) is lacking in the literature, especially in courses offered to online graduate students (Shaffer, 2011). Developing a noncredit course for online Ed.D. students using metaliteracy goals and objectives will fulfill a need in library literature as well as assess online Ed.D. students' skills and knowledge of metaliteracy concepts.

CHAPTER 2 – LITERATURE REVIEW

History of Academic Libraries in the United States

Information literacy is a term that has been used by librarians for decades to describe skills and concepts that are necessary in an information-overloaded world. Librarianship as a profession in the United States has existed for over 100 years, and instruction in how to search, locate, and analyze information did not start with information literacy. Before the term *information literacy* became the norm in library instruction, *bibliographic instruction* was the term used by librarians to describe what librarians did to help students and faculty find what they needed. From the restricted access of materials in colonial college libraries to the abundance of information today, instruction has been a part the librarian profession. As colleges and universities in the United States grew, libraries grew with them; the need for librarians to organize and provide services to students, faculty, and staff also grew.

Colonial College Libraries

The history of academic libraries in the United States began with the establishment of colonial colleges. Harvard, William and Mary, Yale, Princeton, Columbia, University of Pennsylvania, Brown, Rutgers, and Dartmouth are recognized as the first colonial colleges, and each of these college libraries was a predecessor of current academic libraries (Shores, 1935). The colonial college libraries were started with gifts given by founders of the college or beneficiaries (Radford, 1984; Shores, 1935; Wright, 1962). Most of the libraries were either destroyed, raided, or hidden during the Revolutionary War (Clayton, 1968; Shores, 1935). After the Revolutionary War, Shores (1935) indicated the colonial colleges were able to purchase books needed for students to support the curriculum, primarily through donations. After the Civil War, college

attendance steadily grew, availability of books and information grew, and in turn academic libraries grew (Clayton, 1968).

The establishment of graduate schools and the introduction of the sciences to college departments started the specializations within disciplines, often referred to as "the university movement" (Shiflett, 1981, p. 57). Johns Hopkins opened in 1876 and was intended to be a graduate college only (Hopkins, 1982). Emphasis switched from a religion-based, classical curriculum to expertise in a discipline and "scholarship rather than orthodoxy became the criterion by which a man was measured" (Shiflett, 1981, p. 72). The move from rural, agricultural communities to urban, technological communities also played a role in the growth of colleges and universities, and libraries needed to house books to support the curriculum (Abbott, 1988; Holley, 1976; Hopkins, 1982).

Radford (1984) reported that during the early to mid-1900s, the Carnegie Corporation, with the implementation of the Advisory Group of College Libraries, gave grants to help supplement library budgets to hundreds of libraries that might not have survived, especially during the Great Depression. After World War II, many factors were involved in the growth of colleges, universities, and libraries, including veterans returning from the war and attending college with help from the G.I. Bill (Salony, 1995). Also, an abundance of published research, much of which was government funded for "research in science and technology" and the idea of "universal higher education" accounted for growth in library collections and college and university populations (Hopkins, 1982, p. 195).

In the colonial colleges, collections in academic libraries were small, and access to the collections were limited. In the Harvard library, students were only permitted to

check out three books at one time every 3 weeks (Brough, 1953). The librarian was only available once a week to check out books and accept returned books; although, once a week, the library was opened for students and faculty to study (Brough, 1953). With the growth of Harvard's collections and attendance into the late 1800s, the library was opened for 6 hours Monday through Thursday and opened for 4 hours on Friday (Shiflett, 1981). Some libraries were opened several times a week, but many collections in academic libraries in the middle to late 1800s were minimal and access was limited (Shiflett, 1981). In the mid-19th century, expanding hours for students to access books was beginning to become standard practice (Holley, 1976). According to Veit (1976), the Columbia College library in 1878 increased its hours to 14 hours a day and other colleges followed soon after. At the turn of the century, pressure for more books and more access due to the increase in attendance and the shift in curriculum focus created the impetus for full-time librarians to manage, educate, and organize materials for students and faculty (Shiflett, 1981).

History of Academic Librarianship

As the rise in attendance of colleges grew and high demand for materials, collections needed to support the curriculum also grew. In the early 19th century, books were not as important to teaching as they had become in the late 19th and early 20th centuries (Clayton, 1968). At first, librarians were those entrusted to organize and lend books as well as tend to the spaces for students and faculty to read. During the early history of colleges in the United States, the curators and organizers of libraries were often also professors or administrators, also known as "library-keepers" (Shores, 1935, p. 110). Many different disciplines' faculty, including English, Greek, and Latin, were called

upon to supervise library collections and services (Downs, 1976; Hopkins, 1982). Access to books was limited until faculty requested access to books be easier by extending library hours and allowing books to be used outside of the library (Shiflett, 1981).

Until the beginning of the 19th century, professions consisted largely of "law, medicine, and the clergy" (Newton & Dixon, 1999, p. 317). The introduction of scholarship, expertise in disciplines, growth in book publishing, and technological advances increased the need for other professions such as teachers and engineers (Newton & Dixon, 1999). Increase in information resulted in an increased demand for librarians (Abbott, 1988).

Since the opening of colonial colleges, librarians were predominantly male with few exceptions since faculty and administration were also male. When Melvil Dewey (creator of the Dewey Decimal Classification system) opened his library school at Columbia University in 1887, The School of Library Economy, women were banned from enrolling in Columbia (Downs, 1976). However, Dewey went against the wishes of Columbia and enrolled 17 women out of 20 students in his school and possibly began the tradition of a predominantly female profession (Downs, 1976; Vann, 1961). Due to conflicts with Columbia about the admission of women in Dewey's school, the school eventually moved to New York after Dewey accepted a position as library director at the New York State Library, and then the school became the New York State Library School (Downs, 1976; Vann, 1961). Dewey defined the profession of librarianship by shaping the curriculum in library science programs, emphasizing "both information scientist and social missionary" (Newton & Dixon, 1999, p. 320). Dewey, along with other prominent

librarians and organizational beginnings, began the transition of librarianship from curator to educator (Newton & Dixon, 1999).

Librarianship as a profession. The ALA (2018a) is "the oldest and largest library association in the world" (para. 1). The ALA's first inaugural conference was held in 1876—the same year Dewey published his library classification system and 1 year before Dewey opened the School of Library Economy (Newton & Dixon, 1999). According to Abbot (1988), the system of professions includes jurisdiction over an area of work; librarians' area of work is the library and is the jurisdiction in which librarians organize, teach, serve, and evolve. Although academic librarians were a part of ALA, the need for their own section to discuss academic matters arose. In 1938, the Association of College and Reference Libraries, now known as the Association of College and Research Libraries, was officially formed as a division of ALA (ACRL, 2006).

As academic librarianship grew in numbers and professionalism, some administration and faculty recognized that librarians could add to the enhancement of the curriculum by being partners in the educational process and were given faculty status (Downs, 1976). Some institutions and some faculty view librarians as clerical workers or workers of low rank (Abbott, 1988). As early as the turn of the century, disciplinary faculty have devalued instruction conducted by librarians, suggesting that faculty should incorporate library instruction into their own curriculum (Drabinski, 2016; Owusu-Ansah, 2004). W. Miller (1992) suggested that faculty status among librarians depends on the institution where they work and is important in demonstrating to teaching faculty that librarians not only can help students locate resources for their assignments but can also educate students in lifelong learning skills.

Librarian as teacher in bibliographic instruction. Librarians did not start teaching as a major component of the profession until after the Civil War (Ariew, 2014). As early as 1876, Dewey defined the librarian profession not only as those who organize and keep information but as educators (Tucker, 1980). The concept of user instruction, or *bibliographic instruction*, the more common term used among librarians, preceded the concept of *information literacy* with growth in scholarship and access to information increasing in the late 1800s (Hardesty et al., 1986; Hopkins, 1982). Bibliographic instruction is the teaching of specific skills to find information in libraries, including books, articles, and archival materials (Salony, 1995). In 1897, Marvin Davis Bisbee, a librarian at Dartmouth, appealed to librarians to instruct students in the use of the bibliography to help them navigate the "enormous size of the great collection of books" in the world since the student would be "helpless [if] turned loose in one of these vast store-houses and left to [their] own resources" (p. 430).

According to Ariew (2014), bibliographic instruction emphasized how to find and access information as opposed to information literacy, which emphasizes not only how to find and access information but how to analyze and use the information found. Library collections grew due to the production of more books, so bibliographic instruction was necessary to "access the books sitting on the shelves" (Salony, 1995). During the 1970s, bibliographic instruction gained momentum due to the Carnegie Commission on Higher Education's suggestion that libraries "should become a more active participant in the instructional process" (Farber, 1999, p. 172). According to Hopkins (1982), early professor–librarians' "natural inclination in an academic setting was to teach the use of library materials for academic purposes" (p. 193).

Bibliographic instruction in contrast to information literacy. Most academic librarians agree that no matter what term is used to convey the instruction of students in how to find information, whether bibliographic instruction or information literacy, the instruction itself is important. When bibliographic instruction transformed into information literacy, many librarians debated whether the two were the same or not (Farber, 1999; Hutchins, Fister, & MacPherson, 2002; Reichel & Arp, 1990; Wilson, 1992). In 1981, the ACRL's Bibliographic Instruction Section met to discuss the future of bibliographic instruction holding a Bibliographic Instruction Think Tank (Rader, 1990). A second Think Tank was held in 1989; its members agreed that regardless of the term used, the main goal is to teach students how to navigate the abundance of information and to practice lifelong learning skills (Rader, 1990). Many academic librarians still use the term *bibliographic instruction* (or BI) to assess when students have been given instruction on how to use the library.

Much of the transition from bibliographic instruction to information literacy includes the emphasis on lifelong learning for all ages, critical thinking beyond the classroom, rapid technological changes, and information overload (Owusu-Ansah, 2004; Rader, 1990; Wilson, 1992). Other librarians maintain that bibliographic instruction and information literacy are the same and that the term may change, but the instruction that was offered under each term was the same and had the same goal (Farber, 1999; Hutchins et al., 2002). Bodi (1988) suggested that bibliographic instruction could be used to promote critical thinking in students by teaching them to evaluate information sources as well as how to use the library's resources in different disciplines. Reichel and Arp (1990)

described bibliographic instruction as a methodology, while information literacy has an end product—"an information literate individual" (p. 46).

When transitioning from bibliographic instruction models to information literacy models, Hutchins et al. (2002) emphasized that the difference is in the scalability of each model within their institutions. While bibliographic instruction tended to be specific to certain courses, the information literacy model was university-wide and delivered across the curriculum, focusing on "transferable skills" (Owusu-Ansah, 2004, p. 10). Rader and Coons (1992) proposed that shifting from bibliographic instruction to information literacy was an opportunity for academic librarians to collaborate with teaching faculty to integrate information literacy concepts. Until a new term is introduced, information literacy is the term used to describe how librarians instruct students.

Changes in amount of and access to information. In the colonial colleges and until the late 19th century, access to information in libraries was limited. Since that time, information access has increased significantly and contributed to the shift in instruction given by librarians. Abbott (1988) explained, "Information professionals help clients overburdened with material from which they cannot retrieve usable information" (p. 216). The shift from bibliographic instruction to information literacy closely relates to the shift in how information is accessed, housed, and created. With the introduction of the World Wide Web, the internet, Web 2.0, and mobile devices, information has increased and is increasing "geometrically," and books are not the only source of information (Wilson, 1992, p. 49). Even though information is accessible, not all information is equal, and librarians are leaders in teaching how to effectively use and analyze information sources, regardless of format (Farber, 1999).

In many universities and colleges, faculty have determined that librarians can assist them and their students in finding the information they need for research (Farber, 1999). Technology is the change agent that shifted the paradigm in instruction to a "point of need" approach to an information literate citizen approach (Herrington, 1998, p. 383). The number of databases libraries offer in each discipline to access research increases the need for instruction in how to search the databases (Salony, 1995). Accessibility to information does not necessarily translate to effective use of information. The concepts taught using information literacy bridge the gap between the amount of accessible information and effective management of the information retrieved.

Information Literacy

As previously mentioned, *information literacy* is a term that has been primarily used by librarians to describe the skills necessary to be successful in locating, evaluating, synthesizing, and producing information in an ethical manner (ACRL, 2016a). According to Marcum (2002), information literacy has been "a major focus and purpose" of librarians and "serves a major strategic goal" for educational institutions (pp. 1-2). Information literacy has been taught using skills-based pedagogy due to the limited amount of time most librarians receive to teach these skills to students, traditionally in on-campus settings. Unless there is a university-wide initiative for teaching information literacy across disciplines, or a specific information literacy course taught by librarians, many college and university students may receive one 50-minute session to learn how to conduct research for their entire college residency, commonly referred to as one-shot instruction sessions.

One-shot instruction sessions are what most academic libraries "rely on," and skills are emphasized due to the short amount of time students are given to learn how to find information in databases and physical space of the library (Clapp, Johnson, Schwieder, & Craig, 2013, p. 250). Within a one-shot instruction session, coverage may include basic searching skills, an introduction to relevant resources, an overview of the library's physical space, and answering students' questions on their specific topics. Few professors request follow-up sessions due to lack of time or "the course instructor's confidence in being able to teach information literacy themselves" (Gersch et al., 2016, p. 7). Limited research exists focusing on how online graduate students receive and are assessed in information literacy skills (Shaffer, 2011). However, in the literature that does exist, instruction for online graduate students emphasizes many metaliteracy principles, even if this term has not been specifically used by the authors (Courtney & Wilhoite-Mathews, 2015; Ivanitskaya et al., 2008; Kumar & Edwards, 2013; Read & Morasch, 2016; Shaffer, 2011; Tuñón & Ramirez, 2010).

Courtney and Wilhoite-Mathews (2015) reported on a course for online students at Ball State University for a master's degree in nutrition and dietetics and included an embedded librarian who helped students with finding articles for papers. As part of their library assignments in the course, students discussed what they learned in the course with their classmates. In another web-based library instruction program, students were required to "obtain and evaluate" sources for their assignments (Ivanitskaya et al., 2008, p. 513). As part of the study, students were asked to take an assessment, the Research Readiness Self-Assessment, as a pretest and posttest to determine if their knowledge of

research skills had improved after information literacy instruction (Ivanitskaya et al., 2008).

In the study by Kumar and Edwards (2013), librarians embedded in a course gave students a place within the LMS (Moodle) to share their "research and professional goals" with one another, the course instructors, and the librarians (p. 6). The Read and Morasch (2016) study included "research performance support" for online graduate students that emphasized information literacy skills that can be transferred to other courses and professional work (p. 109). Shaffer (2011) provided an online discussion board for students to discuss and collaborate with each other on research questions. In the redesign of their information literacy instruction for online students, Tuñón and Ramirez (2010) developed various online research sessions that were built "sequentially and developmentally" for students to use in their first year (p. 991).

Rethinking how information literacy is taught is the idea behind the metaliteracy framework created by Mackey and Jacobson (2011). Metaliteracy is a concept that attempts to connect and unify information literacy with other literacies that are important in the 21st century, including digital literacy, visual literacy, media literacy, cyberliteracy, and information fluency (Mackey & Jacobson, 2011). The ALA (2018b) defined digital literacy as "the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills" (para. 1). The ACRL's (2011) Visual Literacy Competency Standards for Higher Education defines visual literacy as a set of abilities that enables an individual to effectively find, interpret, evaluate, use, and create images and visual media" (para. 2). According to the Center for Media Literacy (n.d.), media literacy is a set of skills that

include “the ability to access information from a variety of sources,” analyze a media message’s validity, evaluate media’s overall message through one’s personal lens, create one’s own messages using appropriate tools, and “participate in a global culture” (para. 8). Gurak (2001) considered cyberliteracy a “relationship between communication technologies and ourselves, our communities, and our cultures” (p. 16). Information fluency and information literacy are similar concepts, but information fluency is heavily reliant on technological skills while information literacy “is an intentional separation from any specific technology” (Mackey & Jacobson, 2011, p. 67).

As academic librarians and libraries anticipate new technologies and new ways to access information, using metaliteracy as a framework to inform pedagogy and instructional design is an important step for successful learning outcomes. Mackey and Jacobson (2011) recognized the connection of each of the literacies and how they should be thought of together instead of separately when considering a new framework for information literacy. New technologies have allowed students to not only share information but create information using social media sites and applications such as Instagram, Periscope, Snapchat, and YouTube. New technology in the form of social networking has made collaboration part of everyday life and sharing information on the web is easier and faster with the use of smartphones and tablets. Teaching students how to navigate the vast amount of information that is available has been one of the main goals of information literacy and is more important now as the information available increases.

Mackey and Jacobson (2014) proposed a shift in the way information literacy is understood and taught using metaliteracy as a framework. Shifting from skills-based

pedagogy to critical thinking-based pedagogy better prepares students for future technologies that become available, as well as prepare them to analyze the information they find. The focus of information literacy should be on "collaboration . . . and distribution of original content in synchronous and asynchronous online environments" (Mackey & Jacobson, 2011, p. 76). Skills such as how to search a specific library database could be helpful for point-of-need or just-in-time teaching. For lifelong learning skills, however, an emphasis on critical thinking and how knowledge is created, valued, managed, and distributed is necessary. The collaborative, participatory environment that enables students to obtain and share their own information should be part of information literacy instruction (Jacobson & Mackey, 2013). Combining other literacies with information literacy provides a more accurate and complete learning experience for students rather than teaching the literacies as separate skills.

Metacognition

Mackey and Jacobson (2014) connected Flavell's (1979) work with metacognition to metaliteracy. Flavell defined metacognition as "knowledge and cognition as cognitive phenomena" (p. 906). Although most of Flavell's work involved studies with school-age children, he recognized an adult's metacognitive processes as the "target" for a child's metacognitive development (p. 906). Children and adults monitor their own learning strategies, thoughts, and memories of knowledge acquisition. Metacognition focuses on the ability of a learner to "continually analyze and process" their own learning capabilities (Mackey & Jacobson, 2014, p. 11). Memories of how learning took place are part of metacognition. Metacognition, as part of developmental memory strategy, requires understanding that certain tasks "take extra effort" to

remember (P. H. Miller, 2011, p. 288). Learners rely on their memory to continue the next task to search for information. Learners make decisions based on the searches they make to find information, whether their search is successful or not (Mackey & Jacobson, 2014). Knowledge about their searching capabilities informs their new search strategy, whether the search strategy is to continue searching, continue with a second strategy, exclude a strategy, or stop searching (Kuhn, 1999, p. 269). Each decision is informed by self-awareness. Metaliteracy is "focused on critical awareness of one's own knowledge" (Mackey & Jacobson, 2014, p. 13). Information literacy that uses a metaliteracy framework encourages exploration and reflection in searching, locating, analyzing, creating, and sharing information. Metacognition "encourages critical thinking based on previous experiences," resulting in reflection and adaptation of new abilities (Jacobson & Mackey, 2016, p. 149).

Metacognition principles could explain the thought process involved when conducting research. As learners find information, their memory and previous experience regulate how they analyze information, and the connection to the technology determines how they interact with the information. Metacognition has been used to develop assessments that measure students' metacognitive abilities and teaching strategies to help students with self-monitoring tasks (Akyol & Garrison, 2011; Kauffman, 2004). Metacognitive activities have also been applied to online inquiry skills, including "searching a digital library or reading a Web page," involving planning, monitoring, and reflecting on the process of gathering information (Quintana, Meilan, & Krajcik, 2005, p. 236). Incorporating metacognitive activities into instruction could help develop and improve metacognition.

Metacognition and Library Research Skills

Catalano (2017) developed a metacognitive strategies scale as applied to library research skills to understand successful critical thinking skills. Metacognitive strategies used for finding information by accessing the web has been studied by researchers in various educational technology and computer behavior publications. Brand-Guwel et al. (2005) studied experts' and novices' information problem solving skills to inform "instructional guidelines" (p. 487). King (2011) studied Web 2.0—the social, connected, creation, and sharing aspect of the internet—as an instruction tool for teaching metacognitive principles. Kauffman (2004) studied the influence of "web-based" prompts on self-regulated learning and metacognitive awareness using a pretest and posttest (p. 144). Metacognitive strategies used for finding information specifically related to library research skills have been less studied (Catalano, 2017). By developing a scale that measures metacognitive strategies specifically about thought processes when conducting library research, librarians could gain understanding and knowledge of how best to instruct students to develop metacognitive strategies and critical thinking skills. Catalano identified five subscales (later two subscales were combined into one subscale) that "most closely reflect[ed] . . . the library research process" (p. 179). The subscales were based on subscales used in two other instruments not related to library research skills and consisted of awareness, self-checking and debugging, planning, and cognitive strategy.

Awareness is the ability of individuals to know their own needs, experiences, strengths, and limitations (Magno, 2010). Learners who are aware of their information needs will find ways to successfully fulfill those needs (Mackey & Jacobson, 2014). Learners who know which search strategies to use, how to evaluate information found in

searches, how to search for information again when initial strategies do not work, and how to present information in a variety of formats show ability in this metacognitive strategy (Catalano, 2017). Metacognition involves awareness of how one learns to be successful in expanding knowledge and skills.

Self-checking and debugging is the ability of individuals to change plans when a strategy does not work the first time (Catalano, 2017). Changing strategies when the first strategy did not work is a critical thinking skill and necessary for metacognition. Asking for help is one debugging strategy that can make up for a lack of awareness, planning, or cognitive strategy (Catalano, 2017). Self-checking and debugging relating to metacognition include organizing and remembering which search strategies were successful, analyzing previous search strategies, and verifying information through various information sources (Catalano, 2017). An important skill for metacognition is the ability to know how to self-check and debug problems in a research environment.

Planning is the ability of individuals to think about and understand strategies before beginning a task (Magno, 2010). Thinking aloud is one planning strategy that librarians can use to help develop planning as a metacognitive skill (Catalano, 2017). Planning also involves developing appropriate, and often separate, strategies for different aspects of a task (Quintana et al., 2005).

Cognitive strategy is an individual's awareness of memory, prior knowledge, and activities that contribute to learning (Catalano, 2017). The ability to apply knowledge effectively to learning strategies is also a part of cognitive strategy (Mackey & Jacobson, 2014). Being aware of what strategies are used in learning contributes to a learners' overall metacognition.

The principles of metacognition connect to metaliteracy by focusing on self-awareness and self-direction of learners. Metaliterate learners can "monitor and control the progress . . . and reflect on different aspects of the task" (Quintana et al., 2005, p. 236). Cognitive strategies can be more sophisticated in adults, leading to awareness of which strategies are being used (Pintrich, Wolters, & Baxter, 2000). However, adult learners might not have the cognitive or metacognitive skills necessary for research (Rapchak, Lewis, Motyka, & Balmert, 2015). Creating metaliterate adult learners through self-reflection and critical thinking activities can empower them to increase their metacognitive abilities (Quintana et al., 2005).

Metaliteracy History/Background

The term *metaliteracy* has been used in various contexts including language literacy, pedagogy, multiliteracy, information literacy, and critical literacy (Gilmore & Smith, 2005; Kerka, 2000; Luke, 1997; New London Group, 1996). Gilmore and Smith (2005) used the term to describe the academic literacies of indigenous students in Alaska and Australia and how that relates to students' native literacy. Since 1981, students had been mentored to "[be] literate about literacy" (Gilmore & Smith, 2005, p. 84). Kerka (2000) described multiliteracy as a critical literacy that should incorporate "tool literacies and representational literacies" (p. 32). Luke (1997) discussed critical literacy as a "meta-knowledge" and "new forms of sociality" (p. 11). The New London Group (1996) explained multiliteracies through the concept of literacy pedagogy regarding new social and technological advances that students must navigate.

The term *multiliteracy* differs from *metaliteracy* through the prefixes multi- and meta-. According to the Merriam Webster dictionary, the prefix multi- (n.d.) means

"many, multiple, much." The prefix meta- (n.d.) means "more highly organized, situated beyond." The term *literacy* (n.d.) means "the quality or state of being literate." The term *literate* (n.d.) means "having knowledge or competence." In contrast to multiliteracy, metaliteracy suggests an incorporation of literacies—a highly organized competency—rather than just a gathering of multiple literacies as the term multiliteracy suggests. Metaliteracy is an appropriate term to incorporate and fuse various literacies associated with library instruction, including information literacy, digital literacy, visual literacy, media literacy, and cyberliteracy.

Metaliteracy Goals and Objectives

In *Metaliteracy: Reinventing Information Literacy to Empower Learners*, Mackey and Jacobson (2014) suggested that goals and learning objectives be categorized into four domains: behavioral, cognitive, affective, and metacognitive (p. 85). Each student's needs can be described using these domains, and metaliteracy can be used as a framework to meet the student's needs in each of these domains. As an expansion of their original article, and after collaborative efforts with a team at their institution, Mackey and Jacobson (2011) expanded each recommendation that transformed into goals in their 2014 book. The four goals, which can also be found on the metaliteracy.org blog by Mackey and Jacobson (n.d.), follow:

> Goal 1: Evaluate content critically, including dynamic, online content that changes and evolves, such as article preprints, blogs, and wikis
>
> Goal 2: Understand personal privacy, information ethics, and intellectual property issues in changing technology environments

Goal 3: Share information and collaborate in a variety of participatory environments

Goal 4: Demonstrate ability to connect learning and research strategies with lifelong learning processes and personal, academic, and professional goals (2014 Goals and Objectives section, para. 1-4)

Each goal expands on the original practice of teaching information literacy skills to introduce critical thinking as a direct application of the four domains. The goals have specific learning objectives that reinforce the critical thinking aspect of metaliteracy as well as give direction on potential assessments. Learning objectives within any framework of information literacy are important to assess comprehension, knowledge, and critical thinking levels.

Metaliteracy Goal 1: Evaluate Content Critically

Goal 1 objectives include critically evaluating information for bias, including one's own bias, determining an information sources purpose regardless of format, and assess information from sources that are dynamic (Mackey & Jacobson, n.d., 2014 Goals and Objectives section, para. 1). The ability to critically evaluate content is not only a metaliteracy goal but has also been a goal of information literacy instruction since its inception (Behrens, 1994).

Metaliteracy Goal 2: Information Ethics

Goal 2 objectives include using technology, including social web sites, responsibly and discreetly, protecting private information, appropriately and accurately attributing others' work, and understanding the various licensing of creative works (Mackey & Jacobson, n.d., 2014 Goals and Objectives section, para. 2). As with Goal 1

objectives, information ethics has been a part of information literacy instruction for decades by teaching students about being responsible in areas of copyright and other privacy issues (Breivik, 1987). Since the emergence of the internet and social media, information ethics has become a little more complicated and an important responsibility for metaliterate learners.

Metaliteracy Goal 3: Information Creation, Sharing, and Collaboration

Goal 3 objectives include effectively sharing and collaborating with others in a variety of technological formats, critically evaluating information contributed by others, and producing original content using various platforms (Mackey & Jacobson, n.d., 2014 Goals and Objectives section, para. 3). With the development and popularity of social media and collaboration tools, metaliterate learners should effectively critique others' content and create their own content to form their own niche in the information world.

Metaliteracy Goal 4: Lifelong Learning Research Strategies

Goal 4 objectives include determining appropriate search strategies to meet one's information needs, self-reflect on strategies to assess and add to knowledge of one's own learning, and recognize that learning is continual and lifelong (Mackey & Jacobson, n.d., 2014 Goals and Objectives section, para. 4). Lifelong learning has long been a part of information literacy principles for the transferability of skills to reach beyond students' academic careers (Roberts, 2017). Metaliterate learners use strategies that create habits of flexibility and adaptability in a variety of situations and contexts.

Some of the specific learning objectives from Mackey and Jacobson (n.d.) include from Goal 1, "evaluate user response as an active researcher" (behavioral; 2014 Goals and Objectives section, para. 1); Goal 2, "recognize the ethical considerations of sharing

information" (affective; 2014 Goals and Objectives section, para. 2); Goal 3, "produce original content appropriate to specific needs in multiple media formats" (behavioral; 2014 Goals and Objectives section, para. 3); Goal 4, "determine scope of the question or task required to meet one's needs" (cognitive; 2014 Goals and Objectives section, para. 4); and also from Goal 4, "use self-reflection to assess one's own learning and knowledge of the learning process" (metacognitive; 2014 Goals and Objectives section, para. 4).

Metaliteracy Application to Information Literacy Courses

Mackey and Jacobson (2011) recommended strategies for "actively engaging students in new media" (p. 70). These recommendations have been used in practice for two Freshman Seminar courses, a Rhetoric and Social Media course, a redesign of learning outcomes for an Information Use and Student Success course, a redesign of an information literacy class, the creation of a Digital Identity and Participatory Culture course, and a Politics of Information course (Bond, 2016; McBride, 2011; McGarrity, 2016; Stewart & Broussard, 2016; Wallis & Battista, 2016; Witek & Grettano, 2014). The two Freshman Seminar courses focused on students collaborating to create videos, leading discussion posts, conducting research, and reflecting on learning experiences (Bond, 2016). In the Rhetoric and Social Media course, the metaliteracy recommendations (called competencies) were aligned with themes found in the course using data from the student's assignments (Witek & Grettano, 2014). In the Information Use and Student Success course, learning outcomes were redefined using metaliteracy principles, and assignments were assessed by how students learned rather than what students learned (Stewart & Broussard, 2016). The redesign of the information literacy class captured elements of the recommendations to inform better instructional decisions

in the class, and because of using the recommendations, the newly designed course allowed for more flexibility when technologies changed (McBride, 2011). The Digital Identity and Participatory Culture course was designed using metaliteracy principles of participatory environments and knowledge creation. Assignments focused on student reflection of social media accounts, the creation of playlists that were critiqued by other students, and reflection on ideas that were important to each student (McGarrity, 2016). The four goals of the Politics of Information course were compared to the four goals of metaliteracy, highlighting how the assignments and tasks were developing metaliterate students (Wallis & Battista, 2016).

The developers of the term *metaliteracy*, as applied to information literacy, created a massive open online course (MOOC) in Coursera with the title Metaliteracy: Empowering Yourself in a Connected World (O'Brien et al., 2017). The researcher took this course to expand knowledge of metaliteracy and perhaps gain some insights on developing a course using the goals and objectives. The course consisted of metaliteracy concepts in a practical way and included a variety of learning objects, collaborative spaces, peer review components, real-world applications, and opportunities to self-reflect on assignments (O'Brien et al., 2017). The course was self-paced but had 10 weeks of material with assignments due each week, peer review components, and discussion board topics.

Metaliteracy Application to Online Information Literacy Courses

Metaliteracy as a framework for information literacy is a new concept that has implications for the future. One area that needs more research in metaliteracy is the assessment of metaliteracy goals and objectives that are highlighted by Mackey and

Jacobson (2014) and on the metaliteracy.org site. Assessment of critical thinking skills, knowledge of formats, sharing and collaborating, and lifelong learning can be achieved relatively easily as part of a course or assignment that requires a grade. Information literacy courses in a face-to-face setting would be ideal, but the reality is many institutions are offering more programs and courses online, and students do not have an opportunity for face-to-face instruction. Online tutorials are one way to offer information literacy instruction to online students who cannot attend a face-to-face instruction session. Mune et al. (2013) emphasized their goals in creating an online tutorial for distance students with their statement, "Online students deserve the same level of instruction and librarian engagement as students enrolled in face-to-face classes" (p. 115). Online information literacy courses designed for online students developed and used by many institutions throughout the world utilize a variety of goals, objectives, frameworks, and instructional design methods.

Assessment of information literacy in online courses lacks in the literature. Hufford and Paschel (2010) added to the small, existing literature in their study of pre- and postassessment surveys in a for-credit distance information literacy course. They indicated that a for-credit information literacy course increased group postassessment scores overall, although some questions from the assessment were not improved. Gersch et al. (2016) collaborated to design an online public speaking course that supports metacognitive learning by integrating information literacy components throughout the course. Students created content, reflectively discussed public speaking literature, reflected on their own recorded speech, and gave critical feedback to other students' speeches. Although these studies included design and assessment of information literacy

in the online environment, using the metaliteracy framework to inform the instructional design of online information literacy courses should be created and assessed as part of the efforts to move information literacy into the future.

CHAPTER 3 – METHODOLOGY

Research Design

The current study utilized an exploratory, quantitative, quasi-experimental one-group pretest–posttest design. An exploratory design was chosen due to the lack of data found for measuring metaliteracy goals and principles. Exploratory research is useful when "the researcher does not have sufficient understanding of the phenomena to form" reasonable inferences about relationships (Borg & Gall, 1989, p. 32). A quasi-experimental design was chosen due to the research designs found in the literature used for measuring information literacy skills and concepts, namely pretest and posttest designs (Henrich & Attebury, 2012; Huffard & Paschel, 2010; Ivanitskaya et al., 2008; Roberts, 2017; Shaffer, 2011). The number of participants in each study varied between 13 in the Huffard and Paschel (2010) study, 23 in the Henrich and Attebury (2012) study, to 41 in the Roberts (2017) study. The Ivanitskaya et al. (2008) study and the Saffer (2011) study used two groups with 14 and 18 participants and 29 and 30 participants in each group, respectively. Data collected was in the form of scores on the metaliteracy pretest and posttest multiple-choice examination and scores on the MS-LRSS, which were Likert-based scores (Catalano, 2017). The hypotheses were analyzed using dependent *t* test, partial correlation, and bivariate regression procedures. The independent variables are pretest, posttest, and MS-LRSS. The dependent variable is metaliteracy.

Research Questions

RQ_1: Is there a statistically significant difference between metaliteracy pretest and metaliteracy posttest among online Ed.D. students at one university?

RQ_2: Is there a statistically significant relationship between the MS-LRSS and metaliteracy posttest in online Ed.D. students after controlling for metaliteracy pretest?

RQ_3: Can the MS-LRSS statiscially significantly predict metaliteracy posttest?

RQ_4: Can the MS-LRSS and metaliteracy pretest statistically significantly predict metaliteracy posttest?

Null Hypotheses

The null hypotheses follow:

H_{01}: There is no statistically significant difference between metaliteracy pretest and metaliteracy posttest among online Ed.D. students at one university.

H_{02}: There is no statistically significant relationship between the MS-LRSS and metaliteracy posttest in online Ed.D. students after controlling for metaliteracy pretest.

H_{03}: The MS-LRSS cannot statistically significantly predict metaliteracy posttest.

H_{04}: The MS-LRSS and metaliteracy pretest cannot statistically significantly predict metaliteracy posttest.

Participants and Setting

The participants in this study were online doctoral students enrolled in the Ed.D. online program at a small, private, Christian university in the southwestern United States. The sample population consisted of a convenience sample of 338 students enrolled in the Ed.D. program with 19 participants overall. Online doctoral students were chosen for this study because doctoral professors noticed that many doctoral students were not

matriculating with appropriate skills in metaliteracy or information literacy (P. Williams & D. McMichael, personal communication, October 7, 2016). The professors wanted a noncredit course created that would measure the students' skills in these areas as well as prepare them for the program's rigorous research activities. The professors also wanted a course that could be completed in one sitting by the students so that more time could be spent on other important tasks for the program (P. Williams & D. McMichael, personal communication, October 7, 2016).

Treatment

The goals and learning objectives described by Mackey and Jacobson (n.d.) informed instructional design for the online information literacy course explored in this study. The treatment used video tutorials designed to instruct students in metaliteracy competencies and principles. Students took a multiple-choice pretest and the MS-LSSS and then viewed a series of two or three short video tutorials for each of the five modules providing information about the metaliteracy or information literacy concept. The students took a multiple-choice posttest, which had the same questions as the pretest, after viewing the video tutorials. The video tutorials were made using Adobe Spark, and each video was no more than 5 minutes in length. This tool, Adobe Spark, allows for the creation of videos that are less than 5 minutes in length, which enabled students to complete the entire course in one session. The videos were embedded into the Canvas course, and each student viewed the same tutorial for each module.

Tutorial Development

The researcher developed the tutorials using Adobe Spark—a tool for creating short videos as videos specifically covering the metaliteracy goals and objectives were

not found. Each video is less than 5 minutes and includes a combination of text and images. The researcher read the text for the videos for accessibility. The researcher developed learning objectives for each of the five modules using the Understanding by Design (UbD) instructional design approach (Wiggins & McTighe, 2006). The UbD method of instructional design, also called backward design, emphasizes the creation of learning outcomes before designing specific components of a lesson or instruction unit. After developing the learning objectives, the videos were made to coincide with the learning objectives for each module.

The first module focused on critically evaluating information and included two videos—one on recognizing scholarly resources and the other on the peer review process. The focus of the second module was information ethics and included one video on academic integrity, copyright, and plagiarism, and one video that covered the *Publication Manual of the American Psychological Association* (i.e., APA style). The third module focused on information creation, sharing, and collaboration and included three videos: (a) the first video presented general information and privacy concerns on social media, (b) the second video presented basic information about digital and visual literacy, and (c) the third video presented information about creating original content in various formats and included information about Creative Commons licenses. Creative Commons licenses provide the creator of a work the ability to control how the work can be shared. The fourth module included two videos on information needs and metacognition, including searching strategies, how to write a research question, and how to increase metacognitive awareness. The focus of the fifth module included three videos covering types of sources, requesting materials and interlibrary loan, and research methods. Adobe Spark allows for

public access to the videos, and links to the videos for each module are provided in Appendix A.

Pretest and Posttest Development

The pretest and posttest, which are the same test taken by the students before watching the videos and after watching the videos, were developed by the researcher since no existing assessment for metaliteracy goals and principles was found in the literature. The questions were developed using the learning outcomes for each module combined with the researcher's knowledge from 20 years' experience conducting information literacy instruction to college students. Multiple-choice questions were determined to be the best assessment model due to the length of the course suggested by the professors. Each question had one correct answer out of a possible four choices. The questions were reviewed by five experts—librarians with experience in information literacy instruction—for clarity, difficulty or easiness, and general feedback. After the librarians reviewed the questions, the researcher modified the questions as suggested. The questions for the pretest/posttest are found in Appendix A. The researcher conducted a pilot study of the course, which is detailed in the instrumentation section.

Course Development and Procedures

The metaliteracy course was developed in the university's LMS, Canvas, for consistency in instructional design with other courses within the Ed.D. program. The researcher created a course in Canvas that included the MS-LRSS scale (essentially another pretest), the metaliteracy pretest, the video tutorials, and the metaliteracy posttest. The course was designed so that students progressed through the course and could not advance until each previous module and video tutorials were completed and viewed (the

pretest and the MS-LRSS were combined into one module). The student completed the pretest and then the MS-LRSS. After the MS-LRSS and pretest were completed, for each module the student read an overview of the module and then viewed the videos. After the overview and videos for all five modules were read and viewed, the student took the posttest to complete the course. The entire course could be completed within 1 or 2 hours.

Instrumentation

The instrumentation was a pretest and posttest to determine students' metaliteracy competencies developed by the researcher and the MS-LRSS (Catalano, 2017). Five experts in information literacy instruction reviewed the metaliteracy pretest and posttest items for content validity. A pilot test of the pretest and posttest took place using a sample of one online student, one library staff, and one faculty. The pilot test determined items that lacked difficulty, had ambiguous answers, and needed to be reworded for clarity. The multiple-choice questions measured learning from the treatment videos. Each question on the pretest and posttest measured the goals and objectives of metaliteracy, and one module measured traditional information literacy skills such as identifying research questions, searching databases, requesting interlibrary loan items, and other essential information skills.

The metaliteracy pretest and posttest is a 25-item multiple-choice test given at the beginning and end of a video treatment for a five-module noncredit course developed by the researcher. The 25 questions consist of five questions for each module. The pretest and posttest measure the following domains: evaluating content critically, information ethics, information creating, sharing and collaboration, lifelong research strategies, and research skills proficiency. The first four domains derive from the metaliteracy goals and

objectives while the fifth domain derives from basic information literacy skills related to specific skills students need to have to find information in the library of the institution (e.g., using interlibrary loan services or identifying specific databases students will use). The researcher developed the pretest/posttest as no known test exists to measure metaliteracy goals or objectives. The test was administered in the Canvas LMS. Each domain included five multiple-choice questions for a total of a 25-item multiple-choice examination.

The MS-LRSS, developed and validated by Catalano (2017), was used to provide a measurement of students' "metacognitive strategies in the context of information literacy and library research" (p. 178). The scale includes 21 questions in four subscales that include awareness, self-checking and debugging, planning, and cognitive strategy using a 5-point Likert scale from 1 (*not at all*) to 5 (*extremely*; Catalano, 2017). The awareness subscale has seven items, the self-checking and debugging subscale has six items, and the planning and cognitive strategy subscales have four items each. The Cronbach's alpha was 0.93 (Catalano, 2017). Permission to use the scale in this study was obtained from the author, Catalano, and the letter granting permission is in Appendix B. The MS-LRSS is in Appendix C.

Study Procedures

An exempt approval was given to give the pretest, posttest, and MS-LRSS to online graduate students enrolled in the Ed.D. program through the Canvas LMS by the Institutional Review Board of Abilene Christian University. The noncredit metaliteracy course was given as an option to students through the university's LMS, Canvas, in April and May 2018. Students had 10 weeks to complete the noncredit course. Since this

noncredit course is not required of the students to complete and is not a part of their formal grade, informed consent was provided to allow students to opt in. Students were given the procedures involved in completing the course in the informed consent document (see Appendix D). The informed consent included an invitation to complete the study voluntarily and the following sections: purpose and procedures, risks and discomforts, potential benefits, and provisions for confidentiality. Exact language used included, "You are invited to participate in a research study," "your participation is completely voluntary," and "the risks associated with this study are anticipated to be minimal."

Data obtained from the course in Canvas were kept confidential, and the student's personal information was separated from the score data by using two separate spreadsheets. Students who opted to complete the course and who answered all questions (no blank or incomplete data) were considered for the study. A total of 29 students opted into the study, 23 students completed the MS-LRSS, and 27 students completed the metaliteracy pretest. Only a total of 19 students completed all requirements of the course to be included in this study (MS-LRSS, metaliteracy pretest, treatment videos, and metaliteracy posttest).

Data Analysis

A dependent *t* test was conducted in SPSS to analyze the first research question of whether there is a significant difference between metaliteracy pretest and metaliteracy posttest. A partial correlation test was then conducted in SPSS to analyze the second research question of whether there is a relationship between MS-LRSS and metaliteracy posttest in online doctoral students after controlling for the metaliteracy pretest. The next

step was to conduct a bivariate regression test in SPSS to analyze the third research question of whether the MS-LRSS can predict metaliteracy posttest. The last test conducted was a multiple regression test in SPSS to analyze the fourth research question of whether MS-LRSS and metaliteracy pretest can predict metaliteracy posttest.

Statistical Assumptions

The statistical assumptions of partial correlation are "random selection of samples, variables [continuous], multivariate normality, the absence of extreme outliers, independence of observations, homoscedasticity, and linearity" (Rovai, Baker, & Ponton, 2014, pp. 407-408). The subject sample, while not random, reflects a general population of doctoral students enrolled in an Ed.D. program. Besides the assumptions of partial correlation, excluding multivariate normality, bivariate regression assumptions include normality of residuals, "proper specification of the model," and "sample size" (Rovai et al., 2014, pp. 412-413).

Stevens (2009) suggested at least 15 cases per predictor variable are recommended for multiple regression and correlation analysis. A sample size of at least 100 online doctoral students is anticipated, which is approximately one third of the current online doctoral student population. The actual sample size was significantly smaller at 19 than originally anticipated. As an exploratory study, the sample size while not ideal, was adequate. Exploratory studies do not intend to generalize to a larger population but are used to gather information in an area of study to prepare for a "larger study" and "increase knowledge of the field of study" (Grove, Burns, & Gray, 2013, p. 370). Hair, Black, Babin, Anderson, and Tatham (2006) suggested that small sample

sizes under 30 “are appropriate for analysis . . . with a single independent variable” (p. 195).

Threats to Validity

Possible threats to internal validity in this study include history, testing, selection, and attrition. Because students who completed the instruments did so in an uncontrolled environment, events occurring during the treatment could have influence the results. In a pretest/posttest environment, students could be influenced on the posttest by taking the pretest first, causing results to be “mistaken for treatment effects” (Shadish, Cook, & Campbell, 2002, p. 60). The selection of the participants could influence the results if students know the items being measured before taking the pretest and posttest. Attrition could affect results if either the pretest or posttest are not completed.

A possible threat to external validity includes an interaction of causal relationship with settings. Due to students taking the pretest and posttest in various environments, a threat to the setting could influence the relationship between the results and generalizability. Another possible threat to external validity in this study is population. Because the sample is not random, generalization to a larger population of online Ed.D. students is limited (Johnson & Christensen, 2016).

Possible threats to construct validity include mono-operation bias, mono-method bias, reactivity to the experimental situation, and novelty and disruption effects. The mono-operation bias of the pretest and posttest will use only one measurement of the construct of metaliteracy through multiple-choice questions. The mono-method bias could be a threat to construct validity due to the treatment being presented to all students, in the same way, using video tutorials. The threat of reactivity to the experimental

situation is a potential threat due to the students having the informed consent of participating in a study and could affect results by reactions to being in a study, also referred to as the "Hawthorne effect" (Shadish et al., 2002, p. 79). The potential threat of novelty and disruption effects in this study could be caused by the treatment itself that using a video tutorial rather than another means of treatment that would be less innovative. Excitement or disruption of the video tutorials could "contribute to success" or "be less effective" (Shadish et al., 2002, p. 79).

The possible threats to statistical conclusion validity include unreliability of measures, extraneous variance in the experimental setting, and heterogeneity of respondents. The threat of unreliability of measures could include that the instrument created did not use enough measures to get a reliable result. The possible threat of extraneous variance in the experimental setting could include the environment of the students when taking the instrument, especially if they are in their own home. Distractions such as "noises [or] fluctuations in temperature" could affect their results on the instrument (Shadish et al., 2002, p. 51). Another potential threat to construct validity could be the heterogeneity of respondents. Standard deviations could be greater since all the students are in the same program; however, all the students come from different educational backgrounds, and there may be variances in the outcomes due to the prior knowledge possessed by the students taking the instrument. The possible threat of violated assumptions of test statistics is possible due to the participants being in the same program, which could "introduce severe bias to the estimation of standard errors" (Shadish et al., 2002, p. 48).

CHAPTER 4 – RESULTS

Purpose of the Study

The purpose of this exploratory, quantitative, quasi-experimental research study was to determine if implementing a noncredit information literacy course inside a small, private university's Canvas LMS for online graduate students using metaliteracy concepts can improve scores from pretest to posttest. Other purposes of this study were to determine if the MS-LRSS can predict metaliteracy posttest or if the MS-LRSS and metaliteracy pretest can predict metaliteracy posttest. Because a small convenience sample was used and not a random sample, results are not generalizable to a larger population. However, as an exploratory study, the results can be helpful in improving instructional methods for the metaliteracy course used in this study as no known course exists that measures metaliteracy goals and principles for doctoral students. Nardi (2016) suggested that exploratory studies are helpful for getting a "rough sense" about topics that do not have enough information yet (p. 9).

Descriptive Statistics

Descriptive statistics for the MS-LRSS, metaliteracy pretest, and metaliteracy posttest (n = 19) follow. The mean of the MS-LRSS was 81 with a standard deviation of 9.69. The range of scores on the MS-LRSS can range from a minimum score of 0 to a maximum score of 105. The results from the participants on the MS-LRSS in this study ranged from a minimum score of 62 to a maximum score of 100. Descriptive statistics for the MS-LRSS are displayed in Table 1. Descriptive statistics for the MS-LRSS and the metaliteracy pretest and posttest are in separate tables due to the differences in scoring using a scale for the MS-LRSS and using total points for the pretest and posttest.

Table 1

Descriptive Statistics for MS-LRSS (Catalano, 2017)

Variable	*N*	Min.	Max.	*M*	*SD*
MSLRSS	19	62	100	81.00	9.69

The MS-LRSS measured perceived metacognitive abilities in relation to library research skills. For this study, the MS-LRSS asked students to determine their metacognitive strategies when thinking about a recent research assignment that involved locating and using library resources. Students who did not have a recent research assignment were asked to think about a previous assignment that involved locating and using library resources.

Descriptive statistics for the MS-LRSS also include mean and standard deviation for each subscale (see Table 2). The means varied from a minimum of 16.47 for the planning subscale to a maximum of 27.53 for the awareness subscale. Subscales varied in number of items, so scores varied as well. The awareness subscale had the highest mean and also the most items (seven). Cognitive strategy and planning each had four items; self-checking and debugging had six items.

Table 2

MS-LRSS Subscale Means

Subscale	*M*	*SD*	Items
Awareness	27.53	3.06	7
Cognitive strategy	17.21	1.78	4
Planning	16.47	2.14	4
Self-checking & debugging	19.79	4.89	6

The metaliteracy pretest and posttest measured items relating to the four goals and objectives of metaliteracy (Mackey & Jacobson, n.d.) and measured items relating to traditional information literacy concepts using a 25-question test (five questions per

module). The scores on the pretest for the study participants ranged from a minimum score of 52 to a maximum score of 88 on the pretest and a minimum score of 80 and a maximum score of 100 for the posttest. The mean of the metaliteracy pretest was 74.95 with a standard deviation of 9.87. The metaliteracy posttest had a mean of 92.42 with a standard deviation of 6.10. Descriptive statistics for the metaliteracy pretest and posttest are displayed in Table 3. Due to the small sample size, the gender subgroup was too small to generalize results beyond what is represented.

Table 3

Descriptive Statistics for Metaliteracy Pretest and Posttest

	Gender	*N*	Min.	Max.	*M*	*SD*
PRETES	Female	15	52	88	74.29	10.61
	Male	4	64	84	76.80	8.19
	Total	19	52	88	74.95	9.87
POSTT	Female	15	80	100	90.86	6.36
	Male	4	96	100	96.80	1.79
	Total	19	80	100	92.42	6.09

Note. Pretest and posttest minimum score is 0 and maximum score is 100.

The minimum score from pretest to posttest increased by 28 points, and the maximum score from pretest to posttest increased by 12 points. Consequently, the mean scores also increased between pretest and posttest.

Additional descriptive statistics include frequencies of items correct on all questions on the metaliteracy pretest and metaliteracy posttest and the difference between the two scores. The frequencies of items correct are shown in Table 4 and include the module, the subscale, the question from the metaliteracy pretest, the number correct on the pretest, the number correct on the posttest and the difference.

Table 4

Correct Answer Frequencies on Metaliteracy Pretest, Posttest Items, and Difference Percentages

Question	*n* correct pretest	*n* correct posttest	% difference
M1.1 (Evaluate Content Critically) Who are the most likely authors of scholarly articles?	19	19	0%
M1.3 (Evaluate Content Critically) Which of the following are considered when determining if a resource is scholarly?	19	19	0%
M2.1 (Information Ethics) Which of the following is a way to avoid plagiarism?	19	19	0%
M2.2 (Information Ethics) What is academic integrity?	19	19	0%
M3.2 (Information Creation, Sharing, and Collaboration) In the following scenario, which format would be the most appropriate for completing the assignment?	19	19	0%
M5.2 (Research Skills Proficiency) In the following scenario, what would the best option be for a researcher to get the resource they need?	19	19	0%
M1.5 (Evaluate Content Critically) Which of the following is used to determine if an article is scholarly?	18	19	5.56%
M2.4 (Information Ethics) In the following research scenario, which would be considered plagiarism?	18	19	5.56%
M2.5 (Information Ethics) What is wrong with the following citation in APA format?	18	19	5.56%
M3.4 (Information Creation, Sharing, and Collaboration) In which of these scenarios would security most likely be compromised?	18	19	5.56%
M5.4 (Research Skills Proficiency) What is the best description of a primary source?	18	18	0%
M2.3 (Information Ethics) What would an in-text citation look like for this reference in APA format?	16	19	18.75%

Question	*n* correct pretest	*n* correct posttest	% difference
M3.5 (Information Creation, Sharing, and Collaboration) What is the difference between digital literacy and visual literacy?	15	18	20.00%
M3.1 (Information Creation, Sharing, and Collaboration) In the following scenario, which source would not be a potential bias in evaluating the information?	14	19	35.71%
M4.1 (Lifelong Learning Research Strategies) In the following scenario, which step would likely come next?	13	19	46.15%
M4.2 (Lifelong Learning Research Strategies) In the following scenario, which metacognitive skill is being practiced?	13	17	30.77%
M4.3 (Lifelong Learning Strategies) A metaliterate learner is able to	13	17	30.77%
M5.1 (Research Skills Proficiency) In the following article excerpt example, which is the research method used?	12	17	41.67%
M1.2 (Evaluate Information Critically) What role does the editor play in the peer review process?	11	17	54.55%
M5.5 (Research Skills Proficiency) In the following scenario, what research method is being described?	10	13	30.00%
M1.4 (Evaluate Information Critically) An example of a trade publication would be:	9	16	77.78%
M3.3 (Information Creation, Sharing, and Collaboration) What is the best option available if an author wants to share their work while retaining legal ownership?	8	18	125.00%
M4.4 (Lifelong Learning Strategies) In the following scenario, what would the best research question be?	8	11	37.50%
M4.5 (Lifelong Learning Strategies) The following search in a library database was too narrow. How could the search be rewritten to give the most results?	8	15	87.50%
M5.3 (Research Skills Proficiency) In the following scenario, which type of source would most likely be used?	2	15	650.00%

Note. M = Metaliteracy Course Module.

The number of students who answered items correctly on the metaliteracy pretest ranged from all 19 on six questions to only two students on the third question from Module 5, Research Skills Proficiency relating to types of sources. The next highest frequency had 18 students answer items correctly on five questions. Other frequencies for correct answers on the pretest include 16(1), 15(1), 14(1), 13(3), 12(1), 11(1), 10(1), 9(1), 8(3), and 2(1). Out of the 25 questions, 18 questions increased in the number of students who answered correctly from pretest to posttest. Seven questions had no difference in the number of students who answered correctly from pretest to posttest and four questions had an increase of 5.56%. Nine questions increased in the number of students who answered correctly by over 10% from pretest to posttest. Three questions increased in the number of students who answered correctly by over 50% from pretest to posttest, and two questions increased in the number of students who answered correctly by over 100%.

The metaliteracy pretest and posttest subscale descriptive statistics are presented in Table 5. The table includes the subscales of evaluate content critically; information ethics; information creation, sharing, & collaboration; lifelong learning research strategies; research skills proficiency; and the pretest and posttest mean, standard deviation, and minimum and maximum values.

Table 5

Subscale Descriptive Statistics for Metaliteracy Pretest and Posttest

Subscale		*M*	*SD*	Min.	Max.
Evaluate content critically	Pretest	16.00	3.27	12	20
	Posttest	18.95	1.81	16	20
Information ethics	Pretest	18.95	2.25	12	20
	Posttest	19.58	1.26	16	20
Information creation, sharing, & collaboration	Pretest	15.00	2.63	12	20
	Posttest	20.00	0	20	20
Lifelong learning research strategies	Pretest	11.58	4.97	0	20
	Posttest	16.63	3.34	8	20
Research skills proficiency	Pretest	12.84	3.15	8	16
	Posttest	17.26	3.00	12	20

Note. Minimum and maximum subscale scores are based on number of questions answered correctly with a minimum of 0 and a maximum of 20. Correct answers are worth 4 points.

The mean for each subscale increased between pretest and posttest. The standard deviation for each subscale decreased for each subscale. The minimum score for each subscale increased and the maximum score for each subscale for pretest and posttest was 20 except for the research skills proficiency pretest, which was 16 increasing to 20 for the posttest. The information creation, sharing, & collaboration subscale reported a standard deviation of zero for the posttest.

Data Analysis

A total of 29 students opted into the study, but only 19 completed all requirements of the course so data were analyzed on the participants who completed the course (N = 19). A total of 14 participants were female (74%), and a total of five participants were male (26%). Due to the small, nonrandom sample size, results are not generalizable to a larger population. Results from this study can contribute to the library literature on metaliteracy concepts as well as help the researcher design metaliteracy courses in the future.

Research Question 1

A dependent *t* test was used to evaluate the null hypothesis that there was no statistically significant difference between metaliteracy pretest and metaliteracy posttest among online Ed.D. students at one university. The assumption of normality of difference scores was evaluated using the Shapiro-Wilk test and was found not tenable, $p = .04$. An examination of box plots indicated one moderate outlier for metaliteracy posttest (see Figure 1).

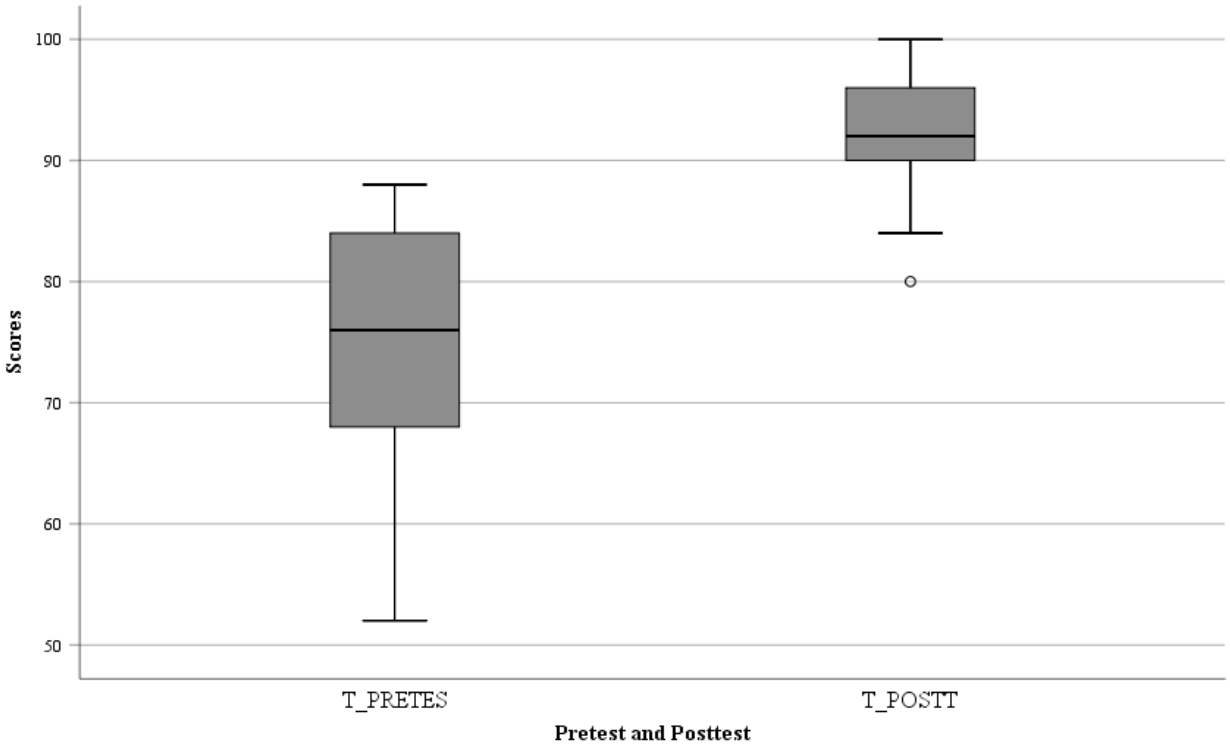

Figure 1. Boxplot of pretest and posttest scores with outlier indication.

Although the dependent *t* test is robust to violations of normality, the sample size is not sufficiently large, so test results should be interpreted with caution. The results of the dependent *t* test provided evidence that metaliteracy posttest ($M = 92.42$, $SD = 6.10$) was statistically significantly higher than metaliteracy pretest ($M = 74.95$, $SD = 9.87$), $t(18) = -8.90$, $p < .001$, $d = -2.04$ at the $p < .05$ level. Therefore, there was sufficient

evidence to reject the null hypothesis. Effect size was large. The 95% confidence interval for the difference in means ranged from -21.60 to -13.35.

Research Question 2

A partial correlation analysis was used to evaluate the null hypothesis that there was no statistically significant relationship between the MS-LRSS and the metaliteracy posttest in online doctoral students after controlling for the metaliteracy pretest. The Shapiro-Wilk test indicated that univariate normality was normally distributed for metaliteracy posttest, $D(19) = .91$, $p = .06$, and the MS-LRSS, $D(19) = .98$, $p = .89$, but not for metaliteracy pretest, $D(19) = .90$, $p = .05$. Standard coefficients for skewness and kurtosis were .08 and -.45 for the MS-LRSS, -.78 and -.06 for metaliteracy pretest, and -.51 and -.59 for metaliteracy posttest. An inspection of scatterplots showed normal distributions of multivariate normality for the MS-LRSS and metaliteracy pretest and posttest. Metaliteracy posttest had one mild outlier.

The correlations among the MS-LRSS, metaliteracy posttest, and metaliteracy pretest are presented in Table 6. The bivariate correlation between the MS-LRSS and metaliteracy posttest was $r(17) = .17$, $p = .49$; the correlation between the MS-LRSS and metaliteracy pretest was $r(17) = -.06$, $p = .80$; and the correlation between metaliteracy posttest and metaliteracy pretest was $r(17) = .51$, $p = .03$. A partial correlation was not statistically significant between MS-LRSS and metaliteracy posttest after controlling for metaliteracy pretest, $r(16) = .23$, $p = .35$. Consequently, there was insufficient evidence to reject the null hypothesis.

Table 6

Correlations of MS-LRSS and Metaliteracy Posttest to Metaliteracy Pretest

Control variables			MS-LRSS	Metaliteracy posttest	Metaliteracy pretest
none	MS-LRSS	Correlation	1.00	.17	-.06
		Significance (two-tailed)		.49	.80
		df	0	17	17
	Metaliteracy posttest	Correlation	.17	1.00	.51
		Significance (two-tailed)	.49		.03
		df	17	0	17
	Metaliteracy pretest	Correlation	-.06	.51	1.00
		Significance (two-tailed)	.80	.03	
		df	17	17	0
Metaliteracy pretest	MS-LRSS	Correlation	1.00	.23	
		Significance (two-tailed)		.35	
		df	0	16	
	Metaliteracy posttest	Correlation	.23	1.00	
		Significance (two-tailed)	.35		
		df	16	0	

Note. Significance is at the $p < .05$ level.

Research Question 3

Bivariate regression was used to evaluate the null hypothesis that MS-LRSS cannot predict metaliteracy posttest. As previously reported, the Shapiro-Wilk test provided evidence that MS-LRSS and metaliteracy posttest were normally distributed. A scatterplot provided insufficient evidence to support the assumption of linearity. The absence of extreme outliers was confirmed using a boxplot, although one mild outlier was found in metaliteracy posttest. The Durbin-Watson statistic, $d = 1.56$, provided evidence of independence of observations.

The bivariate correlation between MS-LRSS and metaliteracy posttest was $r(19) = .17$, $p = .24$. The bivariate linear regression analysis indicated that MS-LRSS cannot

statistically significantly predict metaliteracy posttest, $F(1, 17) = .50$, $p = .49$ (see Table 7). Consequently, there was insufficient evidence to reject the null hypothesis.

Table 7

ANOVA for MS-LRSS and Metaliteracy Posttest

Model		*SS*	*df*	*MS*	*F*	Sig.
1	Regression	19.17	1	19.17	.50	.49
	Residual	649.46	17	38.20		
	Total	668.63	18			

Note. Model 1 predictor includes MS-LRSS and dependent variable metaliteracy posttest.

Research Question 4

Multiple regression was used to evaluate the null hypothesis that MS-LRSS and metaliteracy pretest cannot statistically significantly predict metaliteracy posttest. The absence of extreme outliers was verified using a boxplot. A scatterplot provided insufficient evidence to support the assumption of linearity. The assumption that residuals were normally distributed was evaluated using a visual inspection of a normal P-P plot. The absence of high multicollinearity was evaluated using the Pearson correlation value and values between the independent variables were low and showed no signs of multicollinearity. The Durbin-Watson statistic, $d = 1.71$, provided evidence of independence of observations.

The multiple regression analysis provided insufficient evidence that MS-LRSS and metaliteracy pretest can statistically signficantly predict metaliteracy posttest, $F(2, 16) = 3.44$, $p = .06$. The results of the analysis of variance (ANOVA) can be found in Table 8. Consequently, there was insufficient evidence to reject the null hypothesis. However, a forward multiple regression analysis showed that metaliteracy pretest could

reliably predict metaliteracy posttest when MS-LRSS was removed from the model, $F(1, 17) = 5.98$, $p = .03$. The results of this ANOVA can be found in Table 9.

Table 8

ANOVA for MS-LRSS and Metaliteracy Pretest

Model		*SS*	*df*	*MS*	*F*	Sig.
1	Regression	201.10	2	100.55	3.44	.06
	Residual	467.54	16	29.22		
	Total	668.63	18			

Note. Model 1 predictors include MS-LRSS and metaliteracy pretest and dependent variable metaliteracy posttest.

Table 9

ANOVA for Metaliteracy Pretest Using Forward Regression

Model		*SS*	*df*	*MS*	*F*	Sig.
1	Regression	173.89	1	173.89	5.98	.03
	Residual	494.74	17	29.10		
	Total	668.63	18			

Note. Model 1 predictor includes metaliteracy pretest and dependent variable metaliteracy posttest.

CHAPTER 5 – DISCUSSION

Overview

The overall purpose of this quantitative, quasi-experimental, exploratory study was to determine if creating a metaliteracy course for online Ed.D. students had a statistically significant difference between pretest and posttest. Other purposes of this study included determining whether there was a relationship between MS-LRSS and metaliteracy posttest after controlling for metaliteracy pretest, whether MS-LRSS could predict metaliteracy posttest, and whether metaliteracy pretest and MS-LRSS could predict metaliteracy posttest. The research questions of this study follow:

RQ_1: Is there a statistically significant difference between metaliteracy pretest and metaliteracy posttest among online Ed.D. students at one university?

RQ_2: Is there a statistically significant relationship between the MS-LRSS and metaliteracy posttest in online Ed.D. students after controlling for metaliteracy pretest?

RQ_3: Can the MS-LRSS statiscially significantly predict metaliteracy posttest?

RQ_4: Can the MS-LRSS and metaliteracy pretest statistically significantly predict metaliteracy posttest?

A metaliteracy pretest and posttest were developed by the researcher and were given as part of a noncredit course in Canvas, the institution's course management system, to answer the first research question. Additionally, the MS-LRSS, a scale specifically designed to measure metacognitive strategies for library research skills, was given as part of the course as a pretest to answer Research Questions 2, 3, and 4. A total of 19 students who successfully completed the metaliteracy pretest, the MS-LRSS, and the metaliteracy posttest within the time allotted participated in the study.

Interpretation of Findings

Research Question 1

The results of the dependent *t* test for Research Question 1 determined that there was a statistically significant difference between pretest and posttest among the 19 participants. The difference in average scores, means, and the boxplot confirmed that there was a significant increase in scores from pretest to posttest. According to Hufford and Paschel (2010), significant increases from pretest to posttest were reported for a group of 13 distance students on a library skills assessment. Similarly, Roberts (2107) reported increases from pretest to posttest for an information literacy assessment for 41 nontraditional online only students at a community college. Although there are threats to internal and external validity with a study of this kind that could account for an increase in scores from pretest to posttest, hopefully some learning took place after viewing the metaliteracy concept videos between the pretest and posttest. Overall increases in scores from metaliteracy pretest to metaliteracy posttest is an important finding in this study.

Research Questions 2, 3, and 4

According to the results of the partial correlation analysis, there was no relationship between the MS-LRSS and metaliteracy posttest after controlling for metaliteracy pretest. Similarly, the MS-LRSS could not predict metaliteracy posttest. The students' self-evaluation of their own metacognitive skills may have been either too high or too low to have a relationship with the metaliteracy pretest and posttest or to predict metaliteracy posttest. The differences in scoring between Likert scale and total points could also contribute to a nonrelationship or nonprediction. Measuring metacognitive awareness with questions that are self-rated are different than answering multiple-choice

questions that have one correct answer. According to Catalano (2017), metacognitive skills are "crucial to a successful outcome when searching online" and not necessarily when answering a self-rated scale (p. 179).

Not only was there a significant difference in the results from pretest to posttest, after the forward model was used in the multiple regression analysis, the results showed that metaliteracy pretest could reliably predict metaliteracy posttest. The pretest and posttest seem to be highly relatable perhaps due to using the same test for both pretest and posttest.

Additional Findings

Two questions in the Module 1 subset (evaluate content critically) and two questions in the Module 2 subset (information ethics) were all answered correctly in the metaliteracy pretest. The two questions from Module 1 asked who the most likely authors of scholarly articles are and which criteria are considered when determining if a resource is scholarly, respectively. The two questions from Module 2 asked about ways to avoid plagiarism and what academic integrity is, respectively. One question each from the information creation, sharing, and collaboration (Module 3) and research skills proficiency (Module 5) subsets were all answered correctly in the metaliteracy pretest. The question from Module 3 asked about format for completing an assignment. The question from Module 5 asked about options to obtain resources. No questions from the lifelong learning strategies (Module 4) subset were all answered correctly on the metaliteracy pretest. All six questions all answered correctly on the metaliteracy pretest were also answered all correctly on the metaliteracy posttest. Three questions increased by over 50% in the number of students who answered correctly from pretest to posttest.

These questions included two questions from Module 1, evaluate content critically (54.55% and 77.78%) and one question from Module 4, lifelong learning research strategies (87.50%). These questions included the role of an editor in the peer-review process, trade publications, and narrowing searches in a library database. Two questions increased by over 100% in the number of students who answered correctly from pretest to posttest. These questions included one from Module 3, evaluate content critically (125.00%), and one from Module 5, research skills proficiency (650.00%). These questions included sharing work and retaining ownership of works and types of sources. Each of the questions that received a 50% increase or higher in the number of students who answered questions correctly were noticeably featured in the treatment videos for their respective modules.

There were 18 questions that increased in number of correct scores answered from pretest to posttest. Seven questions from the pretest increased to 100% (19 students who answered correctly) correct on the posttest. The high increase in the number of questions students got correct on these eight questions might explain the increase in the mean scores from pretest to posttest. These questions include identifying scholarly articles, how to identify plagiarism, identifying errors in APA format, identifying security issues in social media passwords, recognizing in-text citations in APA format, identifying potentially bias sources, and recognizing steps in the research process. The question that had the most correct answer gain from pretest to posttest was Question 3 in Module 5, which asked about types of sources, including primary, secondary, and tertiary (two correct on the pretest to 15 correct on the posttest). An additional question for a future iteration of this course would include identifying empirical research since that question is

frequently asked by online Ed.D. students of the research librarians at the researcher's institution and is a major component of several assignments in the program.

Empirical research is mentioned in the Module 5 (research skills proficiency) types of sources video, but there is not a question about empirical research in the metaliteracy pretest/posttest. Other significant gains in correct answer scores from pretest to posttest included Module 4, Question 1, and Module 5, Question 1. These questions were both questions that increased in number of correct answers by over 40% on the posttest (identifying steps in developing a research question and identifying research methods). The gain in these questions, which could or could not be related to the treatment video, is important as these concepts are valuable for students in the online Ed.D. program.

The metaliteracy pretest and posttest subscale descriptive statistics show that increases in the means of each subscale were achieved. The standard deviations of each subscale decreased from pretest to posttest, indicating that questions answered correctly on the posttest deviated from the mean less than the pretest. The standard deviation of zero for the information creation, sharing, & collaborating subscale reveals that all five questions were answered correctly on the posttest. The minimum of zero for the lifelong learning research skills subscale for the posttest agrees with previous reports that there were no questions on this subscale that were answered correctly on the pretest. These results warrant further examination of questions for this subscale to be revised for the next metaliteracy course.

Implications for Librarianship

Focusing on developing metacognition skills and concepts in students goes beyond information literacy as presented in the ACRL Framework. Although the developers used metacognition principles to create the ACRL Framework, the goals and objectives of metaliteracy can also be used to develop assessments not only for on-campus students but for online students. Fulkerson, Ariew, and Jacobson (2017) contended that through the various revisions of the ACRL Framework, the finished product left out a considerable amount of metacognitive principles that would help in assessment of well-established but changing information literacy concepts. Perhaps the use of metaliteracy goals and objectives alongside the ACRL Framework can provide a complete picture of assessment of students. Information literacy courses designed for online students should consider whether the ACRL Framework or metaliteracy goals and objectives would be more appropriate for the student population. A combination of both models could also be considered when designing courses for online students. Often, courses are not an option for librarians for various reasons such as low support from faculty or time constraints. Whether designing a course or designing a one-shot instruction session, incorporating some aspects of the ACRL Framework or metaliteracy goals and objectives would be helpful for consistency and assessment of concepts and skills.

Including metacognitive awareness strategies can also be beneficial to students. Teaching students about metacognitive strategies develops higher-level thinking and gives students opportunities to reflect on how their knowledge can be used in lifelong learning and not just in a course. Magno (2010) found that “factors of metacognition are

significantly related to the factors of critical thinking" (p. 149). Wilson (1992) suggested that lifelong learning would be a skill that reaches beyond a formal education and librarians can help students learn these crucial skills.

The results of this study, specifically the statistically significant results of the first research question, could suggest that designing a course for online students to assess metaliteracy concepts and skills might be helpful by using a pretest/posttest design. Using videos as a treatment could also be helpful in presenting metaliteracy concepts, although alternative approaches to content retention should be explored. Jacobson and Mackey (2013) challenged librarians to "consider creative ways" of incorporating metaliteracy principles into library instruction using "emerging technologies that have become a ubiquitous part of our daily lives" (p. 86). Designing online courses or modules to assess metaliteracy concepts with metacognitive components could help students "stimulate" metacognitive skills such as self-reflection and self-awareness of knowledge and lack of knowledge with the purpose of improvement (Roberts, 2017, p. 541). Acknowledgement of a shift from information literacy to metaliteracy by several researchers, including the current researcher, could be the impetus necessary for change in instruction by librarians not only for online students but all students to help them learn important concepts for lifelong learning, critical thinking, information ethics, and metacognitive skills (Gibson & Jacobson, 2018; Marzal & Borges, 2017; Roberts, 2017; Witek & Grettano, 2014).

In the MOOC on metaliteracy reported by O'Brien et al. (2017), emphasis on metacognitive strategies such as self-reflection, planning, and cognitive strategy were evident and plentiful in the 10-week course. Emphasis on real-life application was also apparent in an assignment that asked students to plan a trip to London using a budget, a

time schedule, and research on specific events during the trip. The assignment, while not academic, was not developed for online students pursuing a degree per se but for library and information science professionals. As online courses and programs continue to grow, the need for development assessment of metaliteracy concepts will also grow out of the research requirements necessary within the courses, especially doctoral-level programs. Many online students need more than just tutorials and webinars to help develop metacognitive strategies to fulfill metaliteracy goals and objectives.

Recommendations for Further Study

Future studies should use a larger sample than was represented in the present study so that results could be generalizable to a larger population. More diversified groups could also be included in future studies such as online undergraduates or master's-level graduate students. Another recommendation for future research would include the addition of qualitative methods, including open-ended questions or interview questions to determine student attitudes toward metaliteracy, as well as gather information on students' metacognitive strategies (Roberts, 2017). Qualitative methods would add strength to any quantitative methods used as were used in the present study. Response rates for noncredit courses could be improved using alternative methods of reaching potential participants (email, announcements in specific courses, etc.), providing incentives for completing the course or keeping the course open longer to allow for completion.

In addition to qualitative methods, a recommended future study could include a longer amount of time given for the course. The current course was completed within 1 or 2 hours; however, a course duration of a few weeks or longer could include more in-

depth assignments. Assignments similar to what was offered in the 10-week Metaliteracy MOOC the researcher completed would allow students to further develop metaliterate strategies in a longer amount of time. Quizzes, tests, essays, discussions, and other assessment measures could perhaps better determine a student's metaliteracy proficiency than a short 25-question test as was developed in this study. A longer course would not only allow for more assignments but a variety of approaches to successful content retention in addition to the treatment videos such as PowerPoints, podcasts, outlines, and PDF documents.

The metaliteracy instrument developed by the researcher could be used in future studies, although different questions measuring metaliteracy concepts might be developed. The questions that decreased in correct number answered from pretest to posttest would need to be examined. Inclusion of qualitative methods, as mentioned earlier, could be used to assess students' self-awareness of metacognitive strategies. Assessing self-rated questions through multiple-choice questions is not usually recommended, so use of a scale like the MS-LRSS or another similar instrument should be used to assess metacognitive strategies. If a longer course were developed, metacognitive strategies could be assessed in a variety of ways.

As previously found in the results, the MS-LRSS did not have a relationship or reliably predict metaliteracy posttest. Another study of MS-LRSS as it relates to metaliteracy goals and objectives should be conducted. A study with a revised metaliteracy pretest and posttest could be used to compare to the MS-LRSS. Adding qualitative methods such as open-ended questions to the MS-LRSS results would help determine students' thinking process when thinking about answers to the scale.

Finally, future studies could incorporate metaliteracy goals and objectives in face-to-face instruction sessions or courses and compare results to online instruction sessions or courses. Many information literacy sessions and courses reported in the literature are face-to-face although more online courses are being represented in the literature.

Summary and Conclusion

The present study utilized a quantitative, quasi-experimental, exploratory design to determine if creating an online metaliteracy course would improve scores from pretest to posttest and also determine if a relationship exists among the MS-LRSS, metaliteracy pretest, and metaliteracy posttest. Results showed that even though a significant relationship did not exist between the MS-LRSS and metaliteracy posttest, there was a significant difference between metaliteracy pretest and metaliteracy posttest.

Rader's (1990) response to the transition from the term *bibliographic instruction* to *information literacy* applies now to a desired transition from the term *information literacy* to *metaliteracy*: "The question is not that should it be one or the other, but rather . . . how can we build strong information literacy programs" (p. 20). Whether metaliteracy goals and objectives, the ACRL Framework or a combination of both is used for assessment of online students, the importance of teaching students lifelong learning concepts is crucial for skills in higher education and the workplace. When using metaliteracy as a framework for information literacy instruction, applying metacognition theory to instructional practice can help explain students' needs when planning instructional goals and objectives. Assessing information literacy concepts using metaliteracy goals and objectives are lacking in library literature, and the present study helps to add to the literature on this topic. Metaliteracy as a term to expand the concept of

information literacy could gain momentum as metacognitive strategies receive more emphasis in many courses designed to help students with lifelong learning skills needed beyond the classroom.

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APPENDIX A – METALITERACY COURSE PRETEST AND POSTTEST

Module 1 (Goal 1): Evaluate Content Critically

Learning Objectives:
Module 1: Metaliterate learners evaluate information critically by determining authority, relevancy, accuracy, and validity of each source regardless of the information's delivery method.
By the end of this module, learners will be able to:
1) Recognize the criteria for evaluating authority, relevancy, accuracy, and validity of information sources
2) Determine context of an information source by considering purpose and format
3) Distinguish between scholarly and non-scholarly sources
4) Understand the process of peer review and its purpose in scholarly research

Video Links:
Scholarly Resources - https://spark.adobe.com/video/5D1ZW4s8PAB5p
Peer Review - https://spark.adobe.com/video/saK51Y8UL9S7E

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1. Who are the most likely authors of scholarly sources?
    a. Book reviewer
    b. Freelance journalist
    c. Amateur writer
    d. Experts in a discipline

2. Which of the following are considered when determining if a resource is scholarly?
    a. Authority
    b. Popularity
    c. Opinion
    d. Images

3. What role does an editor play in the peer review process?
    a. The editor writes peer reviewed articles
    b. The editor chooses which articles should go to peer review
    c. The editor alone decides which articles are peer reviewed
    d. The editor is not involved in the peer review process

4. An example of a trade publication would be:
    a. Publishers Weekly
    b. Journal of Computers in Education
    c. Geographical Journal
    d. Science

5. Which of the following is used to determine if an article is scholarly?
    a. Validity
    b. Opinion

c. Privacy
d. Copyright

Module 2 (Goal 2): Information Ethics

Learning Objectives:
Module 2: Metaliterate learners understand and differentiate between their own intellectual property and others' intellectual property, and give credit to others' work using proper citation style methods.
By the end of this module, learners will be able to:
1) Understand the concepts of academic integrity, copyright, and plagiarism
2) Differentiate between various forms of attribution
3) Identify parts of a citation in APA style
4) Recognize elements of APA style in context

Video Links:
Academic Integrity, Copyright, and Plagiarism - https://spark.adobe.com/video/IggpAp6Vaa3fx
APA Style - https://spark.adobe.com/video/NrYmA6fQFDqmT

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1. What would an in-text citation look like for this reference in APA format?
Bright-Paul, A., Jarrold, C., & Wright, D. B. (2008). Theory-of-mind development influences suggestibility and source monitoring. *Developmental Psychology, 44*, 1055-1068. doi: 10.1037/0012-1649.44.4.1055
a. (Bright, 2008)
b. (Bright-Paul, Jarrold, & Wright, 2008)
c. (Bright-Paul 2008)
d. (Bright-Paul & Wright, 2008)

2. What is academic integrity?
a. A law that governs academic resources
b. Using someone else's work as your own
c. Responsible and ethical use of resources
d. Creative ideas protected by copyright law

3. Which of the following is a way to avoid plagiarism?
a. Knowing what resources are scholarly
b. Rephrasing someone else's ideas into your own ideas
c. Directly quoting someone and giving them credit
d. Asking someone else to paraphrase for you

4. In the following research scenario, which would be considered plagiarism?
Steve has carefully researched his topic for his paper and has created a reference list for his sources. He has paraphrased other's ideas into his own words while also giving them credit. He is in a hurry to turn in his paper, but he decides that he needs another quote to make a point. He finds a quote he used from one of his previous papers and uses it without creating a citation or reference for it.
a. Steve paraphrased other’s ideas into his own words
b. Steve created a reference list for his sources

c. Steve paraphrased other's ideas and used a previous quote
d. Steve uses a previous quote without citing it or referencing it

5. What is wrong with the following citation in APA format?
Dietz, P. M., Williams, S. B., Callaghan, W. M., Bachman, D. J., Whitlock, E. P., & Hornbrook, M. C. (2007). Clinically identified maternal depression before, during, and after pregnancies ending in live births. American Journal of Psychiatry, 164(10), 1515-1520. doi:10.1176/appi.ajp.2007.061118936
a. The DOI should never be included
b. The journal title should be in italics
c. The article title should be in italics
d. The year should be after the title

Module 3 (Goal 3): Information Creation, Sharing & Collaboration

Learning Objectives:
Module 3: Metaliterate learners are aware of their online environments, participate collaboratively, transfer information from one format to another, and produce and share original content.
By the end of this module, learners will be able to:
1) Understand the various ways of sharing original content
2) Consciously participate in social media environments
3) Describe digital and visual literacy and their importance to metaliterate learning
4) Identify digital and media formats and the uses and purposes of each

Video Links:
Social Media - https://spark.adobe.com/video/63rnlkOGcGxEs
Digital and Visual Literacy - https://spark.adobe.com/video/vTqlQ2Xjw9Rh9
Creating Original Content - https://spark.adobe.com/video/Jlkn1qGp3jofa

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1. In the following scenario, which format would be the most appropriate for completing the assignment?
Pam, Shelly, and Rosa are assigned to collaborate on an assignment for their course. The assignment requires them to create a visual presentation they can present to their classmates.
a. Powerpoint
b. Article
c. Speech
d. Book

2. In which of these scenarios would security most likely be compromised?
a. A Facebook setting requiring two-factor authentication
b. A Facebook setting of sharing posts to Friends
c. A Facebook setting of sharing posts to a Custom list of Friends
d. A Facebook password that is the same as all other social media passwords

3. What is the difference between digital literacy and visual literacy?
a. Digital literacy is using computers and visual literacy is using images

b. Digital literacy is using images and visual literacy is using technology
c. Digital literacy is using technology effectively and visual literacy is using images effectively
d. Digital literacy is using media and visual literacy is using photographs

4. In the following scenario, which source would not be a potential bias in evaluating the information?
Tonya is researching the advantages and disadvantages of vaccinations for children for a research paper.
a. A pharmacy website
b. Journal article
c. A mother's blog
d. A doctor's website

5. What is the best option available if an author wants to share their work while retaining legal ownership?
a. Creative Commons license
b. Journal article
c. Social media
d. YouTube

Module 4 (Goal 4): Lifelong Learning Research Strategies

Learning Objectives:
Module 4: Metaliterate learners connect learning with personal, professional, and lifelong goals using their experiences. Metaliterate learners recognize metacognitive principles of learning by acknowledging that learning is a process and can reflect on research difficulties to improve strategies.
By the end of this module, learners will be able to:
1) Know which search strategies are appropriate for the information needs
2) Determine tasks involved to develop research questions
3) Reflect on one's own knowledge and determine ways to increase metacognition skills
4) Recognize the process of critical thinking that leads to metaliterate learning

Video Links:
Information Needs - https://spark.adobe.com/video/M7mRnR9wDSBxl
Metacognition - https://spark.adobe.com/video/buf39HSlMEhui

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1. In the following scenario, what would the best research question be?
Lola has done some preliminary searches on the topic of student enrollment and higher education. She has found articles and other scholarly resources that describe the impact of faculty advising on student enrollment at public universities. This has led her to a potential research question she would like to pursue.
a. Does faculty advising have an impact on students?

b. Does faculty mentoring have an impact on student enrollment?
c. Does faculty advising have an impact on higher education?
d. Does faculty leadership have an impact on higher education?

2. The following search in a library database was too narrow. How could the search be rewritten to give the most results?
"Faculty leadership" AND "student retention in higher education" AND "college freshman" AND diversity
a. Faculty leadership AND student retention AND higher education AND college freshman AND diversity
b. "Faculty leadership" AND "student retention" AND "higher education" AND college freshman AND diversity
c. "Faculty leadership" AND "student retention" AND higher education AND college freshman AND diversity
d. "Faculty leadership" AND student retention in higher education AND college freshman AND diversity

3. In the following scenario, which metacognitive skill is being practiced?
Sydney is not sure about the topic of her next assignment, although she has a basic understanding of it. She decides to set some short term goals in order to learn more about the topic before the assignment is due.
a. Thinking of different search strategies
b. Seeking feedback
c. Being aware of unknown knowledge
d. Asking for help

4. In the following scenario, which step would likely come next?
John has used several Boolean searches using various phrases and terms in scholarly databases to find some articles on his topic. He has also determined which articles will be helpful to develop a research question.
a. Identify keywords
b. Read what was found
c. Repeat the steps
d. Choose a broad topic

5. A metaliterate learner is able to
a. self-reflect on learning strategies
b. search for information using Google Scholar
c. evaluate information based on personal beliefs
d. develop a research question based on reading one article

Module 5: Research Skills Proficiency

Learning Objectives:

Module 5: Metaliterate learners are proficient in distinguishing between types of sources, describing research methods, and understanding how to request materials to find relevant, scholarly, and authoritative information sources.
By the end of this module, learners will be able to:
1) Describe research methods, including quantitative, qualitative, and mixed methods
2) Distinguish between primary, secondary, and tertiary sources
3) Recognize ACU library's databases, authentication process, and InterLibrary Loan procedures
4) Understand how to request physical materials

Video Links:
Types of Sources - https://spark.adobe.com/video/1NamDX7FN9Ehp
Requesting Materials and ILL - https://spark.adobe.com/video/Ctx6nQdn60iLc
Research Methods - https://spark.adobe.com/video/g9ERHYR9eMiFE

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1. In the following scenario, which type of source would most likely be used?
David has an assignment that requires him to look up definitions of terms used in his discipline from reputable sources.
a. Primary
b. Tertiary
c. Secondary
d. Empirical

2. In the following article excerpt example, what is the research method used?
This article used a research method consisting of telling the story of a first generation undergraduate student in a private university. Field notes, interviews, and journal entries from the participant were all used to collect and analyze data to answer the research question.
a. Experimental
b. Grounded Theory
c. Instrumental
d. Narrative

3. What is the best description of a primary source?
a. A primary source is the first source used in a paper
b. A primary source is a dictionary or encyclopedia
c. A primary source is original research conducted by the author
d. A primary source is an author discussing another author's work

4. In the following scenario, what would the best option be for a researcher to get the resource they need?
Alex searched for scholarly articles in the ACU Library's OneSearch database. After reading the abstract of an article, he decides he would like to read it; however, the article is not available in full text from the library.

a. Contact the publisher
b. Pay for the article
c. Use InterLibrary Loan
d. Ask their professor

5. In the following scenario, what research method is being described? After finding, evaluating, and reading articles, Mary's research question lends itself to gathering data about a population. She will use interviews to describe the population's common experiences.
a. Experiment
b. Grounded Theory
c. Quasi-Experiment
d. Phenomenology

APPENDIX B – PERMISSION LETTER

November 14, 2017 Melissa Atkinson
Online Learning Librarian
Abilene Christian University Brown Libra1y
PhD student, dissertation phase, Regent University

Amy Catalano
Curriculum Materials Librarian, Associate Professor Joan and Donald E. Axinn Library
123 Hofstra University
Hempstead, NY 11549-1230

Dr. Catalano,

I am completing a doctoral dissertation at Regent University entitled *The Relationship Between Metaliteracy Pretest, Posttest, and Meta cognitive Strategies for Library Research Skills Scale: Creating a Metaliteracy course for online EdD students.* I would like your permission to use in my dissertation the scale developed and validated from

Catalano, A. A. (2017). Development and validation of the Metacognitive Strategies for Library Research Skills Scale (MS-LRSS). *Journal of Academic Librarianship, 43(3*), 178-183. doi: I 0. 1016/j.acalib.2017.02.017

I will be using this scale to determine if a relationship exists between and/or if the scale is a predictor of my own instrument (pretest/posttest) for measuring metaliteracy goals and objectives (developed by Mackey and Jacobson). My dissertation will be submitted electronically for publication through Proquest/UMl/. and made available through the Proquest Dissertations and Theses database. I am requesting permission to use the scale in current and future revisions of my disse1tation, and to grant others the right to reproduce my entire disse1iation, including the scale described above, for educational, non-commercial purposes. These rights will in no way limit republication of the material in any other form by you or others authorized by you.

Your signing will verify that you own the copyright to the above material.

If this meets with your approval, please sign this letter below and return it to me as an email attachment. Thank you very much for your attention to this matter.

Sincerely,
Melissa Atkinson

Melissa Atkinson

PERMISSION GRANTED FOR THE USE REQUESTED ABOVE:

Amy Catalano

Date: 11/16/17

APPENDIX C – METACOGNITIVE STRATEGIES FOR LIBRARY RESEARCH SKILLS SCALE

Instructions: This scale measures strategies for library research skills using a metacognitive lens. ***There are no right or wrong answers***. While responding to this scale, please think of a recent research assignment you have completed or will complete where you had to find, locate, and use library resources.

If you have not completed a recent research assignment, think of any school assignment, project, or research activity you have completed where you had to find, locate, and use library resources.

For each of the statements below indicate the degree to which that statement describes your thoughts and behavior while working on this assignment (from Not at all to Extremely).

Question 1

I am aware of how to create an effective search strategy

- Not at all
- Slightly
- Moderately so
- Very much so
- Extremely

Question 2

I am aware of the steps needed to find sources for my project

- Not at all
- Slightly
- Moderately so
- Very much so
- Extremely

Question 3

I know how to determine whether a source is reliable

- Not at all

- Slightly
- Moderately so
- Very much so
- Extremely

Question 4

I am aware of the need to understand the assignment before beginning my research

- Not at all
- Slightly
- Moderately so
- Very much so
- Extremely

Question 5

I am aware of the need to evaluate each source before using it

- Not at all
- Slightly
- Moderately so
- Very much so
- Extremely

Question 6

I know how to present the research in a medium that is appropriate to the audience

- Not at all
- Slightly
- Moderately so
- Very much so
- Extremely

Question 7

I am aware of when my searches are unproductive

- Not at all
- Slightly
- Moderately so
- Very much so
- Extremely

Question 8

If I retrieve too many irrelevant results from a search, I revise my strategy

- Not at all
- Slightly
- Moderately so
- Very much so
- Extremely

Question 9

I scan information in a source after I retrieve it

- Not at all
- Slightly
- Moderately so
- Very much so
- Extremely

Question 10

I evaluate the materials I retrieve

- Not at all
- Slightly
- Moderately so

- Very much so
- Extremely

Question 11

I examine sources for clues to point me toward other sources

- Not at all
- Slightly
- Moderately so
- Very much so
- Extremely

Question 12

I try to determine what my professor wants before beginning my research

- Not at all
- Slightly
- Moderately so
- Very much so
- Extremely

Question 13

I think about what I need to accomplish before beginning my search for sources

- Not at all
- Slightly
- Moderately so
- Very much so
- Extremely

Question 14

I make sure I understand what has to be done and how to do it

- Not at all

- Slightly
- Moderately so
- Very much so
- Extremely

Question 15

I try to understand the assignment before I start my research

- Not at all
- Slightly
- Moderately so
- Very much so
- Extremely

Question 16

I ask myself if I have consulted all possible resources

- Not at all
- Slightly
- Moderately so
- Very much so
- Extremely

Question 17

I analyze the usefulness of my strategies

- Not at all
- Slightly
- Moderately so
- Very much so
- Extremely

Question 18

I keep track of my search strategies

- Not at all
- Slightly
- Moderately so
- Very much so
- Extremely

Question 19

I ask for help when I can't find a source that I need

- Not at all
- Slightly
- Moderately so
- Very much so
- Extremely

Question 20

When I find a source and am unsure of its quality, I look for another source to corroborate the first

- Not at all
- Slightly
- Moderately so
- Very much so
- Extremely

Question 21

If some aspect of my research isn't working out, I look at it from another perspective

- Not at all
- Slightly

- Moderately so
- Very much so
- Extremely

APPENDIX **D – INFORMED CONSENT**

Informed Consent - ACU Library Metaliteracy Course

Read the following Informed Consent to decide if you would like to participate in the research study and then respond by with 'Yes' or 'No' below.

Title of Study: The Relationship Between Metaliteracy Pretest, Posttest, and Metacognitive Strategies for Library Research Skills Scale: Creating a Metaliteracy Course for Online EdD students

You are invited to participate in a research study. This form provides important information about that study, including the risks and benefits to you, the potential participant. Please read this form carefully and ask any questions that you may have regarding the procedures, your involvement, and any risks or benefits you may experience. You may also wish to discuss your participation with other people, such as a friend or a family member.

Also, please note that your participation is entirely voluntary. You may decline to participate or withdraw from the study at any time and for any reason without any penalty or loss of benefits to which you are otherwise entitled.

Please contact the Principal Investigator if you have any questions or concerns regarding this study or if at any time you wish to withdraw. This contact information may be found at the end of this form.

Purpose and Procedures

The purpose of this study is to create a course in Canvas that will assess the metaliteracy comprehension and skills of online EdD students using a pretest and posttest. Metacognitive strategies will also be assessed as part of the pretest using a scale developed by Catalano (2017)*. Permission has been granted to use the scale in this study.

You will be asked to participate in a course consisting of a metaliteracy pretest (developed by the researcher), metacognitive scale, five modules of treatment videos, and metaliteracy posttest (developed by the researcher) as part of this study. The estimated time it should take to complete the course is approximately one hour and a half.

Once you consent to participation in the study, you will be asked to participate in the following procedures:

The study procedures include:

a metaliteracy pretest
a metacognitive strategies library research skills scale (pretest)
a series of treatment videos presented in five modules, and

a metaliteracy posttest

Risks and Discomforts

The risks associated with this study are anticipated to be minimal.
The primary risk with this study is breach of confidentiality. However, steps to minimize this risk will be taken by the Principal Investigator. (See Provisions for Confidentiality section below)

Potential Benefits

Although you may not personally experience any benefits from participating in this study, the benefits could include an increased awareness and understanding of metaliteracy goals, objectives, and skills. Additionally, the researcher hopes that the information learned from this study will advance research in the field of online information literacy for graduate level students by developing a course that assesses metaliteracy goals and objectives.

Provisions for Confidentiality

Information collected about you will be handled in a confidential manner in accordance with the law. Some identifiable data may have to be shared with individuals outside of the study team, such as members of the ACU Institutional Review Board. Aside from these required disclosures, your confidentiality will be protected by separating identifying information from the results of the metaliteracy pretest, metacognitive scale, and metaliteracy posttest using different spreadsheets prior to data analysis.

Contacts

If you have any questions, concerns, or complaints, you may contact the Principal Investigator of this study. The Principal Investigator is Melissa Atkinson, Online Learning Librarian, Abilene Christian University Brown Library, and may be contacted at 325-674-4811, melissa.atkinson@acu.edu, or at ACU Box 29208, Abilene, TX 79699.

If you are unable to reach the Principal Investigator or wish to speak to someone other than the Principal Investigator, you may contact Mark McCallon, Associate Dean of Library Services, Abilene Christian University Brown Library, at mccallonm@acu.edu or at 325-674-2348.

If you have concerns about this study or general questions about your rights as a research participant, you may contact ACU's Chair of the Institutional Review Board and Director of the Office of Research and Sponsored Programs, Megan Roth, Ph.D. Dr. Roth may be reached at (325) 674-2885megan.roth@acu.edu320 Hardin Administration Bldg, ACU Box 29103Abilene, TX 79699

*Catalano, A. (2017). Development and validation of the Metacognitive Strategies for Library Research Skills Scale (MS-LRSS). *The Journal of Academic Librarianship, 43*(3), 178-183. doi:10.1016/j.acalib.2017.02.017

Consent Signature Section

Please check the 'Yes' box below if you voluntarily agree to participate in this study. Click only after you have read all of the information provided and your questions have been answered to your satisfaction. If you wish to have a copy of this consent form, you may print it now. You do not waive any legal rights by consenting to this study.
If you choose "No," you can exit out of this survey.