

NO LITERACY LEFT BEHIND:
ADDRESSING INFORMATION ILLITERACY IN THE INFORMATION AGE

A disquisition presented to the faculty of the Graduate School of
Western Carolina University in partial fulfillment of the
Requirements for the degree of Doctor of Education.

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March 2016

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ACKNOWLEDGEMENTS

The advancement of this study was made possible through the support of my committee members and director. I would like to thank Dr. Ann Allen, Dr. Maureen Furr, and Dr. Beth McDonough for their engagement. A special thanks and recognition to Dr. Brandi Hinnant-Crawford for her dedication, guidance, mentorship, and encouragement throughout this venture as my committee director.

I would like to recognize and thank the following people who have dedicated numerous hours of thoughtful discussion, inspiration, and patient kindness that enabled me to overcome challenges and obstacles that occurred along the way: Dr. Michael Eisenberg, Dr. Alison Head, Dr. Robert Crow, Dr. Anna Wells Bloomer, Cathy DuPre, Dana Harper, Rickie Welch, Christine Efird, Traci Anderson, Debbie Wooden, Chuck Gordon, the TRAILS Project Team at Kent State University, and all the members of my EdD Cohort group at Western Carolina University.

I especially want to recognize all the students, parents, staff, teachers, and personnel at Charlotte-Mecklenburg Schools who worked with me for this research study. Special thanks to Robert Folk, my principal at Alexander Graham Middle School, for providing coaching and leadership support for this project. I also greatly appreciate the support of my lead collaborative teachers, school library media specialists, district media curriculum specialist and technology administrator: Laura Mathers, Rhonda Small, Mariam Lackey, Robin Williams, Janet Jones, and Jacob Standish.

DEDICATION

I dedicate this work to my husband, Vinson W. Washburn, Jr.

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LIST OF ABBREVIATIONS

AASL	American Association of School Librarians
ALA	American Library Association
AP	Advanced Placement
Big6™	Big Six Research Process Model
CMS	Charlotte-Mecklenburg Schools
DPI	Department of Public Instruction
HS	High School
IL	Information Literacy
ITES	Information and Technology Essential Standards
LMS	Learning Management System
MPHS	Myers Park High School
NC	North Carolina
NCLB	No Child Left Behind
NWSOA	Northwest School of the Arts High School
PDSA	Plan, Do, Study, and Act cycle for improvement activities
PIL	Project Information Literacy
POB	Phillip O. Berry Academy of Technology High School
SMHS	South Mecklenburg High School
SLMS	School Library Media Specialist

ABSTRACT

NO LITERACY LEFT BEHIND: ADDRESSING INFORMATION ILLITERACY IN
THE INFORMATION AGE

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Western Carolina University (March 2016)

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There is a growing concern in scholarly literature indicating that college students struggle with conducting research and using information effectively (Head, 2013; Lawrence, 2013; Head & Eisenberg, 2011). This research study examines the elements and causes of information illiteracy from a secondary education perspective. The methods used assess the information literacy skill levels of high school juniors, intervene with information literacy instruction, and evaluate the merit of the intervention. The project purpose is threefold: (1) establish a baseline of students' ability to seek, use, disseminate, and communicate information; (2) determine what instructional strategies (including self-paced resources, collaborative instruction, and assessments) will increase student capacity to locate and integrate information; and (3) measure student and teacher perceptions of the importance of information literacy.

Currently, the Common Core State Standards Initiative (2012) treats information literacy as a skill component to be integrated into the curriculum. Since there is not a state-sanctioned assessment examining information literacy within North Carolina, this study will serve as a springboard for capturing data related to information literacy. When

implemented at the district level, this intervention method will use existing standards (specifically curriculum) to increase student readiness for career and college-level course work.

CHAPTER ONE: INTRODUCTION

Far too many of America's high school graduates are information illiterate. This statement is substantiated by the work of Project Information Literacy (PIL), which has presented studies that college students struggle to conduct research as well as transfer these skills to employment and careers. Considering the multiple literacies that exist, information literacy (IL) is not treated with equal importance as other components considered critical for students' overall development. In North Carolina, information standards exist but are not directly embedded or assessed within the required content areas. With these perplexing factors in place, how can educators determine if students have mastered IL skills? As a school library media specialist, I have spent the last 14 years working with secondary students. In this role, I have seen firsthand the challenges that students face in completing research projects or using information effectively to investigate issues, think critically, and solve problems. These observations have led me in the past to seek answers specific to students' performances in the IL area and how students successfully apply these skills.

The American Library Association (ALA) defines IL as the capacity "to recognize when information is needed and have the ability to locate, evaluate, and use [it] effectively" (ALA, 1989). Baseline assessment data is necessary in the area of IL to evaluate North Carolina's progress toward its "guiding mission" for 21st century learning that prepares students for college and career readiness (North Carolina Department of Public Instruction [NCDPI], 2007). IL is essential for college and career success in the 21st century. While North Carolina has acknowledged the importance of IL by strongly recommending a high school graduation project, there is not a clear mandate for teaching

these skills. Some local school districts have eliminated the graduation project as a requirement, thus reducing the opportunity for students to develop critical thinking and problem-solving skills that are rooted in IL. NCDPI uses a variety of assessments to determine student achievement, none of which include IL. These assessment tools are described in the *North Carolina Testing Program Overview* (NCDPI, 2014a), which focuses on End-of-Grade or End-of-Course Assessment. No strategy exists to collect IL data as part of an overall paradigm.

Research conducted by Project Information Literacy (2016) from Washington State University validated academic librarian and instructor concerns that college students are ill-prepared to successfully integrate information, conduct research, and use IL strategies to solve problems (see Figure 13: PIL infographic in Appendix A). Head (2013) reported results from a large-scale national study highlighting students' struggles initiating research. While IL has a well-defined research base to draw from within the post-secondary arena, less research is being conducted on IL development in the K-12 educational setting (Head, 2013; Head & Eisenberg, 2011; Lawrence, 2013). Pinto, Cordon, and Diaz (2010) analyzed professional research and literature produced from 1977 to 2007 related to library science and found 2,580 relevant articles. From this index and database review, 0.01% referred to the combination terms "library skills" as compared with 64% for "information literacy." These findings support the premise that research focusing on the acquisition of basic library skills, which scaffolds IL, has merit (see Figure 1). Carey (1998) notes that library skills are the "knowledge and tool building blocks of problem-solving," whereas information literacy is the "cognitive strategies component of problem-solving" (p. 10), therefore establishing that basic library skills

comprise the foundation for the initial instruction students receive while developing IL skills.

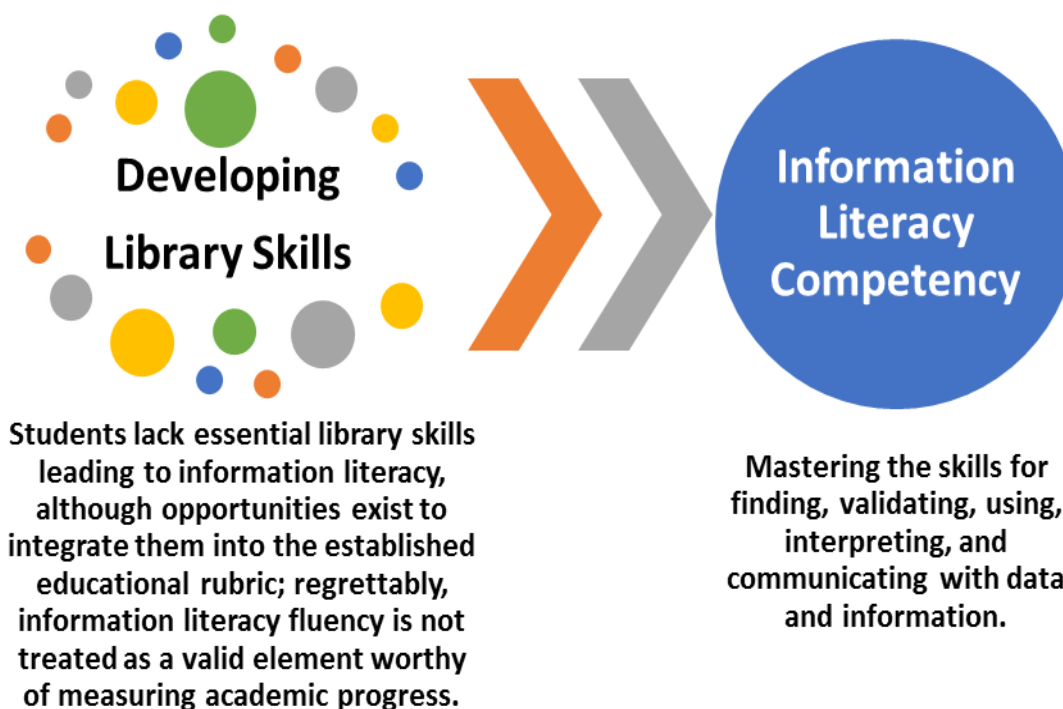


Figure 1. Conceptual framework for K-12 information literacy development.

This disquisition examines the growth of IL in secondary students, particularly high school juniors preparing to complete their graduation research project, as recommended by the state of NC and as required by the Charlotte-Mecklenburg School (CMS) District (NCDPI, 2014). With this focus in mind, the purpose of this project is threefold: (1) to establish a baseline of students' ability to seek, use, disseminate, and communicate information; (2) to determine what instructional strategies (including self-paced resources, collaborative instruction, and assessments) will increase student capacity to locate and integrate information; and (3) to measure student and teacher perceptions of the importance of IL.

Using an Improvement Science approach, I developed an online instructional resource as part of an intervention to support students attempting to improve their IL knowledge (Carnegie Foundation for the Advancement of Teaching, 2016). Improvement Science is a pragmatic methodology that aims to “support improvement efforts by contributing to the re-conceptualization of problems and the conditions that create them; prototyping possible processes, tools, or specific practices to address these problems; and testing them to gauge their potential efficacy” (Park & Takashi, 2013, p. 6). This approach is integral in addressing this problem in a short time frame (90-day project cycle), developing a design and implementation team, as well as using interventions, evaluating, and reporting results. Now, at the project’s culmination, I can make specific recommendations for secondary schools’ IL curricular strategies, ensuring that students are information literate and ready to contribute to the journey of lifelong learning.

Key Terms and Definitions

Improvement Science: seeks to solve problems that directly impact institutions, stakeholders, and direct users. The improvement process focuses on quickly accessing and addressing issues that can be replicated, improved upon, and expanded to the next potential level of a larger problem. Improvement Science is “explicitly designed to accelerate learning-by-doing. It is a more user-centered and problem-centered approach to improving teaching and learning” (Carnegie Foundation for the Advancement of Teaching, 2016, para. 2).

Information Literacy: The American Library Association (ALA, 1989) states “to be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate” (p. 1) and effectively use said information. The

instructional method used to develop this skill includes teaching based on a research model, integration of standards, and practice based on information-seeking and problem-solving activities.

Literacy: is the process used to acquire and apply “knowledge and skills to deal successfully with novel information and situations” (Farmer & Henri, 2008, p. 2).

Literacy occurs when reading, writing, and problem solving are developed as a skill by a learner.

Research Model: is a component of the information literacy skill set. A strategy, guide, or resource which, when used by a researcher, serves as a method to conduct research that addresses questions and curiosities or sparks knowledge in the area of inquiry (Loertscher & Woolls, 1997).

School Library Media Specialist (SLMS): is the education professional who provides instruction and program management for the school library media center. This individual may also be referred to as a school librarian, media coordinator, or teacher librarian (Information Power, 1998).

Information Literacy as an Essential Dimension of Multiliteracies for Secondary Education Curriculum

Both information literacy and illiteracy can be understood within the larger frame of multiliteracies. Conscious of the changing demands in the professional, public, and personal lives of humans, multiliteracy theory contends that schools must evolve to instruct students in literacies falling outside the traditional canon. This instructional shift will prepare students for the “post-Fordism” era, in which employees are required to be “‘multiskilled,’ well rounded workers . . . flexible enough to be able to do complex and

integrated work,” all of which comprise the essential traits of modern workers (Cazden et al., 1996, p. 66). Creating a workforce equipped with these skills requires a keen examination of how we teach these skills and associated literacies, and is critical to creating an equitable society. The New London Group contends that “some have argued that educational research should become as design science, studying how different curricular, pedagogical, and classroom designs motivate and achieve different sorts of learning” (Cazden et al., 1996, p. 73), which is precisely what my improvement study was designed to do. Critically examining the “pedagogical tension between immersion and explicit models of teaching” (p. 62) provides a framework for understanding the need to determine whether students learn best by having IL skills embedded in the curriculum, or if librarian collaborative instruction provides a more effective means for students to acquire these skills (Cazden et al., 1996). My improvement study findings suggest the best process to develop IL among high school juniors is direct instruction.

Students are assumed to acquire information-seeking skills and strategies as part of the general knowledge and literacies currently available through the curriculum. In a recent study by Kovalik, Yutzey, and Piazza (2013), a team of educators explored the “Information and Literacy Skills of High School Seniors” and found more than 50% of the participants had challenges finding and selecting research materials, and more than 86% stated that the research process required more time than they anticipated. It is clear students are not acquiring IL skills in secondary curricula because college students face challenges conducting research beyond basic textual analysis. Head (2013) reported “a majority of first-term college freshmen faced challenges in both locating and then searching through research information systems” (p. 3). Factors revealed by Head’s

(2013) research included students using a limited range of skills and resources for addressing problem-solving activities (p. 4), as well as rarely “used the full range of library resources and/or services” (p. 4) while struggling to complete assignments. Head’s work represents a recent collaborative project spanning 30 high schools and six college/university libraries. Head (2012) states, through a series of focus groups with 33 recent college graduates, that many “struggled to make their transition to a workplace where their information-seeking was driven by an urgent pace” (p. 24). Minimal expectations for jobs and career paths include students with skills enabling them to easily adapt to different technological situations and to adopt IL strategies as “competent researchers” (Head, 2012, p. 25).

Multiliteracy Framework

When considering the multiple literacies that exist, educators must question whether or not IL is privileged within secondary curricula because of instructional difference relative to course level (Standard, Honors, or Advanced Placement, for example); I argue that it is not. Within the Common Core State Standards Initiative (2012) and the North Carolina Information and Technology Essential Standards (NCDPI, 2011), there is an expectation that IL skills will be integrated into instruction as part of the general English and Language Arts discourse. The curriculum policy as presented by the NCDPI in 2009 states that the ITES standards are designed for use in all curriculum areas with the specific expectation that teachers would collaborate with school library professionals in the delivery, integration, and assessment of the instructional context of these skills. The issue implicit in this approach is that no data exists from state-required testing to support that students have acquired or mastered IL skills within any established

curricular area. This issue was confirmed by Dr. Tammy Howard, director of Accountability Services for NCDPI (personal communication, December 11, 2015). Other literacies are treated as integral to the associated curriculum in NC and validated through assessment: Computer, Financial Literacy through Career and Technical Education, Cultural and Global Literacy via Social Studies curriculum, and Reading Literacy through the English Language Arts curriculum, which are all relevant assessments (NCDPI, 2015d).

Applying the multiliteracy framework is appropriate since information standards exist in NC but are not specifically embedded within *required* subject content areas. Establishing a baseline for student performance in this discipline is relevant because students within my school district (and others across the state) are expected to complete a research project as part of their overall graduation requirement. The most significant outcome for IL instruction is that failing to teach IL strategies has real consequences for the students who acquire the skills and for those left illiterate—consequences for college and careers. With increased demands for critical-thinking and problem-solving skills in the workplace, we must teach students these skills as a monitored objective with key concepts systematically constructed and assessed. Ideally, the curriculum for English at the junior and senior level of high school will require an instructional unit on IL, as well as a benchmark evaluation or test before students begin mapping steps for completing their HS graduation project.

In kindergarten through 12th grade, high-stakes standardized testing has created a focus on teaching core subjects almost exclusively, instead of promoting a broad spectrum of knowledge; this narrowed curriculum has led to instruction privileging

objectives that are tested, but unfortunately, IL is not assessed. Lawrence (2013) argues, “High school curriculums remain out of step” (p. 2) with abilities students require for the future. Instead of discerning the best solution, students often accept the quickest answer, blocking learning opportunities (Head, 2013). Based upon my observations and experience as a teacher and information specialist, secondary students struggle to use critical-thinking strategies to locate valid, reliable reference sources. Students unable to conduct research, identify valid, reliable information resources, and evaluate data and draw conclusions will be inherently challenged in their quest to thrive in the information-age workforce. A strong learning culture with collaboratively-developed strategies will align instructional goals, link standards, and provide opportunities for students to learn and practice inquiry as part of IL development.

Information Literacy in CMS

In a focus group investigating the merits of this work, eight high school library media professionals who serve CMS expressed their primary obstacle to facilitate student IL dexterity is the lack of instructional resources and tools. A fundamental guide outlining the minimal knowledge students should acquire before HS graduation should be readily accessible to all students. The discussions this focus group generated also revealed that each school develops its own method of instruction, leading to a lack of district continuity. Lesson plans and content which school library media professionals and English teachers could use to provide instruction, support, and training would greatly benefit students’ acquisition of IL aptitude.

I collected interviews and other preliminary data, revealing one overarching theme consistently noted by English teachers, librarians (SLMS), and administrators: No

assessment tool existed to capture information related to students' specific competencies with IL, which limits the ability to measure the impact of current practices, or the likelihood of creating strategies for future improvements. A review of the literature provides additional insight into recent work developed in the area of IL research, the associated solutions that have been applied, and the impact of instructional standards on addressing these literacy deficiencies.

CHAPTER TWO: LITERATURE REVIEW INFORMATION ILLITERACY IN THE INFORMATION AGE

Information exists in almost every dimension of society as a driver for student learning. The National Forum on Information Literacy expands on this definition by establishing a vision for IL skills that states the purpose of IL education is “to produce independent, self-sufficient lifelong learners who can successfully navigate the competitive challenges of post-secondary educational and/or workplace opportunities” (NFIL, 1989, para. 1). Stemming from the purpose of this study, this literature review details factors that contribute to information illiteracy, scholarly literature on the prevalence of IL and illiteracy, and current instructional models for teaching IL to US and international students.

Addressing Information Illiteracy: Contributing Factors

A variety of factors that contribute to information illiteracy appear in the literature; three of the most prevalent factors are various, haphazardly applied research models; standards or lack of applied standards for IL; and access to valid assessment tools.

Contributing Factor: Haphazardly Applied Research Models

There are many research models that have been developed by educational practitioners in the school library media profession to aid in providing instruction to students for developing IL skills. Using a model as part of the instructional component for developing IL skills provides a pathway to align with standards and knowledge relevant for today’s students. *IMPACT: Guidelines for North Carolina Media and Technology Programs* (NCDPI, 2006), the official state guidebook for school library

media programs, provides recommendations for various types of research models to be included in the curriculum (NCDPI, 2006, p. 21). These models include the Big Six (Big6™) or Super Three (Super 3), Flip-IT, Follett's Information Skills Model, and Jamie McKenzie's Research Cycle. Each of these models has merit but also contributes confusion and weak results by students attempting to follow or adopt the model.

Big Six (Big6™) or Super Three (Super 3). Created by Eisenberg and Berkowitz in 1990, Big Six (Big6™) is a popular and widely used research model. Core principles of this model enable the researcher to follow six steps to successfully solve information problems. Super Three (Super 3) is a version of this model that can be used as a learning resource for younger students in grades K-3. Wolf, Brush, and Saye (2003) advocated for use of the Big6™ model because of the “complex nature of the information search process coupled with the influence of metacognitive skills” (p. 6). James-Maxie (2007) argues that because the Big6™ works to introduce all the IL “skills at once . . . (SLMS) should teach and reinforce the skills in stages” (p. 25).

FLIP-IT. Developed by Alice Yucht in 1988, FLIP-IT works as a four-step research approach to problem-solving and IL. McCarthy (2003) states that FLIP-IT is a “nonlinear information literacy research process that, rather than insisting on a lock-step approach to research, allows flexibility at each stage” (p. 22). FLIP-IT leverages prior knowledge as a means to build toward “the IT of Intelligent Thinking” (p. 22). Access to resources and information related to this model and the developer is limited to the original print manuscript. After Yucht's retirement, the website promoting the model was discontinued.

Follett's Information Skills Model. Also referred to as Pathways to Knowledge Information Skills Model, Follett's Information Skills Model was developed by Marjorie Pappas and Ann Tepe in 1997 with support from the Follett Software Company (Loertscher & Woolls, 1997, p. 5). Originally presented as a free online learning resource, this website tool is no longer available.

Jamie McKenzie's Research Cycle. Introduced in 2000 as a whole school approach to address gaps in IL instruction, the McKenzie Research Cycle provides a practical approach for teaching the research process (Milam, 2002, p. 2). Created as a seven-step process that builds on students developing questions related to their topic, the Research Cycle guides students to refine and clarify the information needed as part of a decision making and problem solving process

Of research models reviewed, only the Big Six (Big6™) and McKenzie's Research Cycle provide the structure needed to address components of IL instruction for today's digital learners. These two models engage students in the research process, enabling them to identify what information is needed based upon a clear understanding of the initial research questions to be answered.

Contributing Factor: Standards or Lack of Applied Standards

There are many examples of educational standards that were developed by educators and librarians that form a promising foundation for student learning. Unfortunately, these standards have not bridged the connection between theories to direct application for instruction. Many of these standards form the framework for NC Information and Technology Essential Standards, which are not assessed as part of the state accountability (NCDPI, 2011). A major factor for this disconnect is the lack of

specifically embedded curriculum strategies drawn across all curriculum assessment areas.

The history of information literacy standards relates basic principles and expectations for student learning. Standards for Student Learning is an essential document developed as part of a national focus on IL (ALA, 1998). These standards appeared in the groundbreaking publication *Information Power: Building Partnerships for Learning* in 1998. The American Association of School Librarians updated these standards with the release of the *Standards for the 21st-Century Learner* in 2007 with an associated application guidebook, *Standards for the 21st-Century Learner in Action* (2009). Supporting IL at the college and university level, the Association of College and Research Libraries (ACRL) released *Information Literacy Competency Standards for Higher Education* in 2000. Also of merit is the *School Library Guidelines* from IFLA/UNESCO (2002), which provides a model for IL programs.

In 2007, North Carolina directly aligned the state's vision for literacy to the Partnership for 21st Century Learning Skills (see Appendix B, Figure 14). This framework specifically identified IL skills within the "Thinking and Learning Skills" umbrella. In the document *An Overview of 21st Century Skills in North Carolina*, the high school graduation project is seen as a defining element for IL assessment:

The North Carolina Graduation Project provides students the opportunity to demonstrate their ability to apply what they learn in a 21st century context. All North Carolina public school students currently in ninth grade will be required to produce a four-part assessment that showcases their 21st century content knowledge and skills. The project, to be completed in the final year of high

school, will include a paper, a reflective portfolio, a product, and a presentation. (NCDPI, 2007, p. 2)

In 2010, North Carolina adopted the Common Core State Standards Initiative (2012). This shift in educational standards also heralds a renewed focus for graduating students to demonstrate college and career readiness. The Common Core State Standards Initiative (2012) incorporates IL skills within the English Language Arts (ELA) and Writing standards. When Common Core standards are reviewed with an eye toward IL, it is difficult to find a direct reference, but several components are embedded. Within the Common Core State Standards Initiative (2012), three College and Career Readiness Anchor Standards (CCRA) speak directly to IL and the component of research. These standards include CCRA-W7, which recognizes the value of short or sustained research projects; CCRA-W8, which emphasizes the importance of acquiring and using information ethically; and CCRA-W9, which supports the process of evaluating evidence, drawing conclusions, and reflection (Eubanks, 2014, p. 27).

Current North Carolina standards lack specific guidance on the process for embedding IL standards across all curricular areas. With a limited focus on the English Language Arts curriculum, this limited focus also remains a weak alignment to specific IL strands. With a lack of opportunities to assess student skill in this area, recommending standards for IL serve a valid purpose but provide no avenue for policy and administrative consideration.

Contributing Factor: Access to Valid Assessment Tools

A lack of accepted standards around IL coupled with a lack of assessment in this area leads to instruction of IL as a low-stakes endeavor. Though not assessed in NC,

assessments for IL are available. Other states use the technology proficiency requirement of *No Child Left Behind* (NCLB) to include information literacy as a criterion for evaluation. New Jersey offered recommendations starting in 2006 that required all school districts to determine the level of computer and information literacy for all students (State of New Jersey Department of Education, 2014). This assessment is based upon a group of recommendations that include crosswalks, checklists, and rubrics. This research study used the *Tool for Real-time Assessment of Information Literacy Skills* (TRAILS) instrument as a method to assess student knowledge in this area. This assessment instrument has been aligned to the American Association of School Librarians (AASL) and Common Core State Standards. The instrument is available for educational use at no cost, is available online, is easy to administer, provides quick access to results, and has the potential for collaboration with the leadership for TRAILS at Kent State University to address future needs that may arise during the design stage of the implementation phase of the research project. This instrument was evaluated by Salem (2014) in a study that determined that questions included in the resource were valid and reliable based upon comparison to other reliable models and that other conditional variables (e.g., reading ability) had no impact on the reliability of the assessment instrument. Other IL assessment tools considered include iSkills Assessment from *Educational Testing Service* and NoodleTools, as well as creating a rubric based on product demonstration. Several instruments also exist to assess IL at the college entrance level. The most common of these tools include the *Standardized Assessment of Information Literacy Skills* (SAILS, also from Kent State University), the Information Literacy Test from James Madison

University, and the Research Readiness Self-Assessment from Central Michigan University (2016).

Prevalence of Information Literacy and Illiteracy

Scholarly literature specific to IL and illiteracy establishes that the challenges that college-bound students have conducting research and applying the information-seeking and problem-solving strategies are rooted in primary and secondary education. Evidence in the literature shows IL skills are lacking among high school students. Kovalik et al. (2013) found that among 289 high school seniors, 44.3% indicated that information located from an initial search was confusing, 63.2% indicated that they were seldom able to find sources of information needed in the library catalog, 56.3% indicated information needed was in an unexpected place, and 50.9% stated they found it difficult to find specific information on a research topic. Students (78%) also reported they rarely asked for assistance from the library professional in the school.

Similarly, Gross and Latham (2007) examined the IL skills of college freshmen. Researchers examined experiences and habits of college students and the challenge of conducting research. Utilizing the *Information Literacy Test* from James Madison University, the researchers sought to determine if secondary education preparation and academic success served as an indicator for IL. The results showed that 45.1% of participating students, nearly half, scored at a level identified as information illiterate (p. 343). Fifty-three percent were ranked as proficient and only 2% were ranked as advanced (p. 343). Researchers also found that a student's prior academic success did not have a significant impact toward competency of IL. This study illustrates that even star students in high school may be far below proficient when it comes to IL.

In a case study presented by Chu, Yeung, and Chu (2012), research was conducted at a school in Hong Kong to examine IL skills for 176 students aged 12. The study used the Hong Kong Information Literacy Framework, an identified information search process, and access to the TRAILS online assessment tools. Results indicated that students' skill level for IL was measured on average to be one to two grade levels below expectation.

Though research studies exist specific to IL skills as directly applied to secondary education and the experiences of first-year college students, additional insight and knowledge can be gained in this area with further examination. The purpose of this improvement project is to provide new and relevant knowledge toward this research area.

Instructional Models

In order for IL to be developed as a skill by students, educators must define the curriculum method used to teach these skills. Carey (1998) provides a clear approach to developing instruction for IL as related to solving problems, identifying strategies, providing instruction, and incorporating cognitive learning behaviors of students. Specifically, the author advocates for a constructivist approach to teaching IL which moves beyond basic library skills for finding information and toward information problem-solving. Loertscher and Woolls (1997) add to Carey's approach by advocating for the inclusion of IL as a co-curricular instructional process across all content areas. Their report examined popular instructional models and outlined the field of research and study that existed from the late 1980s to 1997 within and related to IL. Loertscher and Woolls (1997) contributed to the potential for this research study by providing strategies

for teaching problem-solving and critical thinking skills as a function of IL with curriculum content integration.

Addison and Meyers (2013) expand on potential best practices for IL instruction by proposing three perspectives: “Acquisition of information age skills, habits of mind, and engagement as a form of Social Practice” (p. 4). “Acquisition of information age skills” speaks directly to students’ ability to access knowledge “as a behavior in information environment, such as libraries, and the emphasis is on how users gain and employ such skills, as measured by assessment” (p. 5). This attribute is relevant when students need to demonstrate information-seeking skills to find informational text and resources. The “habits of mind” perspective addresses the realm of problem-solving for IL (p. 8). The authors cite the Big6™ Model from Eisenberg and Berkowitz (1990) as a model for information problem-solving. “Social practice” stems from a “set of practices involving tools and media that are deeply embedded in a particular context or activity” (p. 11). The authors state that the social practice of IL is connected to multiliteracies as defined by the New London Group (Cazden et al., 1996). All of these factors merit consideration during the design stage for this project, which is essential for creating an effective learning system with the goal of increasing students’ IL skills.

Educators and educational leaders must be willing to make IL a priority for student outcomes and seek instructional and curricular solutions to aid in the development of IL in secondary students. With standards in place, national resources available through the Common Core State Standards Initiative (2012), and the Partnership for 21st Century Skills, now is the time to implement tools to identify, track, and evaluate what instructional practices are enabling students to be college and career

ready. As with all content, a one-size-fits-all approach to IL will be insufficient; teachers must be given opportunities to differentiate instruction when working with IL skill development. Professional development may address this need, but access to mentors, team leaders, and online instructional experts will also support this process. Leadership development in the area of creating and developing best practices for today's learning environment specific to IL curriculum integration should also be encouraged.

Instructional resources identified to be included as part of the online intervention tools include S.O.S for Information Literacy and the online "EMPOWER: Information Literacy" practice activities from Wichita State University Libraries (2014). S.O.S. for Information Literacy is a web-based resource hosted by Syracuse University. This website provides access to teaching ideas, lesson plans, and instructional units in the area of IL. Content collected within these resources aligns with IL standards from AASL and is screened through a review process before becoming available for public use. The EMPOWER: Information Literacy website from Wichita State University Libraries is an online tool used during the design stage of the project for including resources for instructional content and practice examples. With the ability to customize units, tools, and content, application of this online tool has potential to increase relevant student practice and learning that will occur as part of the intervention for this project.

Conclusion

The primary function of this literature review was to provide insight into factors that contribute to inhibiting students' development of skills for information seeking, utilization, dissemination, and communication; to review the scholarly literature examining IL and illiteracy; and to explore instructional strategies that can aid in

increasing students' information skill level. The literature provides a strong background for the value of information literacy related to standards, but little is known about its impact on secondary students in the area of assessment. There is also little evidence showing the benefit of instruction toward the development of IL skills. The literature supports the use of a research model for developing a curricular approach to IL.

If students can master skills needed to apply information learned and produce evidence of this learning, student achievement will rise to a new level. Ideally, students will demonstrate their knowledge through investigation, collaboration, production, and ultimately engage with a teacher or an online coach in a process of communication extending beyond a linear pathway of education. The challenge to this development will be if students can leverage their skills toward IL and the research task as applied to the production of research.

CHAPTER THREE: METHODS AND PROCEDURES

Methods

This study evaluated three approaches to aid in the development of IL among high school students and investigated perceptions of IL among stakeholders. Students were assigned to three course levels based on prior academic achievement before the study commenced. These course level designations were *Standard*, *Honors*, and *Advanced Placement*. All three course designations were used in establishing baseline data; only Honors and Standard courses received instructional interventions. The assessment tool used for this investigation was the TRAILS online resource. After assessing baseline levels of IL, three interventions were used to improve the content knowledge of participants. These interventions included appraisal of information literacy skills (baseline assessment data), a self-guided, web-based IL course, and direct instruction. These activities and tools provided instruction and guidance for the development of information literacy skills among 11th graders.

Context

The development of IL was investigated at four Charlotte-Mecklenburg School District locations: Myers Park HS, Northwest School of the Arts HS, Phillip O. Berry Academy HS, and South Mecklenburg HS. These schools represent diverse student subgroups as designated by NCDPI as part of the state's Annual Measurable Objectives. Student subgroups are reported by "gender, ethnicity, language proficiency, disability, and economic conditions" (NCDPI, 2015d). For this study, the primary site was South Mecklenburg High School (SMHS), which included four of the ten 11th-grade English classes involved in the study. There were two Standard and two Honors classes involved

from SMHS. Named as one of the best high schools in North Carolina, SMHS has a diverse overall student population, with more than 657 11th-grade students.

Three additional high schools were added to the study by request of the CMS Office of Accountability. Myers Park High School (MPHS) had three English classes participate, two Honors and one Advanced Placement. MPHS also has a diverse student population with more than 666 11th-grade students. MPHS offers students the option to participate in the International Baccalaureate program, which is seen as an asset for college admission. Northwest School of the Arts High School (NWSOA) had one Standard English class participate. NWSOA is the district's only dedicated fine arts school accepting students through audition and a recommendation process. The smallest school participating in the study, NWSOA has a balance of students represented among the population, with 148 11th-grade students. As the last school participating in the study, Phillip O. Berry Academy of Technology High School (POB) represents the district's only lottery-based high school magnet program dedicated to technology. One AP English class from POB was involved in the study. POB has a balanced representation of students in most categorical areas as compared to other school populations, with 361 11th-grade students represented. Table 1 presents specific demographic data for 11th-graders at all four participating CMS high schools grouped by gender, ethnicity, and academic status.

Table 1

CMS Demographic Data for Participating High Schools (CMS Accountability, 2015)

Demographic Characteristic	High School 11th-grade Enrollment			
	MPHS (N = 666)	NWSOA (N = 148)	POBHS (N = 361)	SMHS (N = 657)
Gender				
Female	50.9%	73.6%	50.1%	53%
Male	49.1%	26.4%	49.9%	47%
Ethnicity				
Asian	4.4%	2.7%	4.7%	3.8%
African-American	23.3%	39.2%	75.6%	30.4%
Hispanic	8.6%	4.7%	15.8%	23.4%
Multi-Racial	2.1%	4.1%	1.4%	4.0%
Native American	0.3%	0.7%	0.6%	0.5%
White	61.4%	48.6%	1.9%	37.9%
Academic Status				
Academically Gifted	26.1%	20.3%	11.1%	15.2%
Exceptional Children	6.9%	3.4%	3.6%	6.7%
Limited English Proficiency	3.2%	0.0%	1.1%	3.0%

Establishing a Baseline

While most Improvement Science projects have a clear baseline, part of this project is establishing the baseline of IL knowledge across participating schools in the district and across different but similar high schools. Improvement Science seeks not only to understand what works, how it works, and in what context it works, but also to implement sustainable improvements. Because of this, stakeholder engagement for this project is different from the approach that would typically be used for a traditional research study. The procedure for this improvement initiative focused on engaging multiple stakeholders, illustrated by creation of a design and implementation team. The design team served as a knowledge base for collecting ideas, content, and strategies incorporated into intervention resources and assessment tools. The implementation team

ensured successful navigation of the project at the local site, which included access to materials, facilities, equipment, teachers, students, parents, and any other related resource.

One of the primary stakeholder constituencies engaged in this improvement project was the design team, which reviewed the improvement project plan, made recommendations for identifying sample student populations in which to conduct assessment and intervention activities, and provided access to internal procedures and practices relevant to the school. The design team also served as experts for identifying content and activities included in the online learning activities delivered during the implementation stage. Two 11th-grade teachers (Mr. Chris Folk, AP English Teacher, and Ms. Rhonda Small, Standard and Honor English Teacher from SMHS) and the SLMS (Mariam Lackey) served in the initial collaborative role for both design and implementation. Scott Smith later joined the SMHS Implementation Team as a collaborative teacher with a Standard English class.

At each additional high school location, one 11th-grade English teacher and a school contact were identified to support the project (MPHS with lead English Teacher, Laura Mathers, and Media Specialist, Robin Williams; NWSOA with lead English Teacher, Sarah Strahan, and Media Specialist, Elizabeth Slater; and POB with Lead English Teacher, Tiemi Halverson, and Media Specialist, Rosalind Moore). Members of the CMS Technology Department also supported the project in a consultant capacity as well as the district curriculum specialist for media. CMS Technology Department liaison, Jake Standish (Technology Project Manager), provided recommendations and training for online intervention tools. The district media specialist, Janet Jones, reviewed the

curriculum plan and provided recommendations for scope and clarity. The district media and technology specialists supported the process as team members by serving in an advisory role at a higher level, reflecting on the impact of IL across the curriculum and the district.

Similar to the design team, the improvement project also employed an implementation team, which served as key partners in the research study process. In this case, the identified English teachers provided class time for collaborative instruction as well as for pre- and post-assessments. The school library media specialist assisted as a partner to make recommendations for conducting assessments and locating additional resources available within the school. The implementation team focused on resources at the school site, whereas the design team included members of the larger school district community. The implementation team also included school leadership (principal or designee) who supported the overall project.

Improvement Project Assessment Tools

The *Tool for Real-time Assessment of Information Literacy Skills*, commonly referred to as TRAILS, was selected as the assessment instrument because it was developed by a reputable agency (Kent State University) and is geared toward assessment in the area of IL specifically within a K-12 setting. The assessment tool was first released in 2004 for use by educators and has been administered to over “817,000 students in over 44,500 sessions; more than 15,500 registered users” from 2004 to 2012 (Kent State University Libraries, 2014, p. 1). This assessment instrument also provided specific data points based on the five curriculum strands (see Table 2).

Table 2

Information Literacy Standards, Strands, and Research Model Comparison

<i>Standards for 21st Century Learner from the American Association of School Librarians</i>	<i>TRAILS Information Literacy Strands</i>	<i>Big Six Skills (Big6™) Research Model</i>
<ul style="list-style-type: none"> ⦿ Standard 1: Inquire, think critically, and gain knowledge. ⦿ Standard 2: Draw conclusions, make informed decisions, apply knowledge to new situations, and create new knowledge. ⦿ Standard 3: Share knowledge and participate ethically and productively as members of our democratic society. ⦿ Standard 4: Pursue personal and aesthetic growth. 	<ul style="list-style-type: none"> Strand 1: Developing a topic ⦿⦿ Strand 2: Locating valid source information ⦿ Strand 3: Utilizing successful search strategies ⦿ Strand 4: Strategies for selecting the best sources for information ⦿ Strand 5: Responsible, ethical, and legal use of information ⦿ 	<ul style="list-style-type: none"> Step 1: Task Definition ⦿⦿ Step 2: Information Seeking strategies ⦿ Step 3: Location and Access ⦿ Step 4: Use of Information ⦿ Step 5: Synthesis ⦿⦿ Step 6: Evaluation ⦿⦿

Improvement Project Intervention—Instructional Research Model

For the purpose of this research project, the Big Six Skills process model (Eisenberg & Berkowitz, 1990) was utilized. Selection of this model was primarily due to the CMS adoption of Big6™ as a research instructional method as part of the district’s 2014 Strategic Plan (Charlotte-Mecklenburg Schools, 2009). Unfortunately, this research model has been weakly implemented and inconsistently applied across schools (as documented by the original research proposal focus group for this project). The Big6™ Skills by Eisenberg and Berkowitz (1990) is described as a model for information problem-solving. Big6™ uses six steps that seek to allow users to enter the model at any

stage and enable users to find an answer or solution relevant to the information needed. The steps include task definition, information-seeking strategies, location and access, use of information, synthesis, and evaluation. I have used this model with more than 2,000 students and have found it to be an effective means of teaching research strategies that led to students successfully and ethically completing research assignments. The Big6™ research model is also relevant to this study because it connects successfully to the basic library skills needed by students while connecting to the information-seeking, problem-solving, and critical thinking attributes as defined by educational standards (see Table 1 for additional comparisons to standards found in the Methods sections).

The primary reason for using a research model is to provide an instructional strategy that creates a path for students to successfully secure and use the information needed; however, with overlapping steps, confusing vernacular terms, and use by different grade levels, there is not a model that can easily work in all settings. The strategy identified in the Big6™ research model is relevant when connected to IL and the specific standards, which speaks directly to seeking, accessing, using, evaluating, and analyzing information specific to learning. Based on the information collected for this project, there appears to be a direct and relevant relationship between implementing and teaching a research model and the potential for students to develop IL skills.

Graduation Project

One catalyst for creating the intervention tool used in this project was that the state recommended and CMS required a high school graduation research project. In North Carolina, some school districts have adopted an accountability model that includes a graduation requirement for students that incorporates research, writing, and presentation

skills as a structured process that occurs during the junior and senior years of high school. For CMS, students complete the graduation project as a graded portion of their English course work. Sometimes referred to as the Senior Exit Project, the intervention resources created for this project were designed to help students successfully complete their graduation project and use 21st century skills. The intervention tool for this project addresses the skills students need as users of IL.

The intervention design team was challenged to help create a tool that:

1. was web-based and accessible within a learning management system,
2. could guide students to completion of tasks in a variety of domains
3. offered practice assessments, and
4. provided feedback with supporting resource materials.

An additional component required for this intervention tool was a clear navigation system that enabled students to see all the lessons, resources, and activities in one location. All activities, practices, and assessments were required to be aligned with the *Standards for 21st-Century Learner* from the American Association of School Librarians.

Improvement Project Intervention—Creating Online Resources

Two instructional resources were created for this project: an online instructional unit delivered via a learning management system and a dedicated IL website. On March 27, 2015, NCDPI announced that they had entered into a state-wide contract with Instructure for their Canvas LMS system (NCDPI, 2015c). As this information became available across the state, I consulted with Jake Standish, the district technology manager, about the status of this system and was advised that CMS was fully vested to utilize this resource. Part of the rollout plan for Canvas was a series of trainings that would be

available during the summer of 2015. With the district committed to using Canvas LMS and an examination of functions based upon similar products (Blackboard, Google Classroom, and Edmodo), I consulted with the design team and updated the project plan to include adapting the IL instructional unit to this interface.

In creating the instructional unit in Canvas, I focused on the four curriculum standards represented in the IL content area (as defined by the *Standards for 21st-Century Learner* from the American Association of School Librarians). I also assembled learning activities into online modules that could be accessed by the student participants in the research study. These specific learning activities aligned to the five IL strands identified within the TRAILS online assessment that also incorporates the Common Core State Standards Initiative (2012) and the Big Six Skills Research Model (Eisenberg & Berkowitz, 1990; see Table 1 for standards, strands, and research model comparison). Content incorporated from these online tools came from existing IL sources and direct instruction content created by this researcher. The framework for instructional modules also became the base of the resources listed in the dedicated online IL website.

The design team reviewed the instructional unit, consisting of six modules. The design of this IL unit provided opportunities for assessment after instruction based on completing the project within a 90-day period. As lessons and activities to be included in each of the modules were developed, members of the design team reviewed and provided feedback before I finalized them to the online unit. The design team provided expertise in the identification, application, and quality of content used with other online resources as part of the direct instruction intervention. I worked with this team by sharing documents and online resources via bi-weekly email and telephone conversations when appropriate.

Feedback and changes were confirmed by the team with a final reporting on August 30, 2016, which confirmed resources available for the implementation phase of the study.

In collaboration with the English teachers, an instructional unit timeline that showed the progression for the instructional component of the project after the pre-test assessment was created. This timeline specifically outlines the instruction and practice that occurred with face-to-face instruction during the first 40 minutes of class over a two-to three-week period. The structure for the lessons supported introducing an IL strand during day one and a practice section for the same strand for day two. This process repeated until all five strands and the research model were reviewed with students and a practice had been completed. The timeframe for assembling the design team, implementation team, creating intervention resources, and online tools occurred from May 2015 through August 2015.

Improvement Project Timeframe

The principles of Improvement Science were foundational throughout this improvement project. With the expectation that decisions, strategies, or resources that were developed for this project would have positive outcomes, establishing a research approach that would address the identified problem was critical. The project timeline enabled me to manage each task identified during the planning stage and make adjustments as needed when issues occurred as well as document adjustments that were made along the way.

After the project had been approved by the disquisition committee, I facilitated the formation of the design and implementation team at the initial school-based site. The goal was to have the improvement project kickoff during the fall semester of the school

year before students began to develop ideas and conduct research for their high school senior year graduation project. The first activity for this project was the development of a “PDSA Cycle.” PDSA is an acronym for “Plan, Do, Study, and Act” that establishes a strategy for navigating a plan to address issues that are problem-oriented and merit study. The PDSA approach was introduced by Deming in 1960 and has become a cornerstone principle for Improvement Science research (The Deming Institute, 2014). A benefit that came from using the PDSA during this first cycle of the study was the establishment of team expectations; addressing questions, issues, or concerns; and documenting potential issues or concerns as well as establishing structure to complete the study within a 90-day time period.

Project Challenges

One of the first identified challenges for the project was recruiting teachers to participate who represented diverse English course designations. I had several teachers offer to participate from AP or Honors with only a few willing to participate from the Standard level courses. A second challenge that occurred later in the project after the CMS IRB approval was the navigation and overlap of activities across four locations. There were several occasions where I needed to be at different schools on the same day. I had to coordinate driving across the city to arrive at the scheduled time for the intervention activities, and then manage to return to my home school to complete my workday. An additional challenge was presented by the collaborative teachers with a request that all students receive the intervention instruction and related activities. Because the IL instruction was already included in the English teachers’ curriculum plan, there was a concern about excluding students and how students would be managed if not

participating during the class time. After additional discussion, an agreement was made that all students could participate in the study for the identified classes and I would provide the IL instruction and conduct the pre- and post-test assessments as well as provide results back to students, but only include students who returned consent forms within the study results.

Project Calendar

During the planning phase, I worked with the collaborating teachers to understand how research skills were taught as part of the standard course of study and to determine the best methods, resources, timetable, and scaffolding to use as the study moved forward (see Table 3).

Table 3

Initial CMS IL Intervention Project Calendar

Month	Activity	Notes
February 2015	<ul style="list-style-type: none"> • Initial Design Team Contacts and Participation Agreements • Complete WCU IRB Process 	SMHS and District Contacts
March 2015	<ul style="list-style-type: none"> • Initial Implementation Team Contacts 	SMHS and District Contacts
April 2015	<ul style="list-style-type: none"> • Evaluate LMS Tools 	NC and CMS select Canvas LMS
May 2015	<ul style="list-style-type: none"> • Begin CMS IRB Process • Begin training on Canvas LMS Tools 	District Contact
June 2015 – August 2015	<ul style="list-style-type: none"> • Finalize CMS IRB Process • Complete training on Canvas LMS Tools • Finalize only unit of instruction and web resources 	District Contacts
September 2015	<ul style="list-style-type: none"> • Project Kick-off meeting 	SMHS
October 2015	<ul style="list-style-type: none"> • Assessment Test TRAILS • Begin Intervention 	SMHS
November 2015	<ul style="list-style-type: none"> • Complete Intervention 	SMHS
December 2015	<ul style="list-style-type: none"> • Analyze Data 	All Intervention Schools

This planning stage resulted in the creation of a detailed plan with potential dates that were used to conduct the assessments at each high school location using the TRAILS online tools. This initial TRAILS assessment served as a pre-test for the selected student population.

Pre-intervention Activities

Starting in March 2015, I began working with the SMHS implementation team to create a formal schedule for the delivery of the IL assessment and interventions. An initial timeframe was selected with a plan to conduct the pre-assessment in TRAILS on September 15, 2016. One week was set aside for me to evaluate the test results and create reports that contained student results. Direct instruction using the Canvas LMS system was scheduled to take place from October 1st through October 15th with the post-assessment taking place on October 16th. After the implementation plan was approved by the team, I collected stakeholder agreement forms and stored them with the IRB documentation in the designated project location.

After a review of the available options for providing online instruction was started, the design team learned that a new program called Canvas would become available from the North Carolina Department of Public Instruction. Based upon the state and school districts' support for the new learning management system (LMS) Canvas, the available functions for integrating grades and alignment to our existing student management system (PowerSchools), I developed a recommendation for using this resource for direct instruction, which was accepted by the members of the design team.

From May through August 2015, I completed the CMS IRB process and was instructed to include additional schools in the study. Therefore, I was required to recruit

potential collaborative teachers with whom I could work with that represented similar diverse student populations. Once the three additional schools were on board, I created a new timetable that enabled me to complete the study within a 90-day period. Summer months provided me an opportunity to attend training on the new Canvas LMS system, create the instructional model with activities, and create a TRAILS online account with scheduled assessments for each of the participating school sites and intervention groups.

The Canvas IL instruction unit was titled CMSINFOLIT and consisted of 36 wiki-style webpages (see Appendix D, Figures 16–52). The progression of the modules was scaffolded in a way that enabled students to follow along with instruction during the face-to-face meetings and practice strategies independently. The initial design was 12 modules, with modules paired to match each of the standards and strands encompassed in this project. The initial timeframe for instruction was slated for 400 minutes (ten sessions at 40 minutes each). This was outside of the time needed to conduct the pre- and post-test assessment. After collecting feedback from the English teachers participating with Standard students that they could only provide half the time requested, I restructured the modules from 12 to six units (see Table 4). In the previous version, the IL instructional unit reflected two paired modules that would allow for instruction in the first module and practice in the second module. With the revised design, the practice was included in each dedicated instructional module (see Appendix E for course content outline and Appendix F for course reference list).

Table 4

Overview of Modules

Title	Standards Covered	Content	Activities
Module 1:	Standard 1 Strand 1 Big6™ Step 1	Introduction Task Definition Big 6	Assignment (Answer three questions about IL)
Module 2:	Standard 1 Strand 2 Big6™ Step 2	Inquiry Selecting and refining a topic	Assignment (Refine topic from broad to narrow), Quiz
Module 3:	Standard 2 Strand 2 and 4 Big6™ Step 3	Locating informational sources	Assignment (Identify sources and how to access), Quiz
Module 4:	Standard 2 Strand 3 Big6™ Step 4	Collecting and evaluating information	Assignment (Search database and report results), Quiz
Module 5:	Standard 3 Strand 5 Step 5	Synthesis Copyright Plagiarism	Assignment (Discussion on citation tools), Quiz
Module 6:	Standard 3 and 4 Strand 5 Step 6	Evaluate Work Graduation Project	Assignment (Define copyright and its impact), Quiz

As an enhancement to the instructional unit, I used an online comic strip resource from MakeBeliefsComix.com to create a graphic illustration introducing students about the functioning of the online LMS “Using Informational Resources” module, and as part of the review section for the last module (see Figure 2).

At the start of the 2016–2017 school year, I contacted all members of the design team to have them preview the new Canvas instructional unit to collect feedback and make changes. After this design review process was completed, I contacted the implementation team at SMHS to schedule the intervention plan. Before conducting the pre-assessment, I gave an orientation of the project to all students, and the first TRAILS

pre-assessment took place on September 29th at SMHS in the school media center computer area for each class. Including all the other intervention classes at other school sites, the TRAILS pre-assessment was delivered to 220 high school juniors (eight English classes). Pre-test assessment data established a baseline report for IL skill level for each student participating in the improvement project.

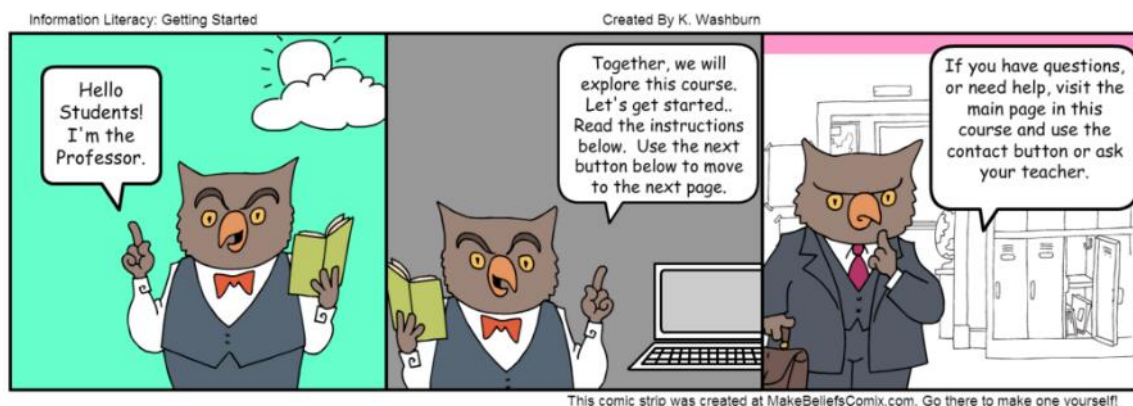


Figure 2. Comic strip created using MakeBeliefsComix.com.

Intervention Activities

Before working with a group of students for the direct instruction intervention, I created the website-only intervention resource. This website was developed using the free hosting and design resources from Weebly. Once completed, the website was shared with students as part of their pre-assessment score report details for this select group of students. The final product was named CMSINFOLIT and is available online at <http://www.cmsinfolit.weebly.com>.

As pre-assessments were completed and score reports prepared for each class, I scheduled follow-up reviews with participating classes to review the results of the assessment and provide individual score documents to each student (see Appendix C, Figure 14 for a sample report). AP students were only provided their scores, whereas

other groups were provided scores and intervention. AP students participated in the initial assessment solely to determine baseline data. Interventions were assigned randomly to class groups, with the first assessed class to have an intervention for score reports, the second class to have access to an IL website that I had created, and the third class group would have access to direct instruction support with LMS. Additional classes added to the study were paired by class type to intervention (this is why there are two Honors groups at MPHS and SMHS). All student participants were provided their individual score reports from the pre-assessment. Classes assigned to the website intervention were directed to the CMSINFOLIT website and encouraged to use this online resource in conjunction with their score report to improve their IL skills. The direct instruction class group was also provided their individual score reports, as well as a link to self-enroll into the online Canvas LMS course. This unit was built and listed in the CMS Canvas system as a course labeled CMSINFOLIT. All intervention class groups were advised that a follow-up assessment would take place and that their English teacher would announce the post-test assessment date.

For the direct instruction group, a new challenge presented itself in the form of needing to provide instruction to students on how to gain access to the new state single sign-on system that served as a gateway to Canvas LMS. Introduced to instructional staff during the summer of 2015, NCEdCloud IAM Service (NCDPI, 2015b) provides access to many of the programs, tools, and online resources available as part of the engagement, instruction, and support for students, staff, and parents. By instructing students on the process of creating their account in the NCEdCloud IAM Service and demonstrating how to navigate the new system, I was able to have all participating students successfully log

on and gain access to the first module in the IL unit in Canvas. The direct instruction students were then provided an overview of the course, expectations and goals, a list of activities, resources, and contact information to submit questions.

The first group of students to receive the direct instruction was the Honors level, which took place over 10 days with an introduction to content on the first day and application of content on the following day; this cycle repeated until all modules within the instructional unit were completed. The total amount of time for direct instruction for the Honors intervention group was 400 minutes. The instructional method used was to present the information related to the standard, strand, or Big6™ process step that was being reviewed; engage students through discussion; provide clarifications; and model how to access additional information and resources on the topic. The practice sessions were designed to use resources available within Canvas to engage students in discussion, submit assignments, or complete practice quizzes. At the end of the modules, students were given a review and summary practice quiz that they could take repeatedly until answering all questions correctly to progress to the next module. Students were also provided a “Student Trained Researcher CMSINFOLIT” badge that could be displayed on their profile page within the Canvas system. This badge tool is a standard feature and available to any student who either participates through direct instruction or self-paced enrollment in the online modules. This feature was added as a progress monitoring component because, at the end of the study, all participating students were provided access to the course and given directions for using the system to improve IL as a self-paced learner.

The second group of students participating in the direct instruction was the Standard level students. Because I was already aware that I would have a significant reduction in the time allocated to work with these students, the instructional method that I used with the previous group was modified to fit the allocated 200 minutes of time. This change also meant that I could only work with students for five days as part of the instructional component of the study. This change resulted in combining the instructional portion of the IL unit with the practice session within each content day. Though I was able to successfully accomplish both tasks in the time allotted, there were instances where I needed to encourage students to use out of class time to complete practice activities.

Post-test Assessment

A post-test assessment was conducted at the end of the librarian-led training for the identified face-to-face instruction class. This post-test assessment and perception survey were given to all participants. The goal of the perception survey was to collect data on students' understanding, practice, and appreciation for IL. With an eye toward continuous improvement, reflective interviews were conducted at the culmination of each collaborative instructional session. The purpose was to ascertain from instructional partners what worked well, what could be improved, and what is different from the usual methods of teaching research. While collaborative English teachers are an important part of the design and implementation teams, this research design recognized their feedback and real-time evaluation of the intervention as an invaluable data source for understanding how to create sustainable improvements.

CHAPTER FOUR: RESULTS

Introduction

The goals of this study were to identify the baseline skill level in IL for a diverse group of HS students within CMS, apply and evaluate the impact of three types of interventions, and gain insight into students' and key stakeholders' perceptions of this topic. Data collected from this study attempt to illustrate students' IL skill level, before and after interventions, as well as capture their perceptions of the importance of IL. Understanding what circumstances contribute to student growth in IL skill was the primary objective of this inquiry. After comparing pre- and post-test results, direct instruction was shown to have a significant positive impact on students' acquisition of IL skills when compared with other conditions in the study.

The total sample consisted of 222 11th-grade students. From this population, 161 returned the parental consent form. From this remaining group of students, 135 were classified as "participants" and 26 were identified as "incomplete." For the purpose of this study, incompleters were determined as students who did not take either the pre- or post-test. Outliers were identified during preliminary data cleaning and removed from analysis. A student was considered an outlier (with unreliable data) if he or she received a grade of zero on 2 or more sub-strands of the post-test assessment (indicating no attempt was made in more than one section of the assessment). Figure 3 shows the breakdown of participants for this study arranged by school name.

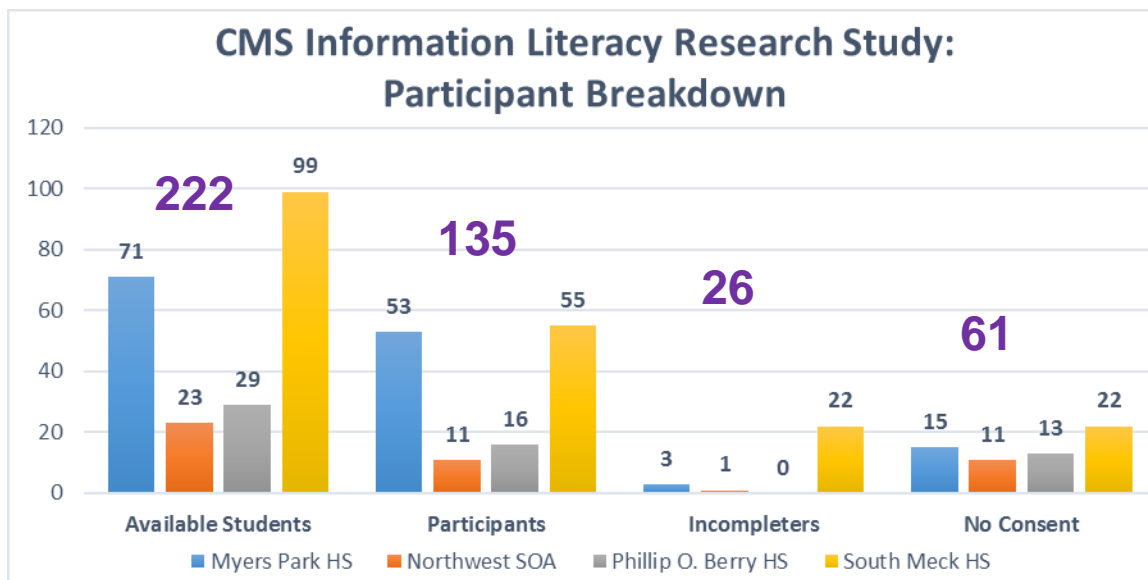


Figure 3. CMS Information Literacy Study participant information.

Results

Baseline of Students' Ability to Seek, Use, Disseminate, and Communicate

Information

From the pre-test conducted at the four school locations included in this study, descriptive statistics were compiled on the pre-assessment data to establish a baseline of IL in the sample. From the data presented in Figure 4 for the first strand on the assessment related to how to develop a topic, the Advanced Placement (AP) students scored higher than all other categories of students with a mean score of 55.44% (across all groups), followed by Standards with a mean score of 44.92% (across all groups), and Honors with a mean score of 43.32% (across all groups). Though the gap between Standards and Honors students in this strand is small, it is still significant given that Honors students have a higher academic performance record. In a comparison of schools for the TRAILS pre-assessment test for the second strand related to identifying sources, Figure 5 shows AP students scored higher than all other categories of students with a

mean score of 66.68% (across all groups), followed by Honors with a mean score of 46.91% (across all groups), and Standard students with a mean score of 39.33% (across all groups).

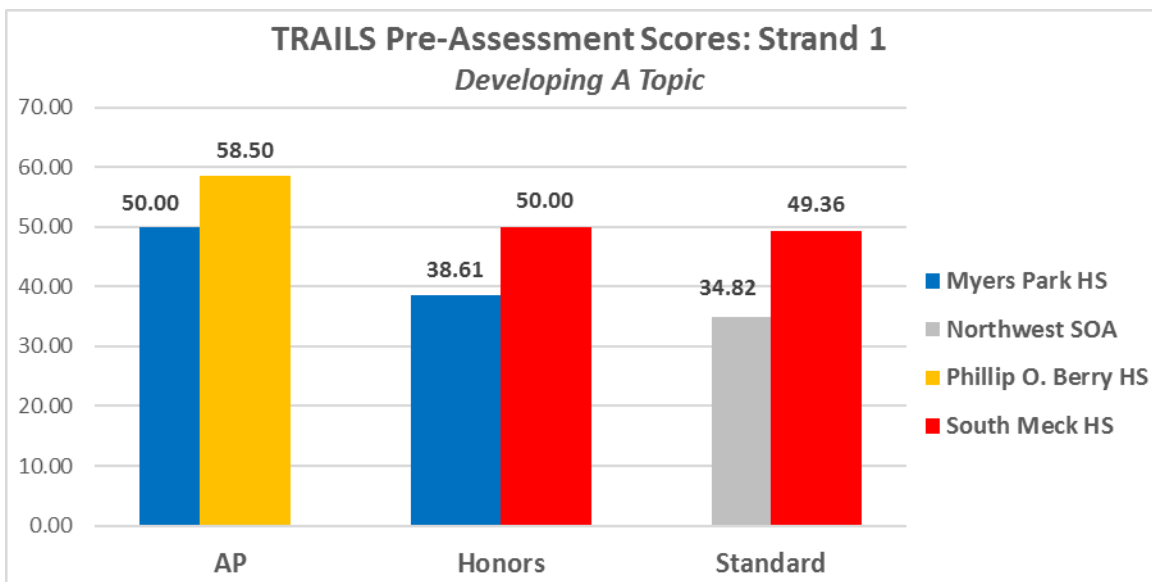


Figure 4. TRAILS baseline data comparison for strand 1 by schools.

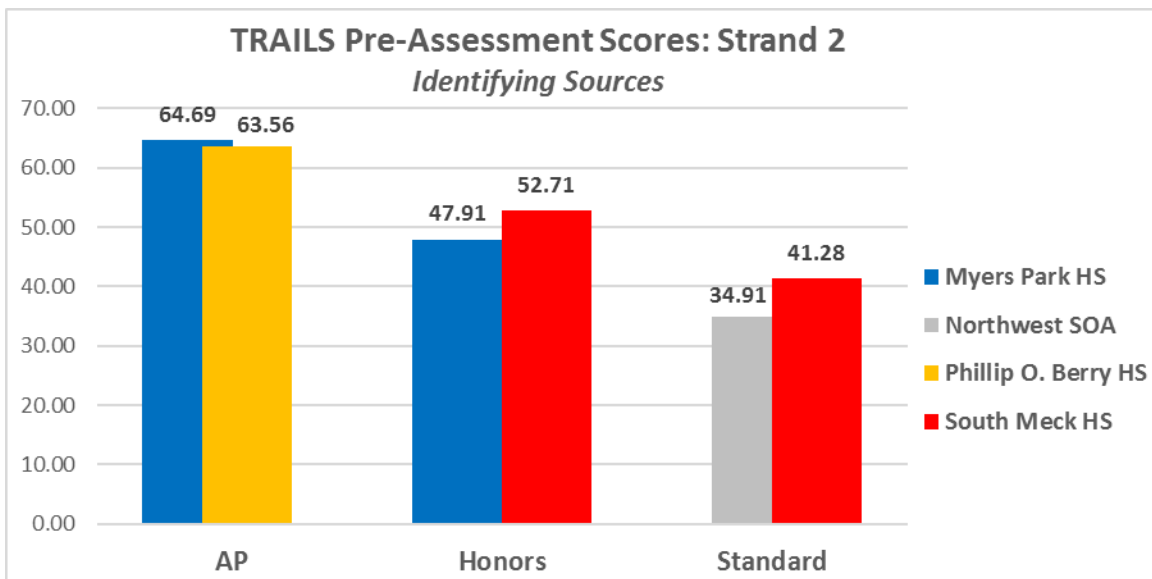


Figure 5. TRAILS baseline data comparison for strand 2 by schools.

Strand three represents the skill that students use to conduct search strategies, which was the lowest total performance area of all topics. Figure 6 shows that AP students scored higher than all other categories of students with a mean score of 51.36% (across all groups), followed by Honors with a mean score of 48.68% (across all groups), and Standard students with a mean score of 44.89% (across all groups).

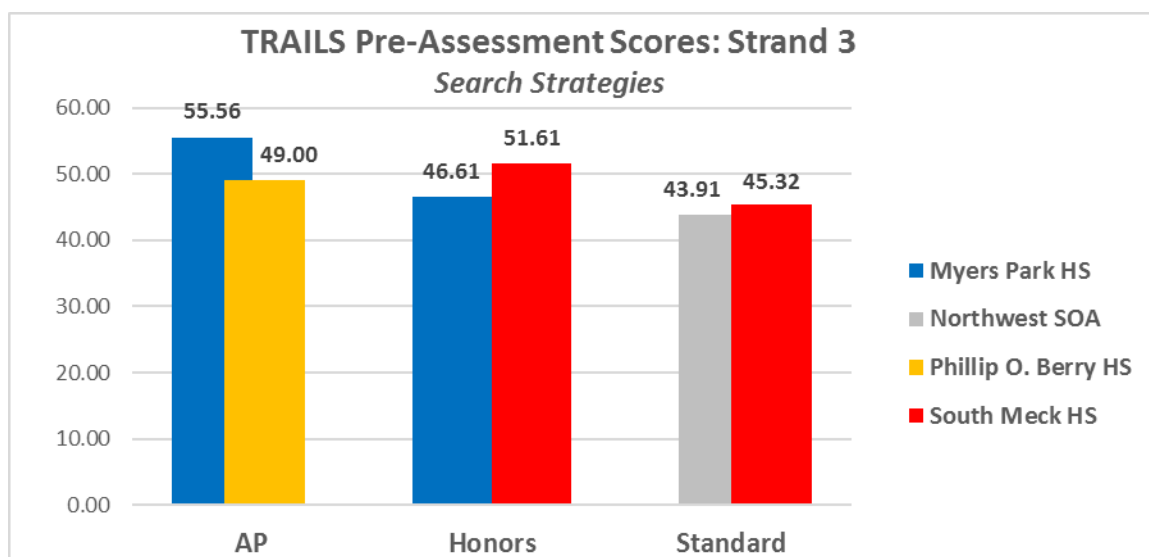


Figure 6. TRAILS baseline data comparison for strand 3 by schools.

The fourth strand assessed focused on how students evaluated resources. Figure 7 shows AP students scored higher than all other categories of students with a mean score of 67.28% (across all groups), which was the highest overall average score of all strands, followed by Honors with a mean score of 51.57% (across all groups), and Standard students with a mean score of 39.81% (across all groups).

The ability to use information responsibly and ethically was the fifth strand skill evaluated in the assessment. Figure 8 shows that AP students scored higher than all other categories of students with a mean score of 67.40% (across all groups), followed by

Honors with a mean score of 57.79% (across all groups), and Standard students with a mean score of 55.14% (across all groups).

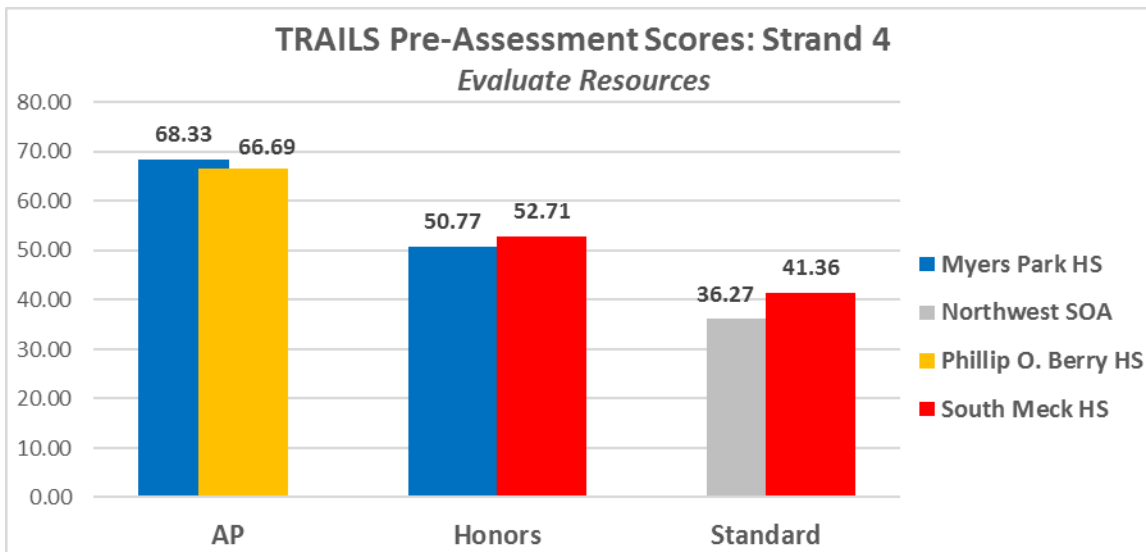


Figure 7. TRAILS baseline data comparison for strand 4 by schools.

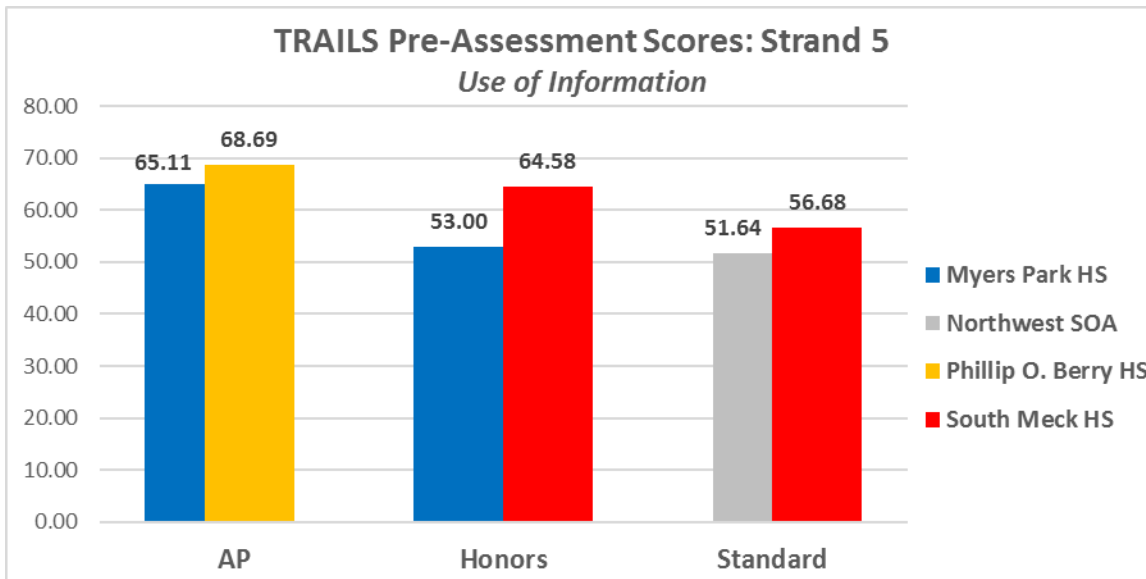


Figure 8. TRAILS baseline data comparison for strand 5 by schools.

In comparison of the total scores across all schools and groups, AP students performed higher with a mean average of 61.68%, with Honors at 49.60%, and Standard

at 44.78% (see Figure 9). A review of the data based on IL strands shows most students found the process of “Developing a Topic” the most challenging, with an exception for the Standard class of students who struggled significantly with the process for “Identify Resources.” This exception may be due in part to the general challenges that Standard students have academically with the process for building on learning methods that require a scaffolding approach. In this case, having mastered the process for “Developing a Topic” required exposure to a list of ideas or the opportunity to develop a list of ideas for a topic, whereas the process for identifying sources would occur from developing a familiarity with sources, as well as navigating to the potential locations where sources exist. The second area with which students struggled is the process for selecting “Search Strategies.” With the total average score across the assessment within a five-point margin between the Standard and Honors students, this justifies a direct comparison of these two groups of students specific to the applied interventions.

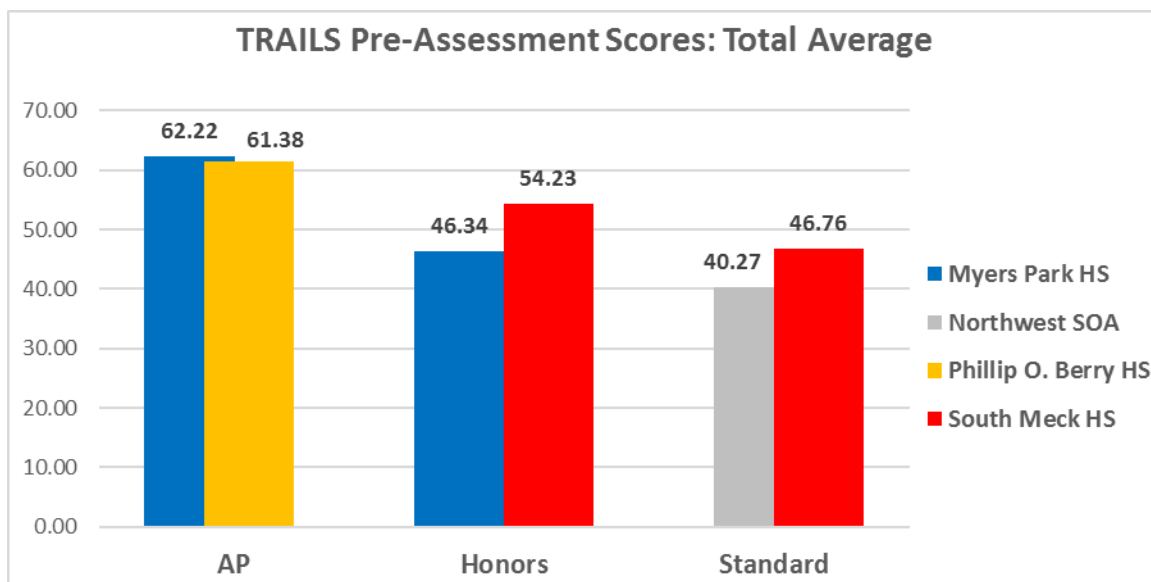


Figure 9. TRAILS baseline data comparison total average by schools.

Analysis of Instructional Strategies (Including Self-Paced Resources, Collaborative Direct Instruction, and Assessments)

The intervention applied during this study included the process for communicating score results, providing access to online website resources, and direct instruction utilizing a six-module online Canvas LMS course. In a comparison of the pre- and post-test data from the TRAILS online assessment used in this study, only the Standards and Honors level course were used as part of the intervention groups. The Standard students received 200 minutes of instructional time compared to Honors students, who received 400 minutes of instructional time.

To understand the impact of the interventions used during this study, I measured the pre- and post-test assessments within each TRAILS strand across the class type, intervention type, instructional time allocated, and the total gain. I completed a one-way ANOVA (analysis of variance) on gain scores for the overall gain as well as gains by domain (Warner, 2013, pp. 960–973). The *gain* score is the difference between post-test and pre-test raw scores. There were significant differences between groups on Total Gains ($F(3, 105)=5.411, p=.002$), and the specific IL skill areas for Strand 1: Topic Development ($F(3, 105)=4.898, p=.003$), Strand 3: Utilizing Search Strategies ($F(3, 105)=4.707, p=.004$), and Strand 5: Responsibility and Ethics ($F(3, 105)=5.003, p=.003$). The data show there was no significant difference among intervention groups when comparing scores against the skill areas for Identifying and Evaluating Sources. Post hoc tests show the differences between the groups often lie between 400 minutes of instruction and self-paced website instruction or scores only. I used Tukey's statistic test (Warner, 2013) as part of a post hoc review to compare multiple elements within

interventions (scores, website, 200 minutes of instruction, and 400 minutes of instruction) (p. 247). Figure 10 provides an illustration of these comparisons.

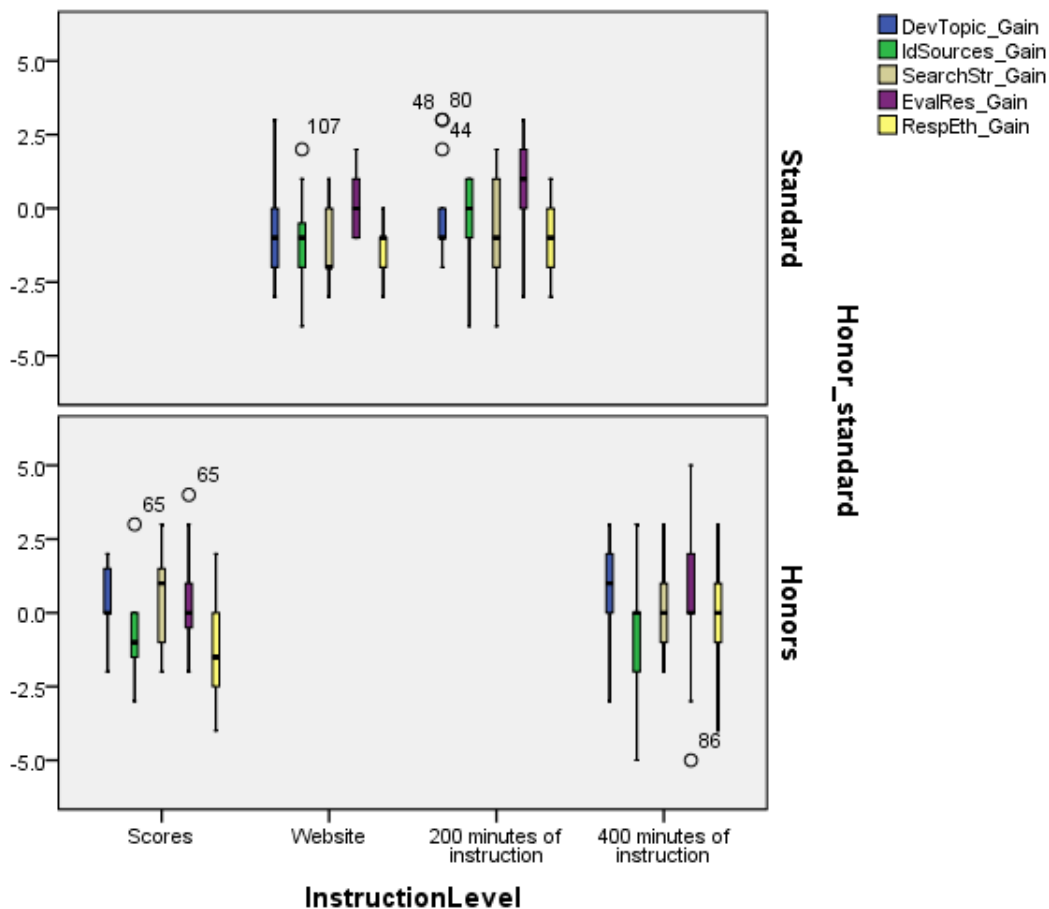


Figure 10. Results comparison by instruction level for honors and standards students.

Total gain for all strands as compared against different intervention groups.

There was a statistically significant difference between groups as determined by one-way ANOVA ($F(3,105) = 5.411, p=.002$). A Tukey post hoc test revealed that students who participated in the website intervention had significantly lower gains on the TRAILS assessment ($-4.27 \pm 2.3, p = .001$) as compared to the 400 minutes of the instruction group ($.40 \pm 4.6$).

“Developing a Topic” strands as compared against different intervention groups. There was a statistically significant difference between groups in gains in Topic Development as well as determined by one-way ANOVA ($F(3,105) = 4.898, p=.003$). A Tukey post hoc test revealed that students who participated in the website intervention had less gains on the TRAILS assessment ($-.60 \pm 1.7, p=.014$), as did the 200 minutes of instruction group ($-.38 \pm 1.5$ points, $p=.022$) as compared to the 400 minutes of instruction group ($.72 \pm 1.5$ points).

“Identifying Sources” strands as compared against different intervention groups. No statistically significant gain was revealed between the domains.

“Utilizing Search Strategies” strands as compared against different intervention groups. There was a statistically significant difference between groups as determined by one-way ANOVA ($F(3,105) = 4.707, p=.004$). A Tukey post hoc test revealed that students who participated in the website intervention scored statistically significantly lower on the TRAILS assessment ($-1.20 \pm 1.1, p=.027$) as compared to the scores of the 200 minutes of instruction group ($.31 \pm 1.7$) and the 400 minutes of instruction group ($.16 \pm 1.3$).

“Evaluating Resources and Information” strands as compared against different intervention groups. No statistically significant gain was revealed between the domains.

“Use of Information Responsibly and Ethically” strands as compared against different intervention groups. There was a statistically significant difference between groups as determined by one-way ANOVA ($F(3,105) = 5.003, p=.003$). A Tukey post hoc test revealed that students who participated in the scores intervention scored

statistically significantly lower on the TRAILS assessment (-1.44 ± 1.6 points, $p=.018$), as did the website intervention ($-1.40 \pm .9$ points, $p=.018$) as compared to the 400 minutes of instruction group ($-.14 \pm 1.8$ points).

Impact of Interventions Compared by Domain

A comparison of the data specific to the average changes found in the pre- and post-test by domain showed that all students struggled in the area of “Identify Sources” and “Use of Information Responsibly and Ethically” (see Figure 11). For the strand areas for “Developing A Topic” and “Utilizing Search Strategies,” the scores and 400-minute direct instruction intervention saw improvement. The domain area for “Evaluating Resources and Information” found that all intervention groups reported improved scores. Comparison by domain based upon intervention shows that students struggled in several areas which indicates that additional instruction may have been needed.

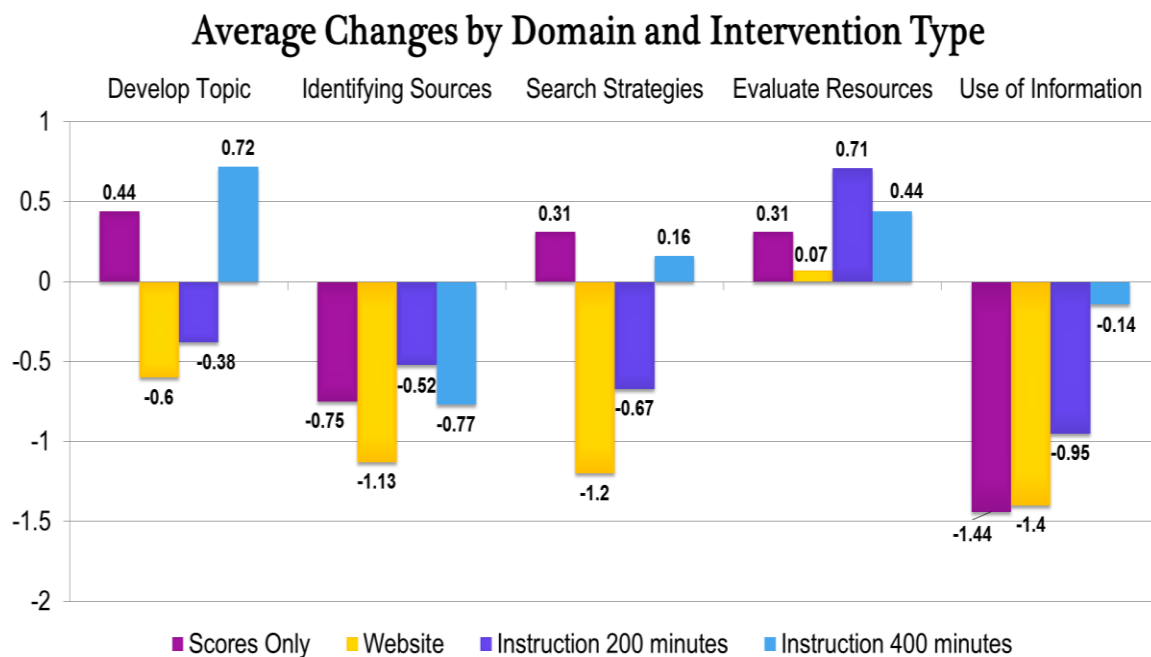


Figure 11. Intervention type comparison by domain.

Impact of the Use of Canvas LMS

One of the capstones that tracked students' completion of the direct instruction LMS was the use of the Canvas badge system. Students earned a badge by completing all assignments, quizzes, and navigating through all of the module sections. Of the 78 students participating in the instruction intervention, 39 earned the CMSINFOLIT badge (50%). Of the 39 who earned this badge, 26 showed growth (67%). From within the instruction group of students, 21 came from Standard classes. Of the 21 Standard students, only two earned badges and only one showed growth. This drastic decline in the percentage of badge earners among Standards students was probably due to the decrease in the instructional time. There were also seven students who earned a passing score from the assignments and quizzes but did not complete all of the activities to earn a badge. Of these seven students identified with passing scores, only two showed growth.

Students who completed the Canvas course. Independent sample *t*-tests were conducted on the data for students who received direct instruction to determine the effectiveness of the Canvas course modules on IL skill development. Of the direct instruction students, 39 students (37 honors, two standard) completed all of the Canvas modules. Data illustrate that students who completed Canvas scored higher than other students with direct instruction. These differences were significant for four domain strands (1. Develop A Topic, 3. Utilizing Search Strategies, 5. Responsible and Ethical Use of Information and Total Gain; see Table 5). The implications for this significance is a need to adjust by either adding or extending the content in the canvas LMS for sections 2. Identifying Sources, and 4. Evaluating Sources and Information. Also, the impact of

this significance is that it is beneficial for students complete the instructional activities embedded into Canvas LMS.

Table 5

Comparison of Mean Students Who Completed Canvas LMS and Non-Completers by IL Strand and Total Gain

Strand	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Strand 1: Develop A Topic (<i>n</i>=39)					
Completers	1.05	1.43	3.15	76	.002
Non-Completers	-1.44	1.52			
Strand 3: Utilizing Search Strategies (<i>n</i>=39)					
Completers	.28	1.81	2.06	76	.043
Non-Completers	-.77	1.60			
Strand 5: Responsible and Ethical Use of Information (<i>n</i>=39)					
Completers	.05	1.65	2.29	76	.025
Non-Completers	-.77	1.51			
Total Gain (<i>n</i>=39)					
Completers	1.05	3.97	2.50	76	.015
Non-Completers	-1.44	4.80			

Student and Stakeholder Perceptions of IL

With an eye toward continuous improvement, reflective interviews were conducted at the culmination of each collaborative instructional session. The purpose was to ascertain what worked well, what could be improved, and what transpired that is different from the usual methods of teaching research. While collaborative English teachers are an important part of the design and implementation teams, this research design recognizes their feedback and real-time evaluation of the intervention as an invaluable data source for understanding how to create sustainable improvements.

Analysis of Coded Key Stakeholder Interviews

At the end of the study, I conducted interviews with the key stakeholders participating in the project as part of the design and implementation teams. Their insight into the project provides an opportunity to collect qualitative information specific to key attributes associated with the creation, delivery, interaction, and reaction to the intervention resources and goals for the study. From the interview questionnaires, I used descriptive and magnitude coding to identify words that aligned specifically to addressing the focus of each question (Miles, Huberman, & Saldaña, 2014, p. 80). Each item on the questionnaire was assigned a control phrase that represented the primary idea for each question. From this group of coded responses, I identified three primary word attributes, creating a specific subcode list. The primary descriptive terms that came from these results include “process, impact, outcome, features, ready, reaction, importance, and vision.” Of these terms, the most relevant is process, which embodies the elements of “ready and reaction” and features that encompass “impact, outcome, and importance.” Inferring from the data, it appears that stakeholders value the process and features associated with this study (see Table 6 for Coding and Subcoding details).

Table 6

Stakeholder Interview Question Coding and Subcoding

Primary Stakeholder Interview Questions	Control Phrase or Word	Subcode Word List and Frequency
1: Please share your current expectations for student awareness and skill for information literacy?	Expectation	Process (9) Success (6) Learning (5)
2: How has this changed with your participation in this project?	Change	Impact (6) Recognize (5) Value (2)
3: Based on your stakeholder role, please share your observations of the pre-planning activities that have taken place for this project (conversations, meeting, lesson or curriculum development, online resource tools, or implementation of the TRAILS assessment)?	Observation	Outcome (6) Participation (5) Plan (3)
4: Considering the relationship between information literacy, research skills, and problem solving, what do you believe to be the most important attribute that we can provide to students to prepare them for college and/or careers?	Attribute	Features (9) Traits (4) Quality (3)
5. How has this project impacted your thoughts on preparing students for the future?	Prepared	Ready (7) Pending (4) Future (2)
6. Reflecting on the scope of this project to evaluate a select group of students for their level of skill related to information literacy and five key strands as compared to national standards, implementing an intervention that includes instruction and/or online access to resources related to developing and enhancing these skills, please share your overall impressions of this project and the potential outcomes.	Impressions	Reaction (6) Influence (4) Idea (3)
7. Are there any other insights or information that you would like to share related to your experience supporting this project?	Insight	Importance (4) Vision (4) Value (3)

Relevant Feedback Responses from the Stakeholder Interviews

Part of the process for conducting the key stakeholder interviews was the opportunity to uncover additional feedback specific to participation and insight gained from the project. Post-study interviews were conducted with two teachers, two SLMS, and two project support team members. Recognizing the importance of this study, one project support team member shared that “Students should know the steps to follow, how to share their work and how to use their self-reflections to successfully complete the process,” and a teacher stated “recognizing that strong information literacy and problem solving skills is important for all students to solve everyday information problems.” This reflection confirms that collaborative partners understood the purpose of the study. When asked about challenges they observed by participating in the study, one teacher stated that the project was “well organized, clear expectations upfront, low impact, and easy to do.” A project support team member voiced that “it is valuable for others in the profession to learn about this research and work, in particular using TRAILS as an assessment tool.” Another teacher commented that providing “curriculum for research skills is a great idea. [It’s] helping students to be better prepared for college.” One SLMS stated she would have liked to participate in the instructional process. Another SLMS was quoted “since Canvas is still new to the district, it is challenging to partner with collaborative teachers to use this LMS for instruction.” Other statements presented that have relevance to the project include “students need to understand how to use resources, what are the questions, keywords, not just Googling,” as indicated by a participating teacher and a “deeper understanding of information literacy, conducting research in an efficient way,”

which was stated by a SLMS, which suggests stakeholders recognize the potential changes that can take place when interventions are successful.

Student Survey

I used the online system from Qualtric Survey Software provided by Western Carolina University to deliver a perception-driven survey using a Likert scale response to gain insight into how students view their understanding, value, importance, and interest in IL. An overview of this survey is shown in Figure 12 (for complete survey totals see Appendix H, Table 8). A review of the data shows students generally have a favorable attitude toward IL and its overall importance. The most revealing elements from the survey came from question 11, which focused on how students valued the instruction for the strand area in “the responsible, ethical, and legal use of information.” With almost a third of the students either neutral or disagreeing in their responses to this question, an inference can be made that this is an area in which students need additional support and training.

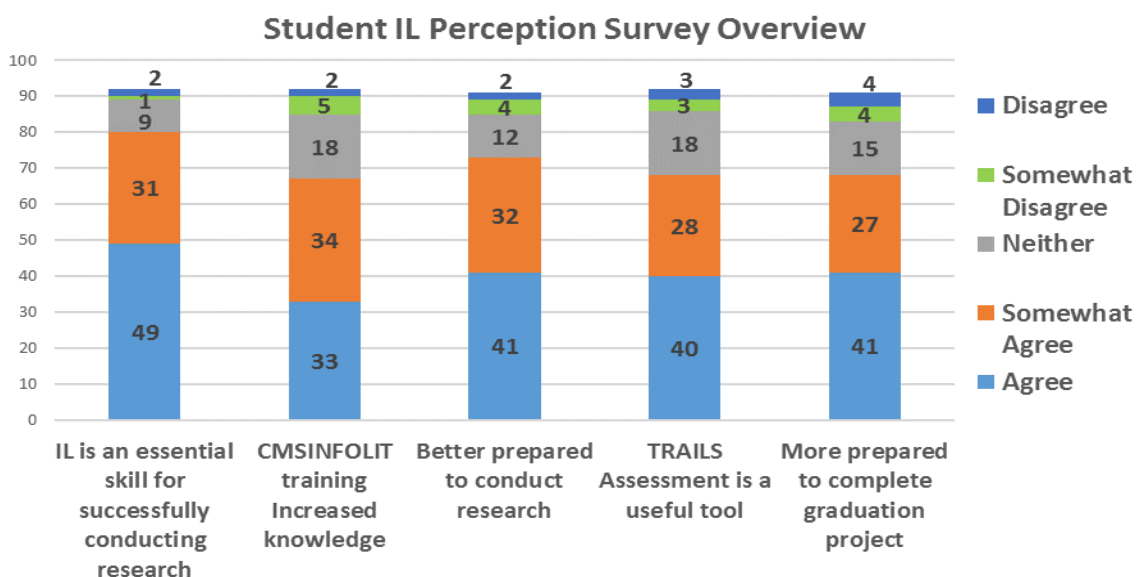


Figure 12. Student Perception Survey overview.

Discussion

The findings from this study provide an interesting and thoughtful context to examine IL as seen through the lenses of high school juniors and key stakeholders. By addressing the three initial questions presented in this study, the results provide a pathway to understand how to enhance IL development in a K-12 setting. The pre-assessment segment of the study showed that the AP students scored the highest on the initial assessment, followed by Honors and then Standard students. The parallels between these groups are also interesting in that the margin between the two AP school sites is within one point. This changes when compared to the Honors and Standards students at the multiple locations.

The pre-assessment data shows that all student category groups struggled with the concepts and knowledge associated with utilizing search strategies. Specifically, within the Honors and Standard class groups, these students found the process for identifying sources challenging. All students performed better on the assessment for the process of evaluating resources and using information responsibly and ethically. These two strands are the most recognized because they are associated with finding resources in the library collection or online databases as well as concepts of ownership and copyright. Most students in their junior year of high school have visited the school library media center to attempt to find information. Copyright and plagiarism are repeatedly reviewed with students because this is part of the student code of conduct. In general, students struggled most with concepts associated with developing a topic. Asking critical questions and developing skills to drill deeper within a topic may not have been processes students were exposed to before the assessment.

Evaluation of pre- and post-test TRAILS data revealed students with 400 minutes of instruction had the greatest gains in IL skills. When examined closely, interventions had significant differences when compared against total gains in IL, and strands related to developing a topic, identifying sources, utilizing search strategies, and use of information responsibly and ethically. The post-survey for students and stakeholder interviews provided additional insight into the value of IL.

CHAPTER FIVE: REPORT AND RECOMMENDATIONS

The complexity of information delivered to society requires the ability to integrate, analyze, and synthesize an increased amount of data from multiple outlets. The development of the literacy skills associated with navigating this wealth of information is paramount. IL as a skill included within the North Carolina curriculum policies and procedures is weakly supported. There is limited actual practice and curriculum integration for IL skills within the curriculum. The driver for this deficit appears to be the expectation that teachers integrate IL skills into curriculum and collaborate with school library professionals.

The lack of formal state mandated assessment data specific to IL skills for K-12 students also restricts the potential for requiring school districts and teachers to include this important skill set into the curriculum and instructional practice. The guiding purpose of this improvement project was to establish a baseline of student skill level for information seeking, utilization, dissemination, and communication; to determine student and teacher perceptions of the importance of IL; and to determine what instructional strategies (including self-paced resources, collaborative instruction, and assessments) aid in increasing student information skill levels. This study illustrated the potential for increasing secondary students' skills for IL by implementing a benchmark process, leveraging instruction, providing a pathway for resources as aligned to standards, and assessment tools.

Discussion

The initial benchmark data from TRAILS provided valuable insight into the existing IL skill level for a diverse student population within CMS. All students, regardless of course level, were below an ideal proficiency rate of 80% on the initial assessment, demonstrating students need coursework that cultivates these skills. From the three groups participating in this study, the direct instruction group had the most significant gains compared to other interventions employed.

Use of the IBM SPSS (Statistical Package for the Social Sciences) and a one-way ANOVA to evaluate the post-test TRAILS data enabled me to closely examine gains that occurred across interventions used for this study. This examination was perplexing because, overall, the gains were very small, and some students went down instead of up. Factors that could explain these issues might include the use of a different test available from the TRAILS system for the post-test. The second assessment test used the same domains as the first assessment but utilized different items and examples. Another factor could be that because students were not required to participate, there may not have been a dedicated commitment to perform well on the post-assessment. There was no real accountability, particularly for the website group, where I have no knowledge of who actually utilized the website.

It was exciting to see some students' scores demonstrated gains in the domains for developing a topic and conducting search strategies. These two strands generated the most questions from students during direct instruction. The two domains that saw no statistically significant gains were the use of and evaluation of resources, which were also the most challenging to integrate into the curriculum. As I was creating the online LMS

CMSINFOLIT modules, I found these two areas were the most difficult for which to design curriculum and create related activities as part of having students practice what they were learning. This observation provides an opportunity for SLMS to develop new curriculum resources to support these specific IL strands. As more content is delivered electronically via online resources, teaching students how to navigate resources as investigators to uncover relevant and reliable facts is critical. Educators must continue to examine these domains to create learning resources meeting the needs of today's students.

The most challenging aspects during the administration of this study were delays during the summer session before the study began to maintain contact with stakeholders, changes to the IRB process required by CMS, and the need to reduce direct intervention time for direct instruction from 400 to 200 minutes. Though I was proactive with keeping my primary stakeholders updated during the proposal stage of this project, needing to expedite communication with these essential partners during the summer was sometimes challenging. Luckily, I kept a documentation log of events and was able to bring everyone on the design and implementation teams up to speed at the start of the new school year. Because CMS required their own IRB process which would only be processed after WCU made their approval, there were several months when I did not know which protocol would be required for the study. Once CMS began the review process for the study, I was told that I would need to include additional schools before approval. This new demand occurred during the summer, which resulted in additional delays due to difficulty in follow-up with school contacts.

Part of the start-up process was to give the pre-assessment to all students (no matter what the course category). After analyzing the pre-assessment data and making arrangements to begin instructions with each school site and course type, I learned that I would only have half the time planned for the Standard instruction group (200 minutes) as compared to the Honors classes (400 minutes). This was disappointing because I believe this would add an uncontrollable variable. Because the instructional time was shortened from 400 minutes to 200 minutes for the Standard group, I would use the time provided as efficiently as possible but encouraged students to spend extra time on their own exploring the online modules available within the Canvas LMS as well as the related practice quizzes and activities. As the results show, the 200-minute direct instruction group did not perform as well as the 400-minute group. Even with the gain that was seen across intervention groups based upon direct instruction and those students who completed the full blending learning coursework, it is shocking that students still demonstrated IL knowledge below an ideal proficiency level. This provides a strong argument that IL instruction requires adequate time to help students become knowledgeable on the topics and provide opportunities for students to practice skills and concepts.

The end-of-study surveys taken by students and the interviews with key stakeholders provided valuable feedback for the project. By gauging the opinions and ideas of these two groups, I have a better understanding of how this study supported the intellectual needs of participants. Students clearly find the topic important and believe acquiring IL skills is relevant for their future. The delivery of content had mixed results on the survey, which could be a reflection of their overall understanding of the Canvas

LMS system or the process that students were required use to complete the course modules (single sign-on through NCEdCloud). Stakeholders interviewed for the study provided a passionate argument for why the study was needed and the value placed on developing IL skills with students. I have recently been asked to help other instructional teams develop online curricula in the Canvas LMS, which came as a direct result of a stakeholder referral.

The findings from this study have many implications for the future of research for IL. Because there are currently only a small number of studies conducted within the PK-12 setting, this research adds to the body of work needed to continue the investigation into impacting student learning as part of a multiliteracy function. This study also advocates for the inclusion of IL as part of the required curriculum that is mandated by the state. By including IL as a measured component within related curriculum areas, student performance data can be evaluated and provide additional insight on this topic. The connection to social justice is also relevant because this study illustrates the impact of sacrificing relevant skill-building instruction for students who are classed in a low-performing group, which took place with the Standard classes engaged in this study. Students who were given less time for instruction may have benefitted from additional exposure and practice of IL, which could have had a positive influence in other academic areas.

Limitations

As part of creating resources for this study, I developed an external website students could use for their own self-directed learning. As the study was ending, I became aware there was no way to track how many actual students visited the website or, for that

matter, if they were even in the intervention class group. Future studies using this method should provide a login process that could be used as a tracking system. Another limitation of this study is that not all categories of intervention have Honors and Standard students in each group. The website intervention did not have a class represented by Honors students. As previously mentioned, there was a challenge that required the redesign of the Canvas LMS when the study moved to the phase with the Standard class groups. An additional limitation was an unannounced break during one of the post-test assessments that required stopping the test, creating a new assessment session, and restarting the assessment for the student group impacted. Though these limitations provided challenges throughout the study, they also provided opportunities to learn from these experiences, as possible future studies may attempt to replicate this method.

Recommendations

Continuation of research in IL for PK-12 students would benefit from a comparison between direct instructions without the use of a LMS. This could provide insight into whether or not a blended learning approach impacts student knowledge. An additional aspect in this area would be to examine what variables kept students from completing the LMS modules towards earning a badge or course completion recognition. Without a specific requirement for students to participate during the life of the study, I believe that some students lost interest or decided to not take the training serious when they realized that there was no penalty or high stakes conditions required. This may also account for the high level of “no consent” forms not returned during the intervention phase of the project. Even having the benefit of developing skills towards completing the graduation project as an incentive to encourage participation, some students may have

realized that if their English course grade was high enough, they might be able to reduce or eliminate all of this requirement.

This study also focused on the cognitive process that takes place as students begin to learn, develop, and enhance their knowledge and understanding of IL. An ideal extension of this would be an evaluation of skills used toward the application of knowledge in creating a product. As part of the NC high school graduation project, there is a rubric process used to evaluate students' completed research. Comparing skills students gained through IL instruction to the results of their final graduation project would yield relevant insight potentially benefitting the development of new IL instruction and assessments. An ideal opportunity exists to collect graduation project evaluation data to understand how students perform on the overall product produced during their senior year as compared to the IL standards. It would also be appropriate to use the evaluation process for the graduation project to determine if there is a correlation between mastery and the assessed skills found within the TRAILS strands. This study utilized only the online TRAILS assessment from Kent State University. Applying similar methods and using different assessment tools would be of value (e.g., using either the ILT test from James Madison University).

The development of IL instruction for this project relied heavily on integrating the Big6™ research process model across the curriculum. There may be a benefit to using a different research model or multiple models to assess student learning and engagement. Using a different research model may provide insight into how research models align to standards or support instruction. This study would also benefit from replication in different K-12 settings (private, charter, or early college). A significant influence during

the early development stage for this study was the work conducted by the Project Information Literacy group from Washington State University. An ideal opportunity would be to have this study become a part of the PIL resources focused on building a base of knowledge and spurring a conversation toward PK-12 IL education within this domain or seek an agency that could provide a similar platform. In addition, it is my hope that this study creates opportunities to influence how the NCDPI treats IL. It is recommended that NCDPI prioritize IL as a scaffold and taught curriculum area throughout all grade levels. While following the recommendations from Common Core to embed IL can address this need, a clear plan for assessment must also be embraced. It is my recommendation that NCDPI use the existing assessment and benchmark process to include items that can be measured and desegregated specifically for IL.

Conclusion

The results of this study showed that direct instruction was significant in helping students gain IL knowledge. The data also indicate that having at least 400 minutes of dedicated time to provide instruction is key to helping students attain this knowledge. The perceptions demonstrated by students and stakeholders illustrate an awareness of the importance of IL and need for additional instruction. As an essential skill, IL must be included in existing assessment opportunities to gain insight into “if” and “how” these skills are being embedded into general curriculum. In developing a goal to create lifelong learners, a curriculum must be designed that successfully integrates IL as scaffolded knowledge taught throughout the K-12 experience. As educators and leaders continue to define policies and practices for student growth and development, IL must be included at

a higher level equal to other literacies focused on preparing students to be career and college ready.

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APPENDICES

- APPENDIX A: PROJECT INFORMATION LITERACY INFOGRAPH
- APPENDIX B: FRAMEWORK FOR 21ST CENTURY LEARNING INFOGRAPHIC
- APPENDIX C: PRE-ASSESSMENT SAMPLE SCORE REPORT
- APPENDIX D: CMSINFOLIT CANVAS LMS MODULES SCREENSHOTS
- APPENDIX E: CMSINFOLIT CANVAS MODULES CONTENT OUTLINE
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- APPENDIX G: CMSINFOLIT WEEBLY WEBPAGE
- APPENDIX H: STUDENT PERCEPTION SURVEY RESULTS

APPENDIX A: PROJECT INFORMATION LITERACY INFOGRAPH

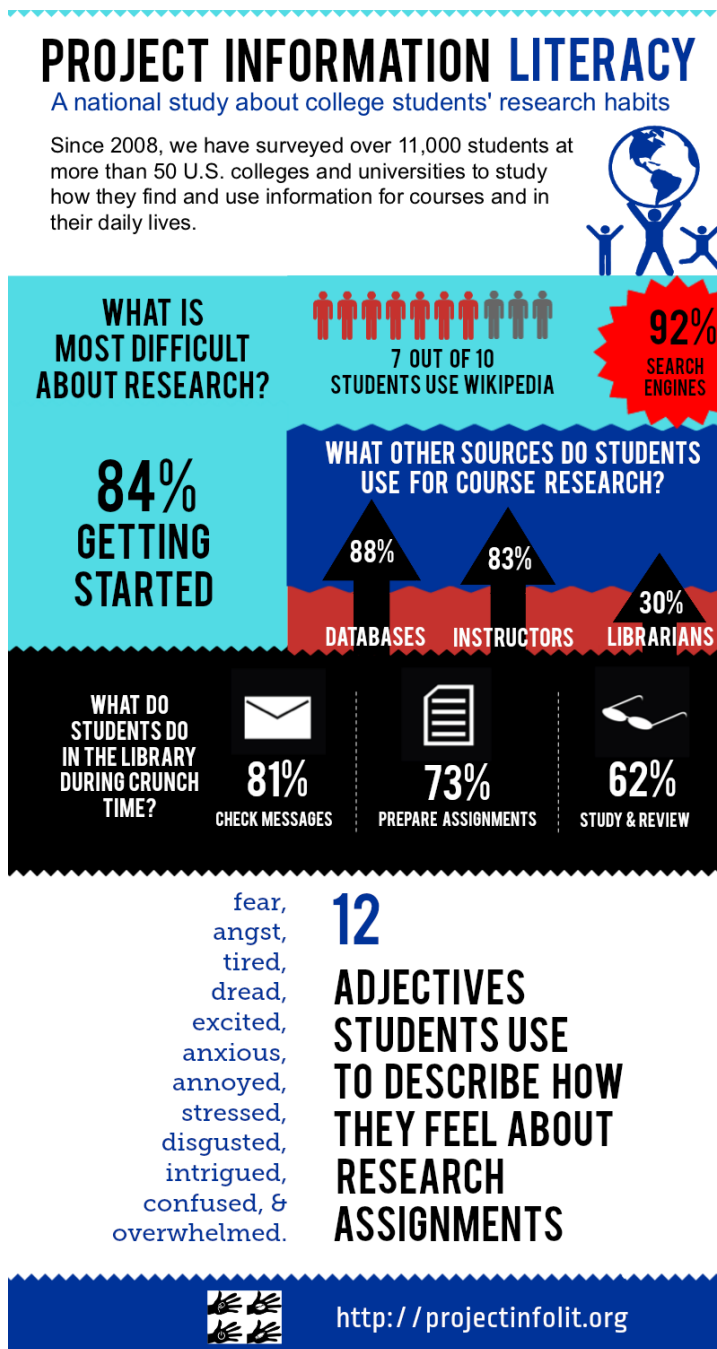


Figure 13. Project Information Literacy infographic (2016).

APPENDIX B: FRAMEWORK FOR 21ST CENTURY LEARNING INFOGRAPHIC

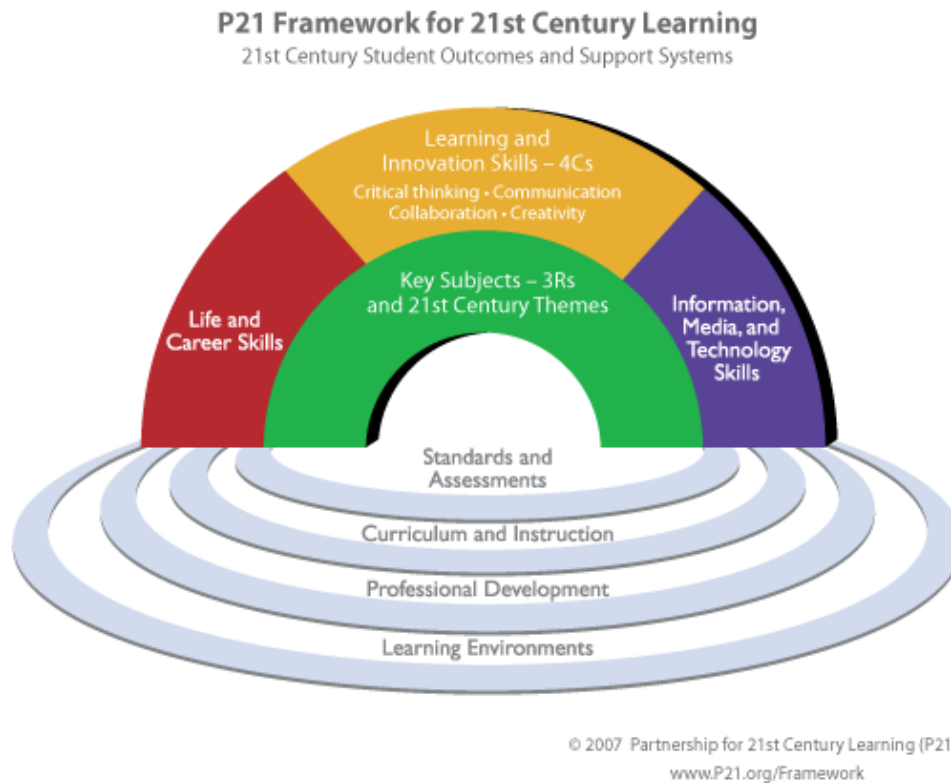


Figure 14. P21 Framework for 21st Century Learning.

APPENDIX C: PRE-ASSESSMENT SAMPLE SCORE REPORT

Information Literacy TRAILS9 Score Report for:**0000****How are scores determined?**

The five information literacy strand areas (Develop Topic, Identify Sources, Search Strategies, Evaluate Resources and Information, and Use Information Responsibly and Ethically) have six questions within each assessment area.

If a student answered all questions correctly, the score in that strand would be 100%.

Score:	Calculated based upon:
100	6 out of 6 correct
83	5 out of 6 correct
66	4 out of 6 correct
50	3 out of 6 correct
33	2 out of 6 correct
17	1 out of 6 correct
0	0 out of 6 correct

Results for the TRAILS9 Assessment Test for October 2, 2015
--

Develop Topic: Recognize need for information to address assignment. Develop questions to clarify and focus topic. Identify individuals and resources to help develop manageable topic based on the parameters of an assignment. Recognize the hierarchical relationships of broader and narrower topics to aid in revising the topic.

% Correct: 50

Identify Sources: Understand information comes in various forms: textual, visual, audio, or data. Appreciate that each form offers differing types of information sources produced in a variety of formats (e.g., print or electronic books, film or streaming video). Understand the roles and limitations of differing types of information sources and the finding tools needed to access them (e.g., libraries, search engines, online catalogs). Select the most appropriate information sources and finding tools to address a given information need.

% Correct: 83

Search Strategies: Create and revise search strategies. Understand how to use the features of an information source in order to retrieve the information needed (e.g., index and table of contents in a book, database filters). Develop a search strategy fitting for the given finding tool. Choose appropriate terms and keywords for searching a topic. Understand how to use search expanders and search limiters (e.g., logical operators) when too few, too many, or irrelevant results are returned.

% Correct: 67

Evaluate Resources and Information: Be able to determine the currency, relevance, authority, accuracy, and purpose of information or information sources. Recognize divergent perspectives. Recognize bias. Differentiate between fact and opinion.

% Correct: 33

Use Information Responsibly and Ethically: Understand the concepts of intellectual property (especially copyright, fair use, and plagiarism) and of intellectual freedom. Understand how to cite and list sources using an appropriate style manual. Recognize how to take notes and paraphrase correctly.

% Correct: 83**Total Overall Score (% Correct): 63**

Assessment and Report Information from TRAILS: Tool for Real-time Assessment of Information Literacy Skills
Copyright © 2015 Kent State University Libraries

Figure 15. TRAILS pre-assessment score report sample.

APPENDIX D: CMSINFOLIT CANVAS LMS MODULES SCREENSHOTS

Intervention Instructional Resource: Online Course for this study (CMSINFOLIT)
Screenshots

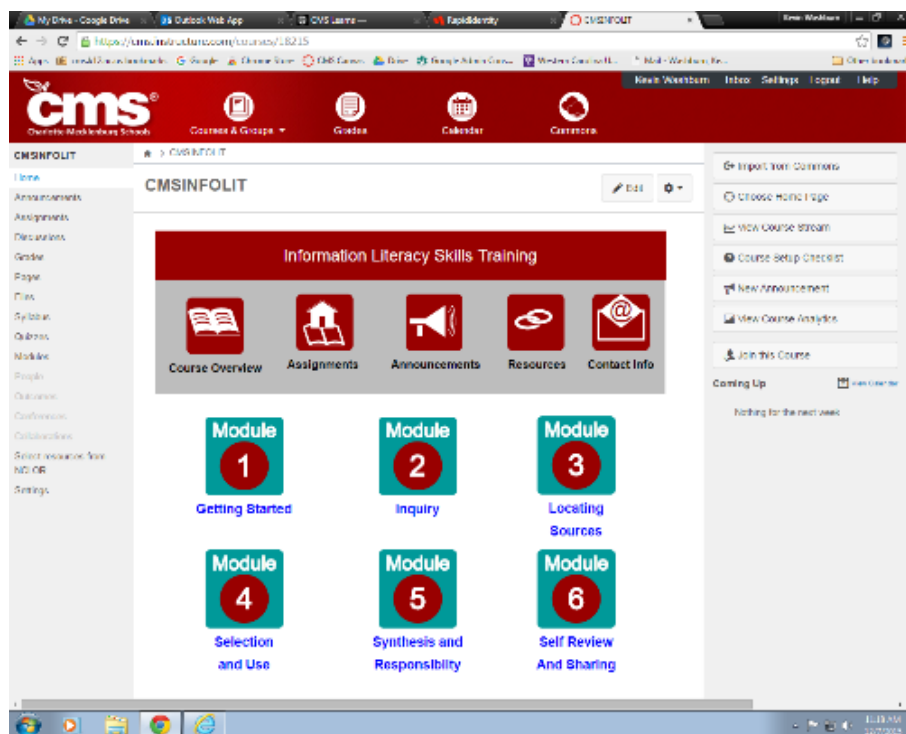


Figure 16. CMSINFOLIT Canvas course screenshot main webpage.

The screenshot shows the Canvas LMS interface for a course titled 'CMSINFOLIT'. The top navigation bar includes 'Home', 'Announcements', 'Assignments', 'Discussions', 'Grade', 'Calendar', and 'Courses'. The left sidebar lists various course tools like 'Home', 'Announcements', 'Assignments', 'Discussions', 'Grade', 'Pages', 'Files', 'Syllabus', 'Outbox', 'Modules', 'People', 'Quizzes', 'Conferences', 'Customizations', 'Select resource from NO OR', and 'Settings'. The main content area is titled 'Overview' and contains three sections: 'Course Summary', 'About Your Instructor', and 'Syllabus'. The 'Course Summary' section states the goal of the course is to provide students with knowledge, skills, and insight towards developing a greater understanding for information literacy. The 'About Your Instructor' section introduces Kevin Westburn as the school library media specialist at Alexander Graham Middle School, listing his 16 years of experience, a specialist degree in curriculum and instruction, and a candidacy for a doctorate in education leadership. The 'Syllabus' section indicates the course is based on the completion of modules representing information literacy strands and provides a link to 'Go to the Syllabus'.

Figure 17. CMSINFOLIT Canvas course screenshot overview.

The screenshot shows the 'Assignments' page in the Canvas LMS. The top navigation bar is the same as in Figure 17. The left sidebar is also the same. The main content area is titled 'Assignments' and features a search bar and a '+ Assignments' button. Below this is a table listing the course assignments:

Assignment Title	Description	Due Date	Status
Module 1: Assignment	Module 1 Module	10/20/21	Completed
Module 1.2: Technology Tools		10/20/21	Completed
Module 2: Assignment	Module 2 Module	10/20/21	Completed
Module 3: Assignment	Module 3 Module	10/20/21	Completed
Module 4: Assignment	Module 4 Module	10/20/21	Completed
Module 5: Discussion Assignment		10/20/21	Completed
Module 6: Assignment	Module 6 Module	10/20/21	Completed

At the bottom of the page, there is a footer with the text 'BY INSTRUCTOR' and links for 'User Support', 'Help', 'Privacy Policy', 'Terms of Service', 'Feedback', and 'Site'.

Figure 18. CMSINFOLIT Canvas course screenshot #1.

The screenshot shows the Canvas LMS interface for the CMSIN FOLIT course. The top navigation bar includes the CMS logo and icons for Courses & Groups, Grades, Calendar, and Courses. The left sidebar lists navigation options like Home, Announcements, Assignments, Discussions, Grades, Pages, Files, Syllabus, Outcomes, Modules, People, Outcomes, Conferences, Collaborations, Select associated View, NC OR, and Settings. The main content area is titled 'Announcements' and features a search bar and a 'Unread' filter. Four announcements are listed:

- End of Course Survey** (Nov 30, 2018): Thank you for the end of course survey. Use the link in the subject to complete the survey. W. Weathers
- Earn the CMSIN FOLIT Badge** (Nov 1, 2018): Students who complete the CMSIN FOLIT Course by working through all the modules, quizzes, and subm...
- CMSIN FOLIT PROLOGS are changing!** (Nov 2, 2018): Information regarding the PROLOGS (1) course is being new. Note the details for the module and pro...
- Review TRAIL 50 Report Before Starting Course** (Jan 20, 2018): Please review your TRAIL 50 report before starting the course. Thank you for your contribution!

At the bottom, there is a footer with 'BY INSTRUCTURE' and links for User Research, Help, Privacy policy, Terms of service, Facebook, and Twitter.

Figure 19. CMSIN FOLIT Canvas course screenshot #2.

The screenshot shows the Canvas LMS interface for the CMSIN FOLIT course, specifically the 'Resources' page. The top navigation bar and left sidebar are identical to the previous screenshot. The main content area is titled 'Resources' and includes a 'Published' status indicator. The page lists 'Information Literacy Online Resources:'

- Big6 Information Literacy Model**
- EMPOWER: Information Literacy practices** - activities from Wichita State University Libraries (2014)
- Evaluating Internet Resources** - Finding Information on the Internet: A Tutorial from UC Berkeley Library
- Kathy Schrock's Guide to Everything** - Information Literacy Resources
- NCWiseOwl** - Online Resources for NC Public and Charter Schools

A note indicates: (Current at home password for NCWiseOwl is wisewow15)

- OWL** - (Online Writing Lab) from Purdue University
- How to do research** - from the Kentucky Virtual Library
- Research it Right** - from Acadia University

At the bottom, there is a footer with 'BY INSTRUCTURE' and links for User Research, Help, Privacy policy, Terms of service, Facebook, and Twitter.

Figure 20. CMSIN FOLIT Canvas course screenshot #3.

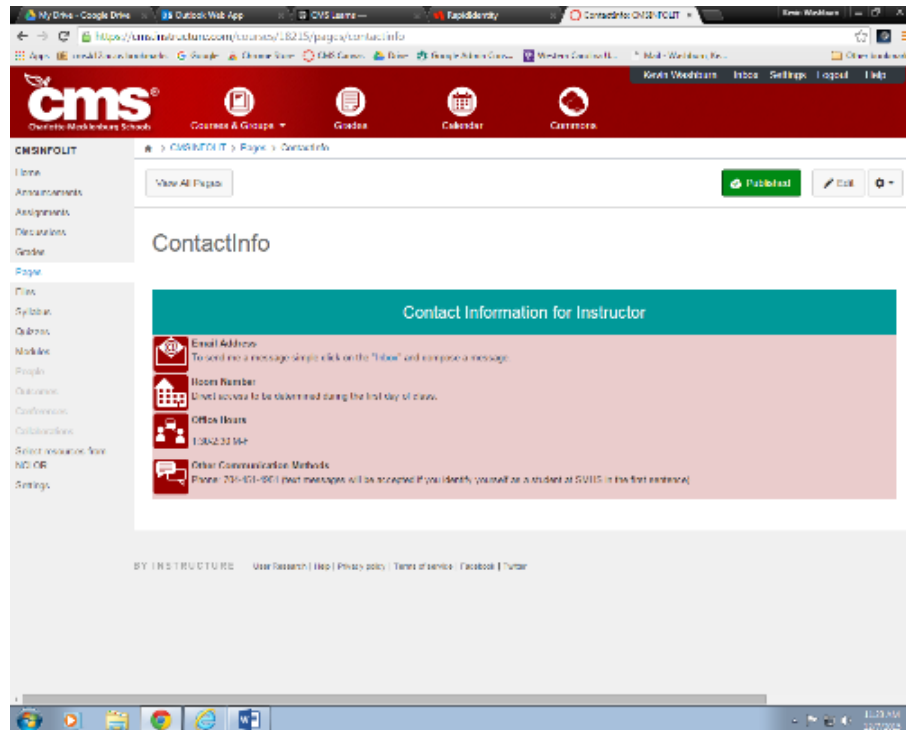


Figure 21. CMSIN FOLIT Canvas course screenshot #4.

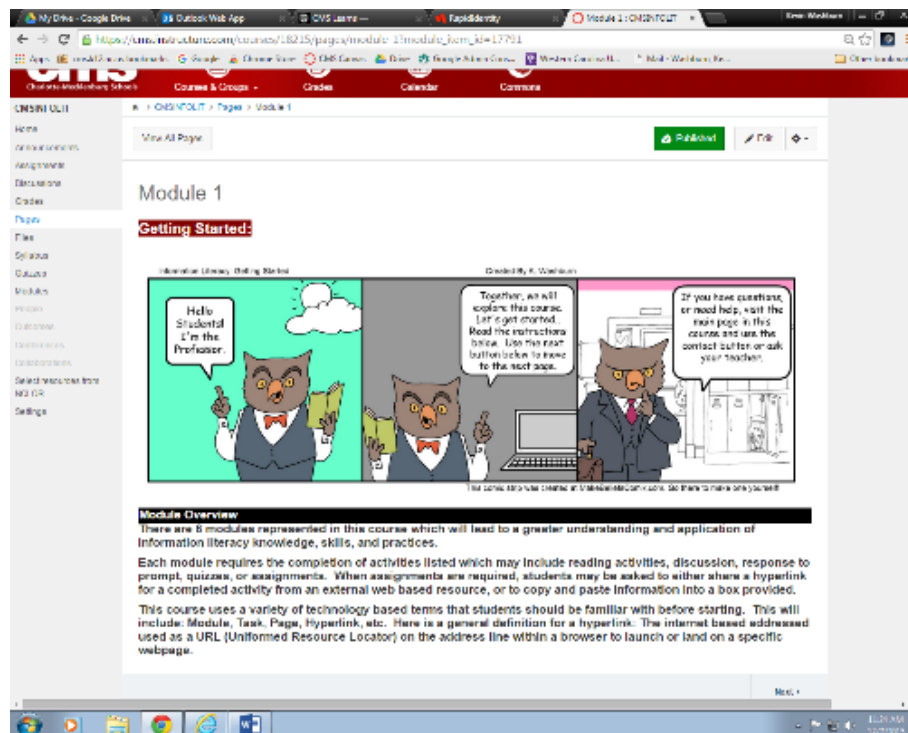


Figure 22. CMSIN FOLIT Canvas course screenshot #5.

Figure 23. CMSINFOLIT Canvas course screenshot #6.

Figure 24. CMSINFOLIT Canvas course screenshot #7.

The screenshot shows the Canvas LMS interface for a course titled 'CMSINFLIT'. The main content area displays 'Module 1: Assignment'. The assignment text reads: 'You just saw Dr. Michael Eisenberg, co-creator of the Big6(TM) Information Literacy model. Considering what you just heard about information literacy, answer one of the following questions:'. Below this, there are three bullet points:

- Why do you think developing skills in recognizing when you need information is important?
- Why is working with a variety of information resources important?
- Developing skills that will help you evaluate and interpret information is important?

 The text continues: 'Use the text box under the "Submit Assignment" button and provide your respond for this assignment. You may also create a file in Google Drives and share the link (post in the website URL field) or upload a document with the information you collected.' Below the text, it shows 'Points: 5' and a 'Submitting' button. At the bottom, there is a table with columns 'Due', 'For', 'Available from', and 'Until', with 'Everyone' listed under 'For'. An 'Add Rubric' button is also visible.

Figure 25. CMSINFLIT Canvas course screenshot #8.

The screenshot shows the Canvas LMS interface for 'Module 2: What is Inquiry?'. The page features a 'View All Pages' button and a '1 Added' notification. The main content includes:

- Module Objective:** Define Inquiry, connect to information literacy, and research skills.
- Module Overview:** The information presented in this module will assist students in using the inquiry process to develop research questions. Good research questions will aid students in create a thesis statement as part of their overall research process.
- Inquiry Defined:** Inquiry as a component of research has been defined as: "Experts see inquiry as a process that focuses on problems or questions in a discipline or between open or unresolved disciplines" (ACRL, 2015).

 A graphic titled 'The Big Six' is displayed, featuring '#2 Information Seeking Strategies' and an illustration of a person with question marks. At the bottom, there is a link: 'Use this link to explore what the Big6 with Dr. Michael Eisenberg and Bob Berkowitz have to share about inquiry and asking questions.' Navigation buttons for 'Previous' and 'Next' are also present.

Figure 26. CMSINFLIT Canvas course screenshot #9.

The screenshot shows a Canvas LMS interface for a course titled 'CMSINFOLIT'. The top navigation bar includes 'Home', 'Course & Groups', 'Grades', 'Calendar', and 'Communities'. The main content area is titled 'Module 2.2: Inquiry' and contains the following text:

Choosing Your Topic v online learning activity from
 Wichita State University Library: EMPOWER website.

EMPOWER
 WICHITA STATE UNIVERSITY LIBRARY

Instructions:
 Use the link above and work through the first 8 webpages.

The page also shows a 'Published' status, a 'Next' button, and a footer with 'BY INSTRUCTURE' and a URL.

Figure 27. CMSINFOLIT Canvas course screenshot #10.

The screenshot shows a Canvas LMS interface for a course titled 'CMSINFOLIT'. The top navigation bar includes 'Home', 'Course & Groups', 'Grades', 'Calendar', and 'Communities'. The main content area is titled 'Module 2: Assignment' and contains the following text:

Using the information that was provided through the **EMPOWER: Choosing Your Topic** website from Wichita State University Libraries, provide an example of the Broad, Narrow, to Specific topic that you might use for your graduation project.

Example:
 Broad topic "What is homelessness?"
 Narrow topic "Poverty and homeless in the United States"
 Specific topic: "Impacting poverty and homelessness in North Carolina"

Points: 5
 Submitting a web page, a website, or a blog post

Due	For	Available from	Until
-	Overdue	-	-

The page also shows a 'Published' status, a 'Next' button, and a footer with 'BY INSTRUCTURE' and a URL.

Figure 28. CMSINFOLIT Canvas course screenshot #11.

The screenshot shows a Canvas LMS interface for a course titled 'CMSINFOLIT'. The page is titled 'Module 2.3: Refining the Question'. It features a video player with the title 'Developing a great research question' and a question 'Why was Saddam the way he was?'. Below the video, there is a text box asking 'Are you considering? What do you really want to discover? Fill in some questions here'. The video is credited to 'Video from Kent State University, "Transitioning to College"'. The interface includes a navigation menu on the left with options like Home, Announcements, Assignments, Discussions, and Pages. The top navigation bar includes 'Home', 'Settings', 'Logout', and 'Help'. The bottom of the page shows the user's name 'BY INSTRUCTURE' and the date '11:27 AM 11/7/2023'.

Figure 29. CMSINFOLIT Canvas course screenshot #12.

The screenshot shows a Canvas LMS interface for a course titled 'CMSINFOLIT'. The page is titled 'Module 2 TRAILS Practice Quiz: Define the question'. It features a text box with the instruction 'Select the best answer from each of the multiple choice questions to follow. All questions used for this practice quiz are from the TRAIL99 website and are used with permission from Kent State University.' Below the text box, there are several settings for the quiz, including 'Quiz Type', 'Points', 'Kilobits/Answer', 'Time Limit', 'Multiple Attempts', 'Score to Pass', 'Attempts', 'View Responses', 'Show Correct Answers', 'One Question at a Time', and 'Lock Questions After Answering'. The settings are as follows: Quiz Type: Multiple Choice, Points: 2, Kilobits/Answer: Max, Time Limit: No Time Limit, Multiple Attempts: Yes, Score to Pass: None, Attempts: Unlimited, View Responses: Always, Show Correct Answers: Immediately, One Question at a Time: Yes, Lock Questions After Answering: No. The interface includes a navigation menu on the left with options like Home, Announcements, Assignments, Discussions, and Pages. The top navigation bar includes 'Home', 'Settings', 'Logout', and 'Help'. The bottom of the page shows the user's name 'BY INSTRUCTURE' and the date '11:27 AM 11/7/2023'.

Figure 30. CMSINFOLIT Canvas course screenshot #13.

The screenshot shows a Canvas LMS interface. At the top, there's a navigation bar with 'cms' logo and icons for 'Course & Groups', 'Grades', 'Calendar', and 'Comments'. Below this is a sidebar with navigation options like 'Home', 'Announcements', 'Assignments', 'Modules', 'Pages', 'Files', 'Syllabus', 'Calendar', 'Profile', 'Help', 'Feedback', 'Support Center', 'Search and Navigation', and 'Settings'. The main content area is titled 'Module 3: Working with Sources' and features a 'View All Pages' button. The central content includes a graphic for 'EMPOWER' (Empowering Minds, Empowering Futures) and a cartoon character holding an apple with a lightbulb, titled 'The Big Six #3 Location And Access'. Below the graphic, it says 'Online learning activity from Wichita State University Library: EMPOWER website'. At the bottom, instructions read: 'Instructions: Use the link above and work through webpages #2 through #7 (displayed at the top of the screen)'. The browser's address bar shows the URL: 'https://lms.inl.edu/canvas/courses/18215/pages/module-3-working-with-sources?module_item_id=121414'.

Figure 31. CMSINFOLIT Canvas course screenshot #14.

The screenshot shows a Canvas LMS interface for 'Module 3.2 Finding Sources'. The navigation bar and sidebar are similar to the previous screenshot. The main content area is titled 'Module 3.2' and has a 'View All Pages' button. The central content is titled 'Finding Sources' and includes a link to 'Visit the Kent State University Library' and another link to 'Explore the webpage on Identifying Potential Sources'. Below these links is a graphic for 'TRANSITIONING TO COLLEGE' and a note: 'Note: Work through ALL of the websites listed on the webpage linked above to collect ideas for different types of resources and how to potential access the information. Your final assignment for this module will be to identify one source that you have not heard of before and describe how you could potential obtain access. Your response must include either accessing online (and how) to the full text information. You will also need to provide an example with a hyperlink.' At the bottom, there's a link to 'The Charlotte-Mecklenburg Library' and a note: 'Based upon your topic that used for the Broad to Narrow assignment in Module 3, see if you can locate any potential sources that can assist you in exploring this topic.' The browser's address bar shows the URL: 'https://lms.inl.edu/canvas/courses/18215/pages/module-3-dot-2?module_item_id=121415'.

Figure 32. CMSINFOLIT Canvas course screenshot #15.

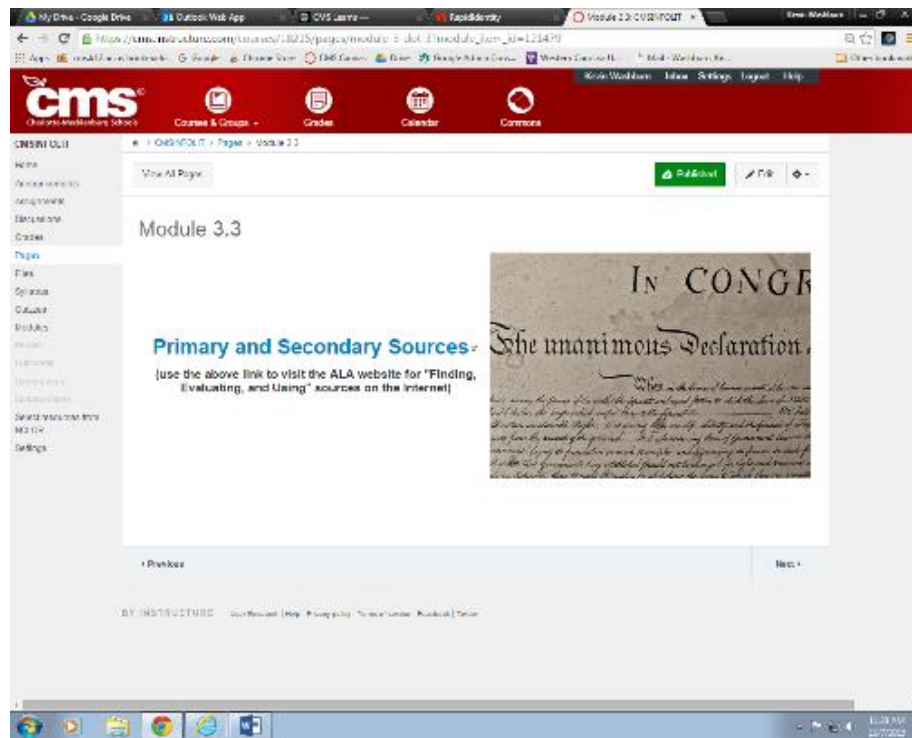


Figure 33. CMSINFOLIT Canvas course screenshot #16.

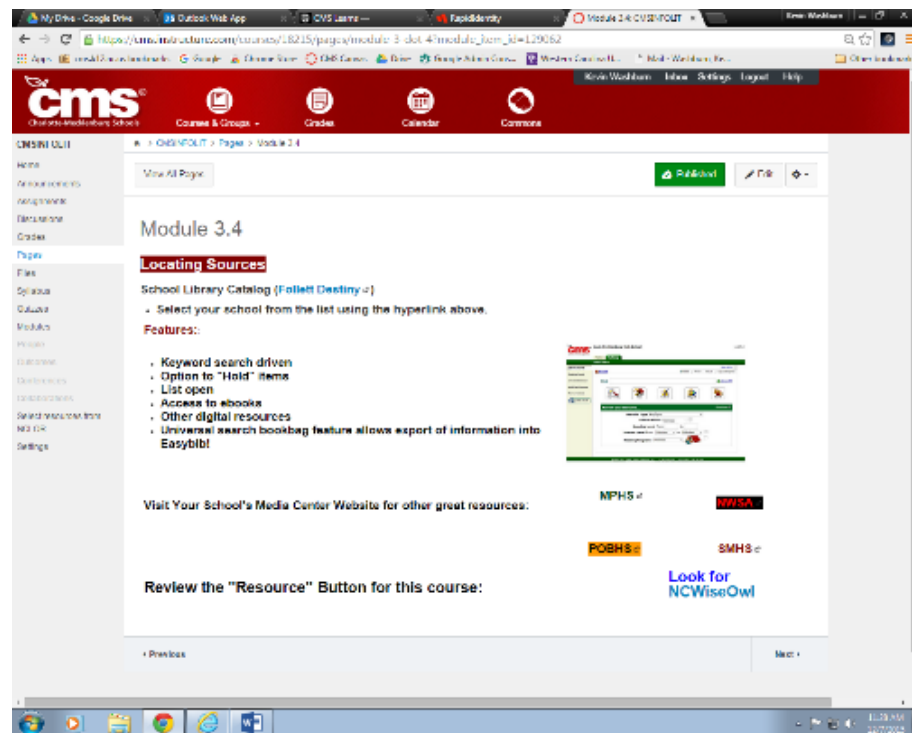


Figure 34. CMSINFOLIT Canvas course screenshot #17.

The screenshot displays the Canvas LMS interface for a course titled "CMSIN FOLIT". The main content area is titled "Module 3: Assignment" and is marked as "Published". The assignment text reads: "Your final assignment for this module will be to identify one source that you have not heard of before and describe how you could potential obtain access. Your response must include either accessing online (and how) to the full text information. You will also need to provide an example with a hyperlink." Below the text, the assignment is set for "10 Points" and "Submitting" is required. A table below shows the assignment is available to "Everyone" from the start of the course. The interface includes a left-hand navigation menu with options like Home, Assignments, Discussions, and Modules. The top navigation bar includes Course & Groups, Grades, Calendar, and Commons.

Figure 35. CMSIN FOLIT Canvas course screenshot #18.

The screenshot displays the Canvas LMS interface for a course titled "CMSIN FOLIT". The main content area is titled "Module 3 Quiz: Identifying and Searching for Potential Sources" and is marked as "Published". The quiz text reads: "Select the best answer from each of the multiple choice questions to follow. All questions used for this practice quiz are from the TRAIL99 website and are used with permission from Kent State University." Below the text, the quiz settings are displayed: "Quiz Type" is "Multiple Choice", "Points" is "3", "Scalable Answers" is "Yes", "Time Limit" is "No Time Limit", "Multiple Attempts" is "Yes", "Score to Pass" is "80%", "Attempts" is "Unlimited", "Use Randomize" is "Always", "Show Correct Answers" is "Immediately", "One Question at a Time" is "Yes", and "Lock Questions After Answering" is "No". A table below shows the quiz is available to "Everyone" from the start of the course. The interface includes a left-hand navigation menu with options like Home, Assignments, Discussions, and Modules. The top navigation bar includes Course & Groups, Grades, Calendar, and Commons.

Figure 36. CMSIN FOLIT Canvas course screenshot #19.

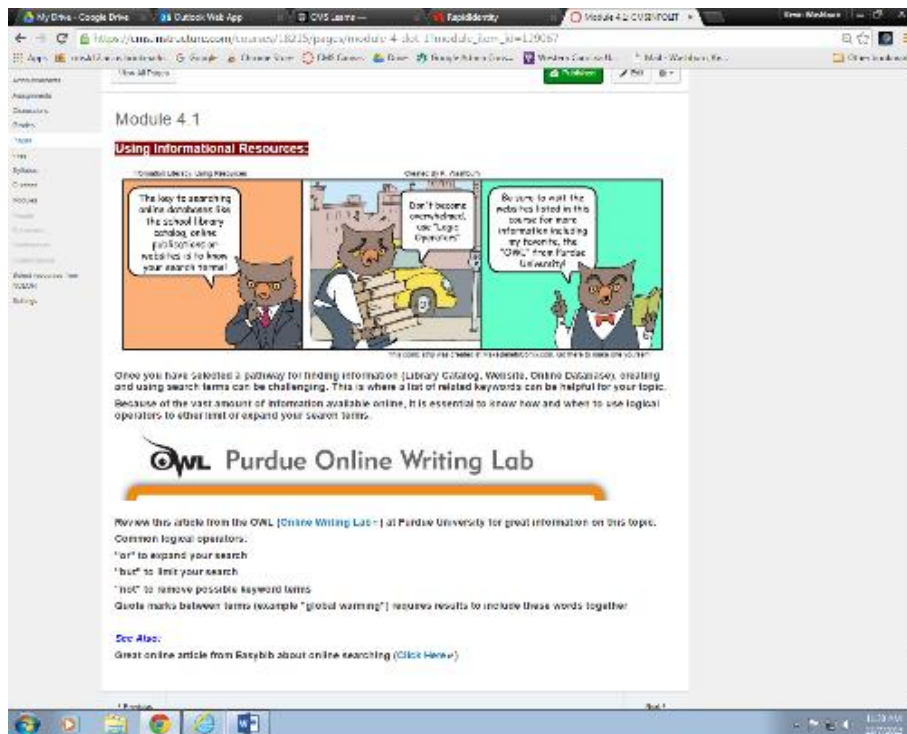


Figure 37. CMSINFOLIT Canvas course screenshot #20.

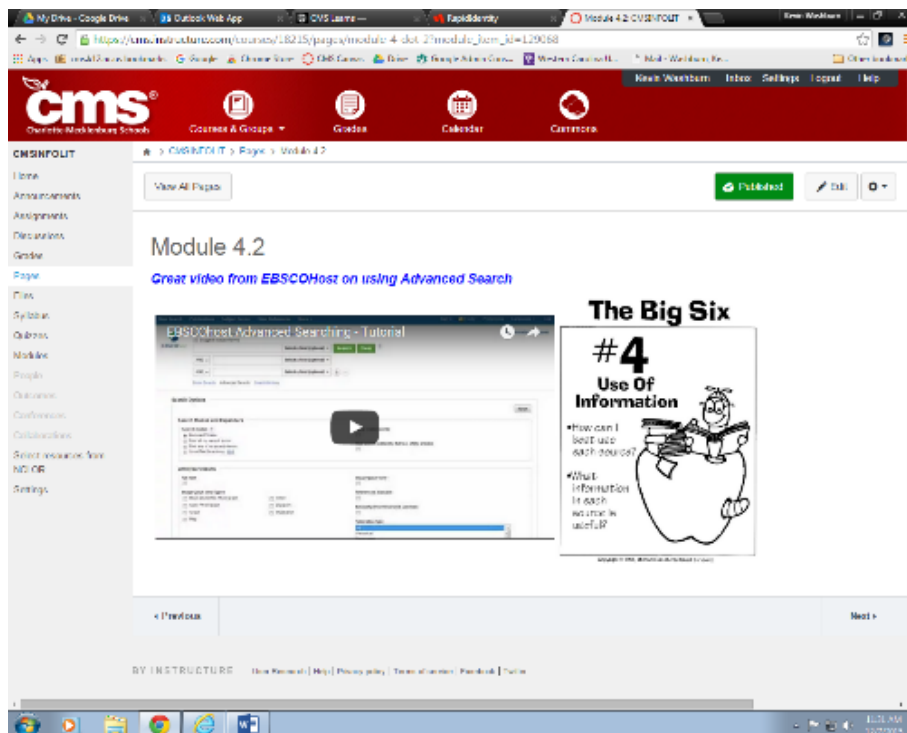


Figure 38. CMSINFOLIT Canvas course screenshot #21.

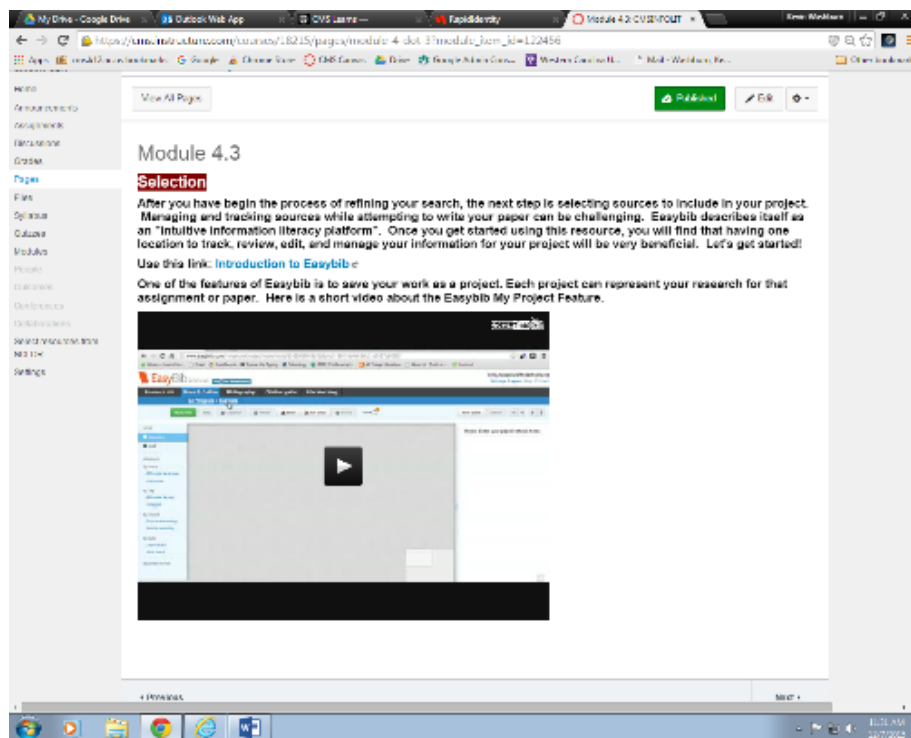


Figure 39. CMSINFOLIT Canvas course screenshot #22.

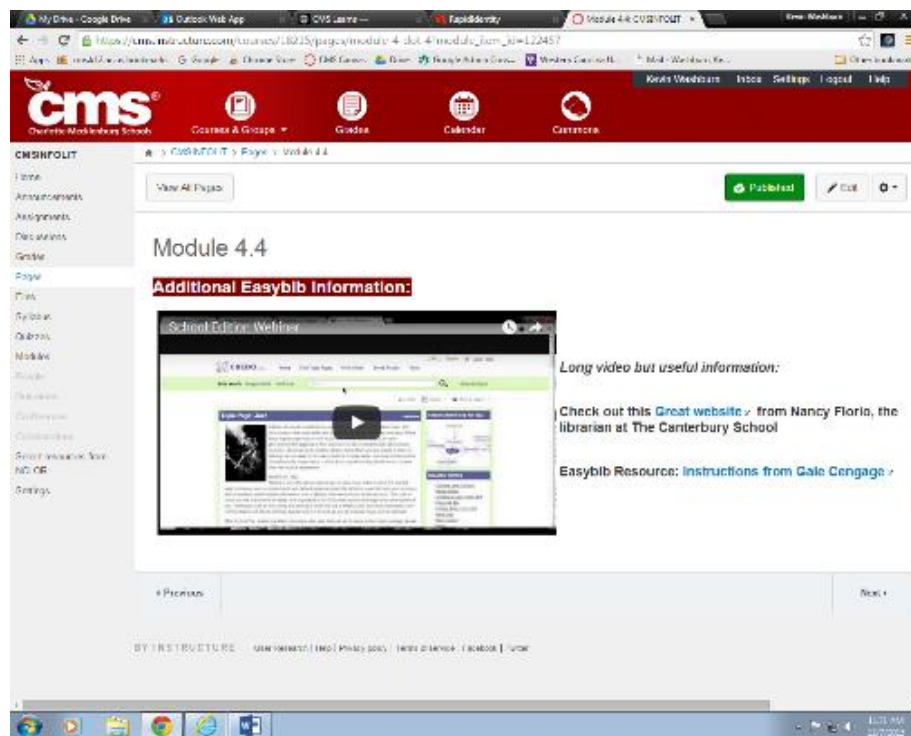


Figure 40. CMSINFOLIT Canvas course screenshot #23.

The screenshot shows the CMSINFOLIT Canvas interface. The top navigation bar includes 'cms' logo, 'Courses & Groups', 'Guides', 'Calendar', and 'Courses'. The left sidebar lists navigation options like Home, Announcements, Assignments, Discussions, Grade, Page, Files, System, Quizzes, Modules, People, Outcomes, Conferences, Collaborations, Select associated user, NO OR, and Settings. The main content area displays 'Module 4 TRAILS Practice Quiz: Develop, use, and revise search strategies'. Below the title, there are instructions: 'Select the best answer from each of the multiple choice questions to follow. All questions used for this practice quiz are from the TRAILS9 website and are used with permission from Kent State University.' A settings table is visible below the instructions:

Quiz Type	Practice Quiz
Points	6
Shuffle Answers	Yes
Time Limit	No Time Limit
Multiple Attempts	Yes
Score to Keep	Highest
Attempts	Unlimited
View Responses	Always
Show Correct Answers	Immediately
One Question at a Time	No

At the bottom, there is a table with columns: Due, For, Available from, and Until. The 'For' column is currently set to 'Everyone'.

Figure 41. CMSINFOLIT Canvas course screenshot #24.

The screenshot shows the CMSINFOLIT Canvas interface for an assignment. The top navigation bar is identical to Figure 41. The left sidebar is also identical. The main content area displays 'Module 4: Assignment'. Below the title, there are instructions: 'Using NCWiseOwl - (If at home, the password is wiseowl15) and visit the Student Research database found on the left hand side of the screen. Search the database for information on global warming. The system will return over 80,000 items. Now, use a combined term search using quote marks (example: "global warming"). #1. Make a note for how many results are returned from this search. Now, conduct the same search for the following and note the number of results returned:'. Below the instructions, there is a settings table:

Points	10
Submitting	Manually or at a time you set

Below the table, there is a table with columns: Due, For, Available from, and Until. The 'For' column is currently set to 'Everyone'. There is an 'Add Rubric' button below the table.

Figure 42. CMSINFOLIT Canvas course screenshot #25.

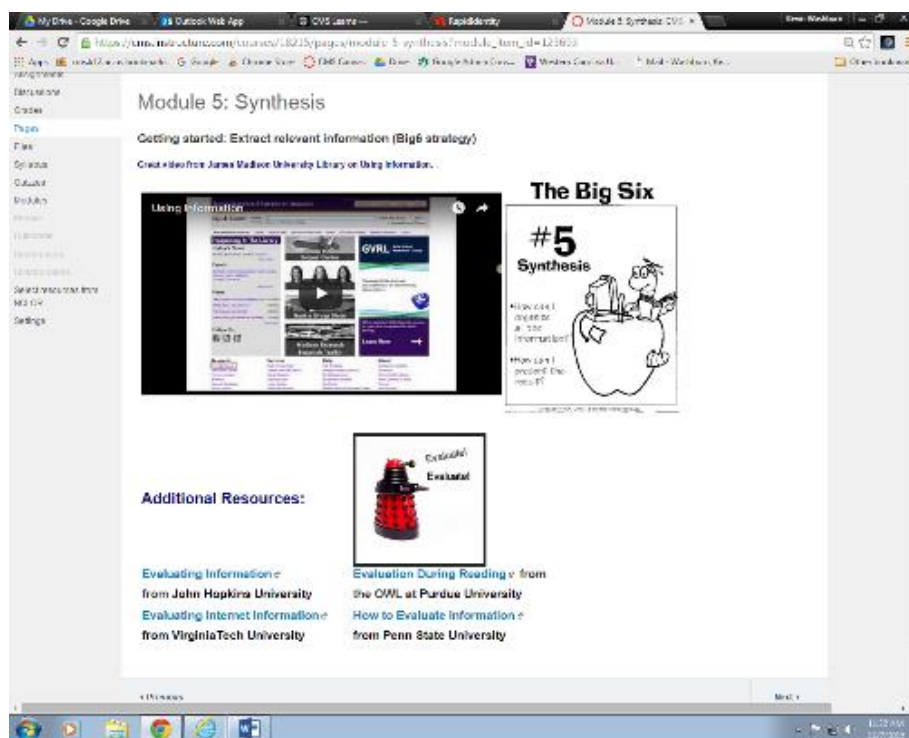


Figure 43. CMSINFOLIT Canvas course screenshot #26.

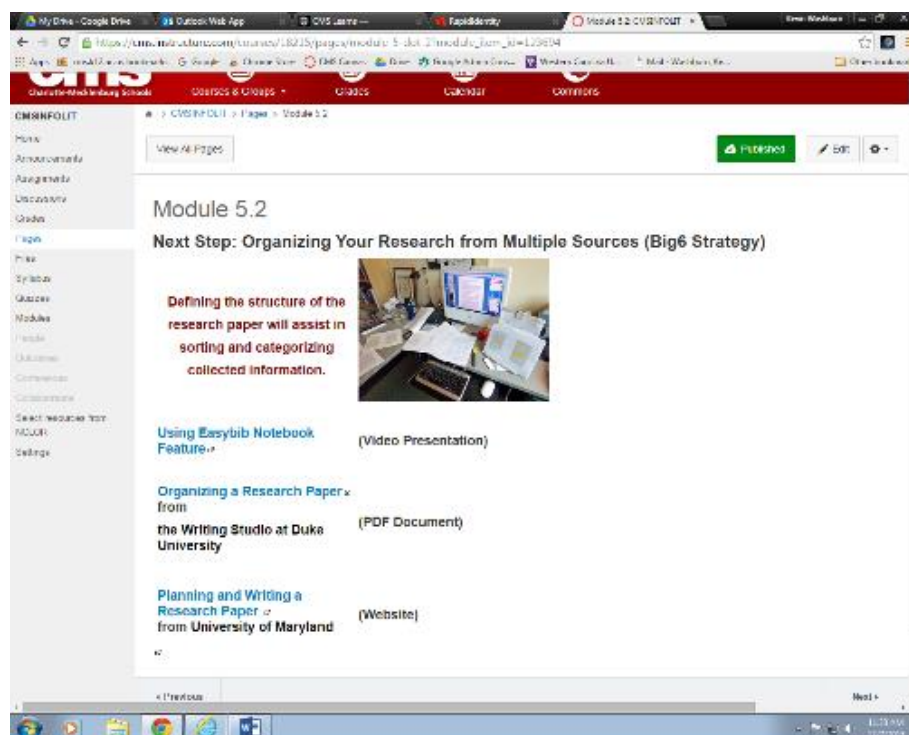


Figure 44. CMSINFOLIT Canvas course screenshot #27.

The screenshot shows a web browser window with the URL <https://cms.instructure.com/courses/18215/pages/module-5-dot-3-responsibility>. The page header includes the CMS logo and navigation icons for Courses & Groups, Grades, Calendar, and Commons. The main content area is titled "Module 5.3: Responsibility" and features a large graphic with a copyright symbol and the text "copyright all rights reserved". Below the graphic, there is a definition of copyright and a list of resources:

- [Plagiarism and Copyright](#) from Empower (pages 4-8)
- [Copyright for Students](#) from NCWiseOwl
- [Top 10 Questions about Copyright](#) from NCWiseOwl
- [Taking the Mystery out of Copyright](#) from the Library of Congress

The bottom of the screenshot shows a Windows taskbar with several open applications, including a PDF viewer and a web browser.

Figure 45. CMSIN FOLIT Canvas course screenshot #28.

The screenshot shows a web browser window with the URL <https://cms.instructure.com/courses/18215/quizzes/7377>. The page header includes the CMS logo and navigation icons for Courses & Groups, Grades, Calendar, and Commons. The main content area is titled "Module 5 TRAILS Practice Quiz: Evaluate sources and information" and features a large text box with the following instructions:

Select the best answer from each of the multiple choice questions to follow.
All questions used for this practice quiz are from the TRAILS9 website and are used with permission from Kent State University.

Below the text box, there is a table with quiz settings:

Quiz Type	Practice Quiz
Points	4
Shuffle Answers	Yes
Time Limit	No Time Limit
Multiple Attempts	Yes

The bottom of the screenshot shows a Windows taskbar with several open applications, including a web browser and a PDF viewer.

Figure 46. CMSIN FOLIT Canvas course screenshot #29.

Module 6.1
Assessing: Evaluation of your work

The research process and path

```

    graph LR
      A[Choose Topic] --> B[Get Background Information]
      B --> C[Refine Topic]
      C --> D[Create Search]
      D --> E[ Gather Results ]
      E --> F[Cite Sources]
      E --> G[Write Paper]
  
```

From Big6 (TM)
Step 6. Evaluation

The Big Six
#6 Evaluation

6.1 Judge the product (effectiveness)
6.2 Judge the process (efficiency)

Big 6 In Action: Evaluation (Checklist)

Figure 47. CMSINFOLIT Canvas course screenshot #30.

cms
Charlotte-Mecklenburg Schools

Module 6.2
Sharing

SHARE
SHARE
SHARE

Research Project Calculator
Graduation Project: Presentation Guidelines
Graduation Project: Portfolio

Additional Resources:
North Carolina Service Learning: NC Graduation Project

Figure 48. CMSINFOLIT Canvas course screenshot #31.

The screenshot shows the CMSINFOLIT Canvas course interface. The top navigation bar includes 'cms' logo, 'Courses & Groups', 'Guides', 'Calendar', and 'Courses'. The left sidebar lists course management tools like 'Home', 'Announcements', 'Assignments', 'Discussions', 'Grade', 'Pages', 'Files', 'Links', 'Syllabus', 'Quizzes', 'Modules', 'People', 'Outcomes', 'Conferences', 'Collaborations', 'Select associate View', 'NO OR', and 'Settings'. The main content area is titled 'Module 6: Use information responsibly, ethically, and legally' and features a 'PUBLISHED' status. Below the title, instructions state: 'Select the best answer from each of the multiple choice questions to follow. All questions used for this practice quiz are from the TRAILS99 website and are used with permission from Kent State University.' A configuration table is displayed:

Quiz Type	Practice Quiz
Points	5
Shuffle Answers	Yes
Time Limit	No Time Limit
Multiple Answers	Yes
Score to Keep	Highest
Attempts	Unlimited
View Responses	Always
Show Correct Answers	Immediately
Use Questions at a Time	No

At the bottom, a table shows the quiz's availability:

Due	For	Available from	Until
	Everyone		

Figure 49. CMSINFOLIT Canvas course screenshot #32.

The screenshot shows the CMSINFOLIT Canvas course interface for an assignment. The top navigation bar and left sidebar are identical to Figure 49. The main content area is titled 'Module 6: Assignment' and features a 'PUBLISHED' status. The assignment instructions are: 'Respond in the text book with your own definition for copyright and how it might impact your everyday life (limit to three sentences or less if possible).' A configuration table is displayed:

Due	For	Available from	Until
	Everyone		

Below the table, there is an 'Add Rubric' button. The bottom of the page shows navigation arrows for 'Previous' and 'Next'.

Figure 50. CMSINFOLIT Canvas course screenshot #33.

The screenshot shows the CMSINFOLIT Canvas course interface. At the top, there is a navigation bar with the CMS logo and user information (Kevin Washburn, Inbox, Settings, Logout, Help). Below the navigation bar, the course title 'CMSINFOLIT' is displayed, along with a breadcrumb trail: 'CMSINFOLIT > Pages > End of Course Review'. A 'View All Pages' button is visible. The main content area is titled 'End of Course Review' and contains the following text:

Review:

CMS Information

Literacy Training Modules

[Interactive Information Literacy Tutorial](#) from the Institute for research and Innovation in Social Services

CMSINFOLIT Resource Page

[Big6™ Evaluate Your Skills Worksheet](#)

Below the text, there is a graphic with two panels. The left panel features a cartoon owl wearing a graduation cap and holding an apple, with a speech bubble that says: 'Congratulations! You've completed the CMSINFOLIT Training. Use your new skills to engage in critical thinking and problem solving.' The right panel is pink and contains three yellow boxes: 'Look For Your', 'CMSINFOLIT Canvas', and 'Badge Coming soon!'. A gift icon is at the bottom right of the graphic.

Figure 51. CMSINFOLIT Canvas course screenshot #34.

The screenshot shows the CMSINFOLIT Canvas course interface for the 'CMSINFOLIT Badge'. The navigation bar at the top is the same as in Figure 51. The main content area is titled 'CMSINFOLIT Badge' and includes the following information:

Student Trained Researcher CMSINFOLIT

Developed by Student Trained Researchers CMSINFOLIT

This badge is issued by Canvas LMS, by [Canvas LMS](#).

You are not a student in this course, so you can't earn this badge.

Below this, there are tabs for 'Current Students' and 'Awarded Students'. A search bar is present with 'Go' and 'Clear' buttons. A table is shown with columns for 'Student', 'Earned', and 'Issued', and a 'Loading...' message below it.

Badge Settings

Badge name: CMSINFOLIT Badge

Badge icon: [cms_infolit_badge_100x100.png](#)

Metadata: [View metadata for this badge](#)

Metadata description: [View metadata for this badge](#)

Figure 52. CMSINFOLIT Canvas course screenshot #35.

APPENDIX E: CMSINFOLIT CANVAS MODULES CONTENT OUTLINE

Table 7

CMSINFOLIT Canvas Module Course Content

Module Page/Section Number	Description
Module Home Page	Information Literacy Skills Training: Module Resource Buttons and Links
Course Overview	<ul style="list-style-type: none"> • Course Summary • About the Instructor Syllabus
Assignments	List of Assignments
Announcements	Posted Course Announcements
Resources	List and Hyperlinks to Additional Resources to Support Information Literacy Instruction
Contact Info.	Contact Information for Kevin Washburn
Module 1	Introduction MakeBeliefsComix created.
Module 1.2	Defining Information Literacy <ul style="list-style-type: none"> • Definition for information literacy from the American Library Association Definition of information literacy from the State University of New York, Plattsburg
Module 1.3	<ul style="list-style-type: none"> • Mike Eisenberg Vodcast #1: “What is Information Literacy?” From ABC-Clio found on SchoolTube Big6™ Image: 1. Task Definition
Module 1 Assignment	<ul style="list-style-type: none"> • Answer information literacy questions
Module 2	What is Inquiry? <ul style="list-style-type: none"> • Big6™ Image: 2. Information seeking strategies • Statement from ACRL Framework • Big6™ Handout: Inquiry Learning
Module 2.2	Inquiry Choosing Your Topic (Links to an external site.) online learning activity from Wichita State University Library: EMPOWER website
Module 2 Assignment	Provide an example for how to define a topic based upon broad, narrow, to specific criteria
Module 2.3	Refining the Question Kent University Recommended video from Calgary University: Developing a good research question.
Module 2 Quiz	Define the question Two practice questions modeled from the TRAILS

Module Page/Section Number	Description
	database.
Module 3	Working with Sources <ul style="list-style-type: none"> • EMPOWER - Starting Your Research: Webpages 2 - 7 Big6™ Image: 3. Location and access
Module 3.2	Finding Sources <ul style="list-style-type: none"> • Kent State University Libraries: Transitioning to college website Resource webpage from the Charlotte Mecklenburg Library
Module 3.3	Primary and Secondary Sources Primary sources on the web: Finding, evaluating, using webpage from the Reference and User Services Association (ALA)
Module 3.4	Locating Sources Using CMS Follett Destiny online library catalog system
Module 3: Assignment	List one useful source that can be used for research not already listed in CMSINFOLIT
Module 3 Quiz	Identify and Search for Potential Sources Three practice questions modeled from the TRAILS database.
Module 4.1	Using Informational Resources <ul style="list-style-type: none"> • MakeBeliefsComix created • Purdue Online Writing Lab webpage for Searching the World Wide Web: Overview Easybib recommendations for searching websites
Module 4.2	Searching Periodicals <ul style="list-style-type: none"> • EBSCOHost tutorial video: Using the advanced search feature Big6™ Image: 4. Use of Information
Module 4.3	Selection <ul style="list-style-type: none"> • Easybib introduction website SchoolTube Video: How to create a project in Easybib
Module 4.4	Additional Easybib Information <ul style="list-style-type: none"> • Easybib School Edition Webinar video • Website from Nancy Florio, librarian at The Canterbury School Gale Cengage Learning: Handout for using Easybib
Module 4 Quiz	Develop, use, and revise search strategies Six practice questions modeled from the TRAILS database.
Module 4 Assignment	Using NC WiseOwl for the Student Research

Module Page/Section Number	Description
	database, find articles on Global Warming, use broad to narrow strategies and count number of returns.
Module 5	Synthesis <ul style="list-style-type: none"> • Video from James Madison University: Research Toolkit - Using Information • Big6™ Image: 5. Synthesis • Flickr Evaluate Image • John Hopkins University Sheridan Library website for Evaluating Information • Virginia Tech University Libraries website for Evaluating Internet Information • Purdue Online Writing Labs website for Evaluating During Reading Penn State University Libraries website for How to Evaluate Information
Module 5.2	Next Step: Organizing Your Research from Multiple Sources <ul style="list-style-type: none"> • Easybib Notebook Overview • Duke University: Writing Studio PDF on Organizing a Research Project University of Maryland University College Online Guide to Writing and Research
Module 5.3	Responsibility <ul style="list-style-type: none"> • Copyright symbol image from Flickr • Copyright definition from the U.S. Copyright Office • EMPOWER Citing Sources - Plagiarism: Webpages 4 - 8 • Copyright for Students from NC WiseOwl Interactive copyright website from the Library of Congress
Module 5 Quiz	Evaluate sources and information Four practice questions modeled from the TRAILS database.
Module 6.1	Assessing: Evaluation of your work <ul style="list-style-type: none"> • Research paper process image from Flickr • Big6™ Image: 6. Evaluation Big6™ Checklist for a writing assignment
Module 6.2	Sharing <ul style="list-style-type: none"> • Research Project Calculator • CMS Graduation Project: Presentation Guidelines • CMS Graduation Project: Portfolio

Module Page/Section Number	Description
	North Carolina Service Learning Wiki: NC Graduation Project
Module 6 Quiz	Use information responsibly, ethically, and legally Three practice questions modeled from the TRAILS database.
Module 6: Assignment	Define copyright
End of Course Review	<ul style="list-style-type: none"> • Interactive Information Literacy from the Institute for research and Innovation in Social Services • CMSINFOLIT Module Resource Page • Big6™ Evaluate Your Skills Worksheet MakeBeliefComix illustration
Completed Module	<ul style="list-style-type: none"> • Badge Recognition

APPENDIX F: CMSINFOLIT COURSE MODULE REFERENCE LIST

Below is a list of resources that were used within the CMSINFOLIT Canvas modules as curriculum and content related resources.

ABC Clio. (2011, March 23). *Mike Eisenberg Vodcast #1: What is information literacy?* Retrieved from <http://bit.ly/WZCqy5>

Association of College and Research Libraries. (2015, February 2). *Framework for information literacy for higher education*. Retrieved from <http://www.ala.org/acrl/standards/ilframework>

Badke, W., Baer, R., & University of Calgary. (2008, June 4). *Developing a good research question*. Retrieved from https://youtu.be/vK6_U4SCZSc

Canvabadges. (2015). Retrieved from <https://www.canvabadges.org/>

Canvas by Instructure. (2016). Retrieved from <https://www.canvaslms.com/>

Charlotte Mecklenburg Library. (2015). *Resources*. Retrieved from <https://www.cmlibrary.org/resources>

Charlotte-Mecklenburg Schools. (2014, April 29). *Graduation project: The presentation guidelines*. Retrieved from <http://www.cms.k12.nc.us/cmsdepartments/ci/grad-project/Pages/ThePresentation-Guidelines.aspx>

Charlotte-Mecklenburg Schools. (2014, April 29). *Graduation project: The portfolio components*. Retrieved from <http://www.cms.k12.nc.us/cmsdepartments/ci/grad-project/Pages/ThePortfolio-Components.aspx>

Easybib: Imagine Easy Solutions LLC. (2013, October 31). School edition webinar. Retrieved from <https://youtu.be/B5hE413tUbM>

Easybib: Imagine Easy Solutions LLC. (2014, November 25). *General notebook overview*. Retrieved from <http://imagineeasy.freshdesk.com/support/solutions/articles/4000036391-general-notebook-overview>

Easybib: Imagine Easy Solutions LLC. (2015a). *EasyBib: Introductory tutorial*. Retrieved from <http://www.easybib.com/help/intro>

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- Eisenberg, M., & Berkowitz, B. (1990). *A Big6™ skills overview*. Retrieved from <http://big6.com/pages/about/big6-skills-overview.php>
- Eisenberg, M., & Berkowitz, R. (1996a). *Big6™ coloring pages: 1. Task definition* [Worm and apple design]. Retrieved from <http://big6.com/media/freestuff/lwormtrans1.gif>
- Eisenberg, M., & Berkowitz, R. (1996b). *Big6™ coloring pages: 2. Information seeking strategies* [Worm and apple design]. Retrieved from <http://big6.com/media/freestuff/lwormtrans2.gif>
- Eisenberg, M., & Berkowitz, R. (1996c). *Big6™ coloring pages: 3. Location and access* [Worm and apple design]. Retrieved from <http://big6.com/media/freestuff/lwormtrans3.gif>
- Eisenberg, M., & Berkowitz, R. (1996d). *Big6™ coloring pages: 4. Use of information* [Worm and apple design]. Retrieved from <http://big6.com/media/freestuff/lwormtrans4.gif>
- Eisenberg, M., & Berkowitz, R. (1996e). *Big6™ coloring pages: 5. Synthesis* [Worm and apple design]. Retrieved from <http://big6.com/media/freestuff/lwormtrans5.gif>
- Eisenberg, M., & Berkowitz, R. (1996f). *Big6™ coloring pages: 6. Evaluation* [Worm and apple design]. Retrieved from <http://big6.com/media/freestuff/lwormtrans6.gif>
- Eisenberg, M., & Berkowitz, R. (2014, January 28). *Inquiry learning Big6™-style: It all starts with asking great questions!* Retrieved from [http://big6.com/media/Eisenberg-Berkowitz-Inquiry%20Learning%20Questioning%20Webinar%202014\(1\)](http://big6.com/media/Eisenberg-Berkowitz-Inquiry%20Learning%20Questioning%20Webinar%202014(1)).
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APPENDIX G: CMSINFOLIT WEEBLY WEBPAGE

CMS INFORMATION LITERACY HOME ABOUT CONTACT MORE...

MASTERING INFORMATION LITERACY SKILLS FOR HIGH SCHOOL STUDENTS

Resource list that addresses the four information literacy standards and aid students in developing problem solving skills.

What is information literacy?

The American Library Association defines information literacy as the capacity "To recognize when information is needed and have the ability to locate, evaluate, and use effectively" (ALA, 1989). Information literacy as a skill forms the foundation for critical thinking and problem solving.

Resources (aligned to AASL Standards and TRAILS Strands)

Standard 1: Inquire, think critically, and gain knowledge.

- Strand 1: Developing a topic
- Strand 2: Locating valid source information

Standard 2: Draw conclusions, make informed decisions, apply knowledge to new situations, and create new knowledge.

Strand 3: Utilizing successful search strategies

- Strand 4: Strategies for selecting the best sources for information

Standard 3: Share knowledge and participate ethically and productively as members of our democratic society.

- Strand 5: Responsible, ethical and legal use of information

Standard 4: Pursue personal and aesthetic growth.

- All strands apply

Relevant Online Resources:

- Big6 Information Literacy Model
- EMPOWER: Information Literacy practices activities from Wichita State University Libraries (2014)
- Finding Information on the Internet: A Tutorial from UC Berkeley Library
- NCWiseOwl Online Resources for NC Public and Charter Schools
- OWL Online Writing Lab from Purdue University
- Kathy Schrock's Guide to Everything: Information Literacy Resources
- Evaluating Internet Resources

Additional Information Literacy Resources:

- How to do research from the Kentucky Virtual Library
- Research it Right from Acadia University

Figure 53. CMSINFOLIT Home Weebly Webpage.

APPENDIX H: STUDENT PERCEPTION SURVEY RESULTS

Table 8

Student Perception Survey Questions and Results

Item #	Agree	Somewhat Agree	Neither	Somewhat Disagree	Disagree	Total Responses	Mean
<i>Question 1. Information literacy is an essential skill area that enables me to successfully conduct research.</i>							
1	49	31	9	1	2	92	1.65
<i>Question 2. The TRAILS: Tools for Assessing Information Literacy Skills test is a good indicator of knowledge for information literacy.</i>							
2	40	28	18	3	3	92	1.92
<i>Question 3. The training and resources that I received after the first assessment using the TRAILS test increased my knowledge on the process for developing a research topic.</i>							
3	33	37	14	3	4	91	1.99
<i>Question 4. Examining all of the potential elements, factors, keywords, and historical context to a topic can provide ideas.</i>							
4	50	29	8	2	3	92	1.68
<i>Question 5. The training and resources that I received after the first assessment using the TRAILS test increased my knowledge on locating valid source information.</i>							
5	41	30	14	3	4	92	1.90

Table 8

Cont.

Item #	Agree	Somewhat Agree	Neither	Somewhat Disagree	Disagree	Total Responses	Mean
<i>Question 6. Using authoritative and scholarly books, databases, and publications increases the potential for locating relevant and accurate information.</i>							
6	44	27	14	5	2	92	1.85
<i>Question 7. The training and resources that I received after the first assessment using the TRAILS test increased my knowledge on utilizing successful search strategies.</i>							
7	38	31	15	6	1	91	1.91
<i>Question 8. Conducting research in an organized manner as part of an overall plan increases the potential for success.</i>							
8	52	24	12	3	1	92	1.66
<i>Question 9. The training and resources that I received after the first assessment using the TRAILS test increased my knowledge for selecting the best sources for information.</i>							
9	38	30	18	3	3	92	1.95
<i>Question 10. Finding relevant primary resources is a critical component for successfully conducting research.</i>							
10	48	31	11	1	1	92	1.65
<i>Question 11. The training and resources that I received after the first assessment using the TRAILS test increased my knowledge on the responsible, ethical, and legal use of information.</i>							
11	33	30	23	3	2	91	2.02

Table 8

Cont.

Item #	Agree	Somewhat Agree	Neither	Somewhat Disagree	Disagree	Total Responses	Mean
<i>Question 12. I have an obligation to cite and follow recommended practices for using source information as part of an overall research process.</i>							
12	49	22	17	3	1	92	1.75
<i>Question 13. I value the training that I received after the first information literacy assessment and time well spent.</i>							
13	33	34	18	5	2	92	2.01
<i>Question 14. Expanding my information skill knowledge will better enable me to conduct research and solve problems.</i>							
14	41	32	12	4	2	91	1.84
<i>Question 15. I feel more prepared to complete my graduation research project.</i>							
15	41	27	15	4	4	91	1.93