A THEORY OF RESEARCH LITERACY: THRESHOLD PERFORMANCE SKILLS FROM CLASSROOM TO PRACTICE

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ABSTRACT

There are two different, yet related, concrete research realities in library and information science: 1) competencies for designing and conducting quantitative, qualitative, and mixed methods research; and, 2) competencies for using advanced techniques for searching, retrieving, interpreting, critically evaluating and using primary (empirical, peer-reviewed research) and secondary (second-hand reflections or filtered accounts) sources. This paper discusses and defines research literacy and presents threshold performance skills for the professional librarian in four areas of research expertise: bodies of knowledge; evidence-based actions; customization of resources; and organization of information.

KEYWORDS

research; information literacy; research literacy; library and information science education

Librarians and information professionals frequently use the word research in multiple contexts and with many subtle variations in meaning. It is important to be mindful and clear about what we mean. The word research is derived from the French word recherché that means to “search for, seek, try to obtain” (Urwin, 1988, p. 414). How can professional librarians and information professionals use the term research to most efficiently and effectively convey to many audiences in need of multiple ways of knowing what is meant to search for, or go about seeking, information as critical consumers and communicators? In addressing this question, it is necessary to isolate and present specific points-of-reference about use of the term research. It is important to use words and concepts that differentiate between two different, yet related, concrete research realities: 1) competencies for designing and conducting quantitative, qualitative, and mixed methods research; and, 2) competencies for using advanced techniques for searching the content of information resources. Information literacy anchor frames (ACRL, 2015) and institutions addressing the need for articulated research literacy competencies are especially important to achieving this distinction.

A focus on research literacy, that is, skillful searching, retrieving, interpreting, critically evaluating and using primary (empirical, peer-reviewed research) and secondary (second-hand reflections or filtered accounts) literature, is relevant to all educators’ who participate in the pursuit to increase intellectual growth in college students as well as to sustain critical pedagogy across academic disciplines and into professions. It is important to acknowledge that practices, processes, and intellectual products that comprise the academic environment are politically and socially constructed. Educators, therefore, must assume the responsibility to instruct students to question underlying principles they discover in the academic environment and within existing systems of knowledge.

With these basic premises in mind, after a brief overview of information literacy, our discussion begins with a brief synopsis of the emerging, specialized form of information literacy, research literacy. We provide language for describing librarians’ and information professionals’ dual research realities. We also share a model for teaching research literacy competencies to master’s level library and information science (LIS) students that can be used across the spectrum of professional education to assess proficiencies of practicing information professionals. Our research literacy model was presented at the 2016 Association for Library and Information Science Education annual meeting in Chicago, IL. Since then, we have had requests to share our thinking and model with other LIS educators.
FROM INFORMATION LITERACY TO RESEARCH LITERACY

An overview of developing influences on the theoretical concept of research literacy would not be complete without brief mention of what might be considered research literacy’s close, well-known predecessor, information literacy. Many point out that it was Zurkowski (1974), a former president of the Information Industry Association, who first introduced librarians to the concept of information literacy. Cunningham and Rosenblatt (2015) emphasize that while information literacy was taught in libraries for at least a century earlier, it was not until nearly 20 years ago that the American Library Association (ALA, 1989) defined information literacy as “one’s ability to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information” (section 2, para. 7). Cunningham and Rosenblatt highlight use of the ALA’s 1989 definition of information literacy by organizations outside libraries such as UNESCO, the National Council of Teachers of English, and the Association of American College and Universities as well as use inside library organizations such as the American Association of School Libraries, the Public Library Association, and the Association of College and Research Libraries.

Today, many academic librarians use the ACRL (2015) Framework for Information Literacy in Higher Education as a source of authority and guidance in the development of learning outcomes and instructional programming. The ACRL framework, intended to encourage development of authentic options for implementation, is comprised of six anchor frames related to the ACRL’s new description of “information literacy” (para, 5) including “authority is constructed and contextual; information creation as a process; information value; research as inquiry; scholarship as conversation; and searching as strategic exploration” (para. 2). Taken together, we believe these frames suggest the need for a new concept, and a new set of competencies for librarianship: research literacy. From the lens of librarianship, becoming a research literate professional emphasizes the process of transitioning students from their solo reliance on Google to the use of scholarly, professional, and educational information sources. Research literacy competencies open the door to collaboration that can potentially serve to improve conditions of information production and dissemination that exist today. They help to explain what librarians mean when using the term research.

Just as information literacy has developed overtime and has been promoted as a survival skill needed in a democratic society during the Information Age (Soni & Goodman, 2017), the phenomena of research literacy has emerged and is evolving as a set of skills necessary not only for life in a democratic society but also for innovation and growth of a new, global highly technical workforce as described by the National Academy of Engineering, Policy and Global Affairs, & Board of Higher Education and Workforce (NRC, 2012). In the past decade, for example, Mackey and Ho (2005) recognized the need for a new concept when they combined research literacy (information literacy) and web literacy (technology literacy) to form a convergent model for information literacy that they used to investigate instruction in an upper level college course. In their study, Mackey and Ho described research literacy as “library and online research, including database searching, evaluation of materials, the differentiation of sources, and the synthesis of information through writing and revisions” (p. 545). In addition, evolution of the concept of research literacy has gained momentum as new efforts are made by the United States (U. S.) government and private education establishments to identify the value of a college education in terms of educational competencies associated with various academic areas. Through interrelated discussions of what are necessary outcomes now and in the future for graduates of college degree programs, it is becoming clear what is meant by solidly preferred interdisciplinary and use of cross-cutting intellectual skills.

The National Science Foundation (NSF, 2017) in their efforts to describe a highly technical workforce has established a high bar for interdisciplinary research that contributes to defining research literacy. The NSF
through the work of career employees and scientists, engineers, educators, and students at universities has identified multiple research areas for innovative and integrative activities including Biological Sciences; Computer and Information Science and Engineering; Geosciences; Mathematics and Physical Sciences; Social, Behavioral and Economic Sciences; and Education and Human Resources. In addition, the Lumina Foundation (LF, 2017), an independent U. S. organization that states its purpose is “to making opportunities for learning beyond high school available to all” (para. 1), has created a Degree Qualification Profile (DQP, 2014) that identifies six cross-cutting Intellectual Skills (IS) that college graduates should know and be able to do at the associate, bachelor’s and master’s levels. The LF cross-cutting, intellectual skills can be associated with research literacy.

For example, Use of Information Sources, one of the six core LF DQP (2014) Intellectual Skills, significantly contributes to differentiation of learner-centered, research literacy competencies. According to the DQP, “[t]here is no learning without information” (p. 16). Use of Information Sources is therefore a necessary cognitive capacity developed over a range of levels of academic education that enables an individual at the associate, bachelor, and master’s degree levels “to find, organize and evaluate information in order to work with it and perhaps contribute to it” (p. 16).

At the associate’s level, the student with capacity for use of information source skills can “identify, categorize, evaluate and cite multiple information resources so as to create projects, papers or performances in either a specialized field of study or with respect to a general theme within the arts and sciences” (LF, DQP, IS1.2, p. 16). At the bachelor’s level, the student “locates, evaluates, incorporates, and properly cites multiple information resources in different media or different languages in projects, papers or performances, and generates information through independent or collaborative inquiry and uses that information in a project, paper or performance” (LF, DQP, IS2.4, p. 16). At the master’s level, the student with capacity for use of information source skills “provides evidence (through papers, projects, notebooks, computer files or catalogs) of contributing to, expanding, evaluating or refining the information base within the field of study (LF, DQP, IS3.2, p. 16). Consciousness of the DQP’s six core Intellectual Skills contributes to defining proficiencies that should come from an effective college education that includes library instruction by professional librarians and influences understanding of research literacy.

Descriptions of sets of skills needed for high quality searching that serve to influence understandings of research literacy are also found across a wide variety of professional fields and academic areas. From the point-of-view of naturopathic medicine in the U. S., Senders, Erlandsen, and Zwickey (2014) describe and promote research literacy as “the ability to access, interpret, and critically evaluate primary medical literacy” (para. 2). Beaudry and Miller (2016), professors of educational leadership at the University of Southern Maine, assert that research literacy is “the ability to locate, understand, discuss, and evaluate different types of research, to communicate accurately about these, and to use findings for academic and professional purposes” (p. 4). Beaudry and Miller also state that this set of skills requires that a researcher have understandings about “what is knowable and how it can be known” (p. 5).

The American Association of Law Librarians (2013) identifies approved Principles and Standards for Legal Research Competency. These principles include

- foundational knowledge of the legal system and legal information sources; gathering information through effective and efficient research strategies; critical evaluation of information; application of information effectively to resolve a specific issue or need; and ability to distinguish between ethical and unethical uses of information, and understands the legal issues associated with the discovery, use, or application of information. (para. 3).

Partin and Wise (2016) define legal research proficiencies and how law firms, law schools, the courts, government, and users in other related settings use them to improve research. They outline a scaffolded
framework in three stages over the first year that moves new associates through learning a series of competencies necessary for doing legal research. They recommend a strategic approach to developing a curriculum, assessing outcomes, and measuring competencies to ensure that instruction is the best it can be and students learn at a high level.

From the point-of-view of library and information science, Markey (2016), a professor in the School of Information at the University of Michigan, influences understandings of research literacy in her articulation of a skill set for high quality searching as well as skills to function as a professional librarian assisting library users. Markey recommends that online searching begin at the “library’s database hub” (p. 16). She describes skills for engaging in technical reading of databases and their systems; selecting relevant databases for locating research and assessing research impact; and search strategies including use of control vocabulary, free text searching, and known-item searching. Markey also identifies best practices in individualizing reference interviews and services for professional librarians that are informed by theories of information behavior.

RESEARCH LITERACY FOCUSES ON PROFESSIONALS

The ideas that we have expressed above, ours and others, have converged in our definition of research literacy as having two different, yet related, realities. While ALA’s (1989) definition of information literacy is focused on individual achievement of knowing when and how to use information, research literacy is focused on professionals’ knowledge and skills. A research literature professional has knowledge of advanced techniques, strategies, and competencies that are used on behalf of someone else as well as to resolve their own information needs, which are often more sophisticated than other library users, even other scholars. Research literacy encompasses not only searching, retrieving, interrupting, critically evaluating and using primary and secondary literature to synthesize and write in multiple formats but also designing and conducting quantitative, qualitative, and mixed methods research. The research literate professional

- recognizes that research literacy focused on professional knowledge and skills is a specialized form of information literacy.
- is skillful at searching, retrieving, interpreting, critically evaluating and using primary and secondary sources.
- differentiates among information sources and communicates research-based evidence in various formats.
- leads students from solo reliance on Google to the use of scholarly, professional, and educational information sources.

A research literate professional has grasped the threshold concepts that move them from a novice user of information to someone who as a new identity as a researcher. This transformation that we expect from novice to professional, as described by Tucker et al. (2014), “causes a significant change in the person’s understanding, simultaneously with a shift in identity” (p. 153) that can be demonstrated through research literacy competencies.

IMPLEMENTING RESEARCH LITERACY IN LIS CURRICULUM

The Emporia State University (ESU), School of Library and Information Management faculty approved research literacy competencies for their first-year Master of Library Science (MLS) courses. Dow and Sutton (2014) published a white paper titled Research Literacy that identifies standards alignment and research literacy competencies that are outlined in terms of threshold performance skills and are embedded in the first four required MLS courses. There are four phases (two semesters) of the research literacy curriculum and threshold competencies. Following is the second edition updated with what we believe are minor edits for improvement.
Semester One

801, Foundations of Library and Information Science, Threshold Concept: Librarians are information professionals who exercise ethical decision-making as they function in the context in the global information society. An advanced beginner research literate information professional who has grasped this threshold concept can:

- identify bodies of published literature in a variety of subject areas including library and information science.
- use a library’s data hub to access and retrieve information resources using basic and advanced search techniques.
- use technology responsibly to establish online identity.
- communicate using etiquette appropriate for the situation.
- apply principles of information ethics to promote social justice, advocate against policies that undermine public interests, and further the common good.
- make accurate use of APA in-text and end-of-text citation rules.

810, Research in Library and Information Science, Threshold Concept: Librarians are consumers and critics of published research literature who use research-based evidence to make claims about best practices and to lead change. An advanced beginner research literate information professional who has grasped this threshold concept can:

- make appropriate database choices for inquiry about specific topics.
- locate, retrieve, and evaluate quantitative, qualitative, and mixed methods research based-evidence for use in scientific argumentation and making explicit and defensible connections between questions, observations, data, claims, and evidence.
- communicate research-based evidence in a variety of formats to recommend best practices in specific libraries (e.g., academic, public, government, school, and special).
- make accurate use of APA rules when writing academic paper, presentation, or poster.

Semester Two

802, Information-Seeking Behavior and Reference Services, Threshold Concept: High quality reference and information literacy services in libraries and other information agencies requires knowledge and application of theory and evidence based standards. An advanced beginner research literate information professional who has grasped this threshold concept can:

- apply theories of information behavior and models of information seeking, retrieval, and use to conduct a successful reference interview.
- apply theories of learning, information behavior, and information literacy to the conduct of bibliographic instruction.
- use knowledge of reference sources and services to assist others to fulfill a specific information need.
- create reference guides in multiple formats that are suitable for storing and publishing in response to societal consumption trends.
- use universal design principles in response to patron needs.
- make accurate use of APA rules when creating reference guide and instructional materials.
- create reference guide for communicating with target audiences.

804, Information Organization, Threshold Concept: Theories, models, and mechanisms for information organizing inform user-centered design decisions for creating and improving information organizing systems. Knowledge of these theories, models, and mechanism improves advanced beginner searchers’ ability to find, identify, select, obtain, navigate, and share information resources and to teach
others to do the same. An advanced beginner research literate information professional who has grasped this threshold concept can:

- recognize APA citation style manual as a metadata schema and use it to correctly cite sources.
- apply knowledge of information organization theories, models, and tools to find appropriate, trustworthy, authoritative sources.
- determine what metadata elements are appropriate for a particular organizing system.
- create a system for organizing information resources that meets the information needs of a particular group of information users/seekers.

Based on governmental, private sector, university, and other professional perspectives of necessary use of information sources, we approach research literacy as a set of skills that master’s level LIS students use themselves when searching and seeking information and should use to provide library instruction with individuals and groups. In addition, our research literacy theory concentrates on quantitative, qualitative, and mixed methods philosophical concepts and methodologies for designing and conducting research and using research-based evidence to inform best practices and to lead change. We maintain that searching in electronic information resources such as library databases requires professional proficiencies not likely to be fully realized except through competency-focused library and information studies (LIS) education. In other words, while some scholars and professional may be knowledgeable of library sources, excellent online searching and use of primary and secondary sources requires a combination of formal education and continuous practice in order to become reliable in the librarian’s roles to curtail post-truth and do-it-yourself fact finding.

**ASSESSING OUTCOMES**

Our first step in delivering instruction was to identify essential, achievable, and measurable learning outcomes or the skills and knowledge that students should take away from two courses in the first semesters, and two courses in the second semesters with the goal of completing all 21 research literacy competencies by the end of the second semester. Students are informed about research literacy instruction during orientation and reminded of the research literacy competencies running through the first four courses whenever they see our research literacy logo image in course syllabi and/or assignment documents (Table 1).

Our goal is for students to grasp all four threshold concepts and to function at an advanced beginner level (Dreyfus & Dreyfus, 1980) of research literacy by the end of their second semester, then engage in knowledge building and practice-specific training throughout the degree program, and make use of the overall research literacy curriculum once employed in a library or other information environment. Our research literacy competencies provide a ready-made checklist of knowledge and skills. Incorporating these competencies does not require a complete revision to the MLS curriculum. A comparison of research literacy competencies and competencies taught in the MLS curriculum reveals that many research literacy competencies are included in various ways. Likewise, making a comparison reveals critical gaps that are then integrated into a course. Our research literacy competencies are as relevant to library and information practice environments as they are to learning in the School. They facilitate curriculum-competency planning across the educational spectrum. Not only do our graduates become research literate, they know a model and process for providing research literacy instruction.

**MEASURING COMPETENCY**

The purpose of assessment is to improve student proficiency and to enrich instructional methods and materials to achieve projected outcomes. Whether formative or summative, assessment in our formal research literacy instruction (Table 2, Table 3) consists of demonstration, presentations, quizzes, and
written assignments. Rubrics are an informative measure of student achievement, especially for assignments that incorporate multiple learning outcomes. We have developed common rubrics that are applied to assess various levels of research literacy skills at the same assignment point in each of the four courses in which research literacy is taught and in multiple sections of a course taught by multiple members of the faculty. These common assessments are used as audits to review the effectiveness of instruction and to determine what revisions to instruction are indicated to improve student’s research literacy knowledge and skills.

Our faculty audits are intended to inform faculty benchmarks and to identify learning experiences of benefit to professional librarians. During our audits, we discuss use of materials and their relevance to each of the four phases of the research literacy curriculum. Audits also enable the School’s faculty and the university library faculty to play key roles in teaching library school students to meet library user expectations and to advance students’ future careers.

Self-assessment is another tool in our formal research literacy instruction. Guided self-questioning, introspection, and self-assessment can raise awareness about established expectations for research literacy competencies, stimulate conversation about research literacy skills, and offer opportunities for students to consider their individual strengths and weaknesses. Self-assessment, though not considered an objective evaluation of outcomes, can provide a method to measure improvement over time. We have developed a self-assessment survey based on the research literacy competencies. MLS student at the end of their fourth course will be asked to answer yes if they feel competent or no if they feel the need for more experience or knowledge. This survey instrument can be adapted as a check list for use in variety of environments and with librarians at all stages of their career to inform and create opportunities for professional development training programs.

CONCLUSION

It is important for librarians and information professionals to be mindful and clear about what we mean when using the word research. Otherwise, we remain at high risk of failing to accurately communicate our specialization in information sources and services that includes the dual research realities of 1) designing and conducting LIS research studies, and 2) using published research from many disciplines and reference sources to advance and defend new ideas. Now, as the volume of web resources increase, one of the greatest opportunities for academic librarians is to transition college students from reliance on Google to making appropriate use of the online electronic information resources and trustworthy reference sources. Research literacy competencies are vital to college students as they progress into interdisciplinary graduate and post-graduate studies, jobs and careers in a highly technical workforce. A strategic and measured approach to instruction and learning of research literacy may be an institution’s next step in making use of the ARCL (2015) frames. We hope you will use our model as it is or use it as a starting place for your institution’s own model.

REFERENCES


**Table 1**

Research Literacy Image for Course Syllabi and Instructional Materials

![Research Literacy Image](image)

**Note:** A circle is used to signify the course wherein the image appears (e.g., LI801, LI810, LI802, LI804).
Table 2

Research Literacy Course Descriptions and Learning Outcomes, LI801 and LI810

LI 801: Foundations of Library and Information Science (3 credit hours)
An introduction to information agencies and professions, this course examines the philosophical and ethical underpinnings, roles and societal contexts, and current issues of the global information society. Students explore the role of information in society, change as reflected in paradigm shifts, the theory and processes of information transfer, and the characteristics of information professionals and professional practices. (Required) Recommended for all new MLS students in their first semester. (Approved 11/9/11)

Course Learning Outcomes
1. Describe the missions and values of libraries and information organizations from past to present.
2. Identify and discuss current and developing issues in library and information management taking into account a variety of political, economic, technological, and social forces.
3. Explain and apply the information life cycle.
4. Demonstrate knowledge of the basic principles of information ethics and the ability to apply a model for ethical decision-making.
5. Identify and integrate personal values, beliefs, and behaviors with core tenets of the library and information management profession.
6. Have a vision of professional service and demonstrate adaptability and openness to new ideas.
7. Work effectively and collaboratively with others, online, one-to-one, and in large and small groups.

LI 810: Research in Library and Information Science (3 credit hours)
Introduction to qualitative and quantitative research methods and their applications in library and information science. Principles and procedures for analyzing and evaluating research are introduced. Students learn to be better consumers and critics of published research literature. (Required) Prerequisite: LI 801.

Course Learning Outcomes
1. Describe the importance of research to the practice of library and information science.
2. Discuss ethical issues involved in conducting research.
3. Explain the stages of the research process.
4. Define the characteristics of quantitative, qualitative, and mixed methods research.
5. Analyze, critique, and evaluate methods and findings from current library and information science literature.
Table 3

Research Literacy Course Descriptions and Learning Outcomes, LI802 and LI804

LI 802: Information-seeking Behavior and User-centered Services (3 credit hours)
An introduction to the theories of information-seeking behavior and their application to user-centered services. Students are introduced to models of information seeking, retrieval and sharing; the selection, evaluation, and use of appropriate electronic and print resources; information literacy, learning styles, and best practices in providing user-centered services. (Required) Prerequisite: LI 801 or concurrent enrollment.

Course Learning Outcomes
1. Identify major models of information-seeking behavior as applied to the design, implementation, and evaluation of information services.
2. Describe individual differences, including learning styles, and their effects on user services.
3. Identify, describe, and evaluate the basic types of electronic and print information sources available in libraries and other information organizations.
4. Discuss the components of information literacy and related instructional methods strategies.
5. Use instructional strategies for user-centered services.
6. Can deliver library instruction.

LI 804: Organization of Information (3 credit hours)
Introduction to the individual, social, and institutional perspectives of organizing information. Students examine the assumptions, practices, issues and tools of commonly used subject analysis and classification systems in various types of information organizations. The impact of different approaches to accessing information is emphasized. (Required) Prerequisite: LI 801 or concurrent enrollment.

Course Learning Outcomes
1. Describe information access systems and how they reflect the role of organization in human endeavors.
2. Explain and provide examples of information access systems that have been developed to make sense of collections of information.
3. Explain how theories of organization of information can be applied to the design of information retrieval systems.
4. Identify appropriate approaches to the organization of information objects in various situations and environments.
5. Demonstrate knowledge of theories of organization of information relevant to information objects, collections of information objects, and systems for organizing information objects.