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Abstract

Information literacy and metacognition have long histories of addressing the same concerns: how people think about and evaluate what they have learned. By exploring research from the library science and cognitive psychology fields, this article highlights how these two concepts are related and how that relationship can be made more explicit in the way librarians talk about and teach information literacy.

Keywords: information literacy instruction, classroom assessment, faculty development, reflection, reflective practice

Perspectives
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Teaching and Assessment of Metacognition in the Information Literacy Classroom

I have been part of the academic library field for almost twenty years, and the prevailing question in my branch of the profession—reference and instruction—is "what are students learning? How do we know?" I have had more conversations than I can count about teaching strategies, assessment strategies, learning outcomes, backward design, and assignment design—complete with anecdotes regarding successful and failed attempts at change and implementation of all those ideas. Through it all, the claim is consistent: librarians are uniquely equipped to work with students and to partner with teachers and faculty at all levels of education to provide support and expertise regarding the incorporation of information literacy, critical thinking, and metacognitive skills into their courses. All three of those concepts center on understanding the nature of the information problem that needs to be solved, identifying the variety of ways to solve it, evaluating the potential solutions presented, and reflecting on the outcome to determine its value in providing the answer to the problem.

However, the way these concepts are taught, practiced, and reinforced is up for debate and is the driving force behind many of the conferences, conversations, and literature in the library field. We tend to focus primarily on information literacy as a combination of separate skills–searching, finding, and evaluating–without examining how those skills reflect the thinking and learning that is occurring during those processes. This thinking and learning, which is often "invisible" in the information literacy classroom, is at the center of metacognitive attentiveness. While conversations and connections regarding information literacy, critical thinking, and metacognition have been made for multiple decades within the library profession, I am not confident that we have been explicit in describing this relationship outside our own community. It is time for librarians to express those discrete connections in order to demonstrate to faculty and administrators that information literacy is an essential aspect of all levels of learning, not simply because of its measurable skills, but also because it develops students' thinking and awareness. The following research illustrates the interconnectedness of these ideas as well as the conversation gap between these areas of study. It also highlights some simple but specific ways librarians can begin scaffolding metacognition into their information literacy classrooms.

I began exploring the idea of metacognition more deeply in the fall of 2020 and was curious about its relationship to information literacy theory and practice. The discussions I have had around metacognition use the definition "thinking about thinking." That is a very casual way to describe the evaluative goals of information literacy– that is, teaching students how they know what sources are the best fit for their needs. Students need to pause and identify what they think about a source before deciding on its appropriateness. However, I did not understand metacognition as encompassing a unique skill set of its own. This skill set includes not only evaluation but also reading and recall strategies, realizing when a thinking path is not beneficial to a project, and incorporating "repair" strategies to correct one's thinking. The benefits of incorporating metacognition specifically into an information literacy program are multifaceted because metacognitive strategies can increase students' confidence and their academic success as well as expand the reach of a library's information literacy goals (Houtman, 2015; Osman & Hannifin, 1992). When students understand that these metacognitive skills and practices are universal to any subject matter or daily living choices, those skills are more likely to transfer to other contexts, thus increasing academic success. This is why a more deliberative focus on metacognition needs to be a part of any information literacy program.

Like metacognition, information literacy is a broad term that encompasses both a set of skills and a disposition of thought and action. The Association of American Colleges and Universities (AAC&U, 2013) *Information Literacy VALUE Rubric* defines information literacy as "the ability to know when there is a need for information, to be able to identify, locate, evaluate, and effectively and responsibly use and share that information for the problem at hand" (p. 1). The Association of Colleges and Research Libraries (ACRL, 2015) takes a more philosophical approach to its definition, describing information literacy as a "set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning" (p. 8). It is evident from both definitions that the library community sees information literacy both as a cognitive task which takes place to solve a problem as well as a conceptual approach to knowing. If one defines metacognition as "an awareness of one's own knowledge and the ability to understand, control, and manipulate individual cognitive processes" (Osman and Hannafin, 1992, p. 83), it is also clear that information literacy and metacognition share complementary concerns and assumptions about knowledge acquisition—essentially, where knowledge comes from and what we do with it. The distinction is made in the visibility of

the practice, where metacognition is part of a hidden thinking process and information literacy is part of the action that is taken as a result of that thinking. In fact, research by Mackey and Jacobson (2011) broadens the scope of librarianship by advocating for a focus on *metaliterary*, of which information literacy is a part: "Metaliteracy expands the scope of information literacy as more than a set of discrete skills, challenging us to rethink information literacy as active knowledge production and distribution in collaborative online communities" (pg. 64). They have consistently argued that librarians need to be thinking and speaking broadly about what we teach and how we teach it, as well as the words we use to describe what we are doing. And while that may seem overwhelming to many of us in the practical throes of everyday librarianship, it is important that we can articulate these connections.

Information literacy requires an understanding of how you are thinking about and evaluating the information that is being found and consumed; this is a metacognitive act that can be explicitly taught and practiced in the information literacy classroom. If we can weave metacognitive strategies into an information literacy session, we can help students develop metacognitive practices and demonstrate that they are simultaneously developing information literacy skills and metacognitive habits. Spending time on the planning stages of searching, increasing the practice time of alternative keyword searching, and aiding students in anticipating their next steps once they leave the session are foundational metacognitive methods that library instructors can use to aid in that simultaneous learning.

Connecting Information Literacy and Metacognition: An Historical Perspective

The more I studied metacognition, the more I realized how beneficial a collective understanding of the concept could be for librarians' teaching practices. There is minimal research from either the library science or the cognitive science fields regarding the intersection between information literacy and metacognition. While many institutions use the term *critical thinking* as part of their overall learning outcomes, librarians in the field know that both metacognition and information literacy have a place within that broad term of critical thinking. Librarians have an opportunity to be explicit about meeting institutional learning outcomes by weaving metacognition and information literacy together within our research and teaching practice.

The AAC&U *Information Literacy VALUE Rubric*, which is the information literacy structure I use for my institution's practices, describes what I now see as an explicit metacognitive

standard: that learners will be able to "evaluate information and its sources critically"—that is, they must think about the information they have found, engage with it, and decide that it is more relevant than other information they have sought and perhaps discarded. The ACRL *Framework* describes information literacy as a "knowledge practice" through which learners demonstrate how they will increase their understanding of the problem at hand. The *Framework* is particularly helpful in creating the metacognitive connection because it exposes that these practices should be employed regularly, not just to accomplish one discrete knowledge task. Both of those descriptions describe learners relying on their previous knowledge about something; learners must identify a problem or an information need, and then be aware enough of their own knowledge to identify the deficits or gaps they have in that area of knowledge. They then must employ a variety of techniques for locating the information needed to solve the problem, techniques which may include a transfer of skills from one content domain to another, an evaluation and repair of the strategies used, and an understanding of how to interact with that information once it is found. Within that definition, there are many assumptions made about a learner's metacognitive awareness and skill. Yet librarians are rarely seen as allies in addressing those specific techniques and are primarily asked to help students practice search strategies without moving to the next step of evaluation.

How Assessment Helps and Hinders Metacognition

Student self-assessments have been the primary avenue libraries have used for understanding the impact of information literacy sessions. Librarians need to consistently evaluate what students are learning and how they are learning, both for reporting purposes and for improving teaching practices. While there are plenty of experiences that share a common theme of using pre- and post-tests, exit surveys, and follow-up quizzes to assess student learning, there are scholars who push back on the effectiveness of these assessments for measuring information literacy, in part because the assessments themselves are asking students to practice thinking skills they have not developed in order to answer the questions. Specifically, Santamaría and Petrik (2012) raise the concern regarding the cognitive load needed from students within information literacy assessments.

Cognitive load is essentially the balance between knowing enough information to accomplish a task without being overwhelmed by too many options or new information. Information literacy assessments often ask student to recall what they knew before a session, what they have learned, and how they might apply it (Santamaría and Petrik, 2012, p. 266).

Librarians have little consistent contact with students, so employing self-assessment within a library instruction session assumes that their current instructors have taught the students to be reflective about their thinking and knowing, or that students have developed these abilities along the way. These self-assessments rarely allow for a full picture of how information literate a student is because they tend to take place in a singular environment. An example of a more complete assessment would be the completed research project, which exhibits what sources are being used.

Houtman (2015) described an alternative assessment in a student workshop that included a focus on the self-regulation of students' own learning. Self-regulated learning encompasses metacognition, "but it is also the broader awareness of control over one's emotions, motivations, behaviors and environment, as those relate to learning" (Houtman, 2015, p. 7). While the students were told that the workshop was skills-based, the instructors incorporated the teaching of self-regulation strategies throughout the session. They gave students time to reflect on their emotions surrounding research, to understand how they cope with research stress, and to anticipate where they may run into research roadblocks. This unique weaving of teaching information literacy practices and metacognitive strategies within a research context can provide more impactful benefits than a how-to session. This example provides a model for how metacognition and information literacy can support each other.

Metacognition as Foundational to Learning

Osman and Hannafin's (1992) research on instructional design offers a description of metacognition that can be included within the discussion of information literacy skills. Metacognition includes *employing repair strategies,* as they describe it: trying something, evaluating the results, and adjusting the strategy being used. Metacognition also includes the ability to *transfer knowledge*, which "refers to the application of a trained strategy to dissimilar learning tasks, problems or circumstances" (Osman and Hannafin, 1992, p. 90). While adjusting search strategies and transferring skills have always been explicit learning goals for the information literacy classroom, I have found that students rarely remember what strategies worked from a previous class or semester when confronted with a new information seeking problem or task. I was encouraged to read these descriptions of metacognition because they illustrate that librarians have being thinking about and teaching

about these issues, even if we did not realize that it was metacognition that we were teaching.

Furthermore, building on Osman and Hannafin's (1992) work, Schraw and Dennison (1994) found that metacognitive awareness can be independently taught and measured apart from individual intellectual ability or academic achievement. In other words, metacognition can be taught to students along any part of the educational preparedness spectrum because "metacognition is separable from other cognitive constraints on learning such as aptitude or domain knowledge" (Schraw and Dennison, 1994, p. 461). This would be an important concept for librarians to understand more widely, as we can see students of diverse abilities on any given day. But if all students are capable of learning and retaining metacognitive strategies regarding information, we are challenged to be more intentional in our approach during an information literacy session. The skills and strategies we teach are not dependent on a student's innate "smarts," but rather on their opportunities to learn and to practice these skills in a positive learning environment. The library classroom can provide that space and build the confidence of these learners who may experience low-confidence or anxiety regarding information seeking and evaluating. Understanding this concept may impact librarians more, as we think about the biases we ourselves bring into the classroom about particular students and how those attitudes affect our teaching. Assuming that every student in our classroom is capable of learning these skills and progressing along their metacognitive journey creates a more positive interaction overall and could alter the way students feel about library spaces and activities, thus setting them up for greater academic success.

Metacognition and Information Literacy: Methods and Application

Once I learned more about what metacognition is and the variety of approaches to teaching it in the classroom, I recognized areas where metacognitive strategies are hinted at, assumed, or even referenced within the sessions I do with students. These areas include planning, time management, adaptive strategies, and understanding one's feelings around research and writing. For example, most information literacy sessions meet the metacognitive goal of "reflection and repair," though that is not what we call it in information literacy circles. However, understanding why a search term is not working, identifying that as a problem, and trying something new– this is reflection in action and is by nature metacognitive. Students must understand why they chose the terms they did, think about what is not working, and then think again about what could work. Depending

on the expertise of the students, that thought process could take place in a matter of seconds. However, many students end up frustrated and give up because they have not been taught explicitly why this reflection process is important or how the brain processes this kind of information.

When executing a search, I encourage students to evaluate their results and assess if the search terms they used are effective for their needs. If the results are insufficient, I teach students how to filter, adjust their terms, and try again. Ideally, they have time to practice these repair strategies while still in the session, and there is peer and instructor guidance along the way. Those thinking tasks are metacognitive in nature. During a library session, time could be spent in practicing the formation of those tasks in order to let that skill take hold and become habit forming. However, it can be difficult to spend time on thinking strategies if the professor's learning outcomes for the session are unclear or if the library instructor does not understand the value of those thinking tasks. More time could be spent discussing what the task is and planning how to accomplish it, monitoring and regulating the cognitive task, and reflecting on or assessing the accomplishment of the learning goals (Quintana et al., 2005). A library session can be about more than finding sources and evaluating them; it can be a space for students to learn to think about what they found and how they found it.

As a result of my own exploration of metacognition, I altered a current student assessment after a library session to encompass three questions:

1. What part of the session will you apply first as you work on this assignment?
    (multiple choice, specific to what was covered in the session)

2. How did today's session prepare you for your assignment?
    (open comment)

3. After today I feel _____ about using library resources for this assignment
    (Likert scale from less confident to super confident)

These questions are a combination of information literacy questions and metacognitive ones. Questions one and two have students recall what they learned about navigating library sources and ask them to imagine what they will do with that knowledge. Planning and naming an action into the future is a metacognitive act that spurs the student to think about how they will apply what they have learned. The answers to the first two questions show

me what they learned and helps them visualize what they will do. Question three measures their feeling about the next steps, offering the opportunity for students to reflect on any potential anxieties or uncertainties. Even if students do not have much practice at reflecting upon their thinking, the questions are designed to be non-threatening so that they engage in metacognition while being assessed about information literacy skills at the same time. This is one small change that felt natural to employ; if I am creating a self-assessment for the students anyway, why not ask a question that requires some metacognitive thought behind it that nudges them in thoughtful directions?

Modeling Metacognitive Reflection

Perhaps one reason why metacognition and information literacy do not have a more synergetic relationship is because educators themselves are not always taught the value of reflection and regulation of their own teaching and learning, which are the foundation of metacognitive thinking. Reflective practices are specific and beneficial to educators who wish to understand and improve their approach to instruction. During the past year, I have adopted a number of reflective strategies as part of my teaching preparation and self-assessment. These practices have slowed down my teaching and allowed me to see the value in offering students the opportunity to reflect on their own learning during a library session. These practices also helped me to recognize that going deeper into fewer concepts may be more beneficial in the long run. During one such reflection after teaching a class, I recognized a metacognitive problem from the session: because of the content I had to cover, I bounced frequently between instructions on search strategy and the mechanical aspects of how to print, save, and cite the source. Those require two different areas of the brain, and upon reflection, I realized how confusing that is for students. In the next session, I had students divide their note-taking in half and write "strategy" in one column and "mechanics" on the other. And as we went through the material, I told them which kind of thing we were practicing and which column the reminder note should be in. This very simple tactic teaches students the value of grouping ideas together and how to organize what they are learning into a cohesive pattern. This is a metacognitive practice that strengthens a student's confidence in information gathering and retrieval.

With all this in mind, the initial and natural partners to explore these ideas further are the team of library instructors. Describing and discussing what metacognition is, why it is valuable, and where these strategies are already employed within the classroom would help library instructors identify how to make metacognition a more intentional aspect of the

library's learning outcomes. Cultivating a culture of learning unites the library instruction team around the implementation of these concepts.

Additionally, library instructors can identify areas where the intersection of information literacy skills and metacognitive awareness creates an opportunity for additional assessment. Incorporating formative self-assessments, which are more open ended and create space for students to think about what they learned, would not only teach metacognitive strategies like reflection but also demonstrate students' information literacy with more subjective data. When matched alongside the data within a rubric-guided assessment (either internal or the rubrics provided by the AAC&U), the understanding of what students are learning is bound to be more robust.

Approaching teaching faculty directly can also have positive outcomes on the integration of both information literacy and metacognition within the curriculum. Three possible methods to employ regarding faculty collaborations are: building on individual relationships with specific faculty members, gathering departmental involvement, and embracing an institution-wide focus that develops teaching faculty's understanding of information literacy and metacognition. One possibility would be to create a series of workshops about metacognition for faculty, allowing them to brainstorm practices and interventions across their own content curriculum in order to transform their assignments. The goal would be to include metacognitive skill building within their course outcomes. Another approach would be to incorporate a discussion of metacognition into faculty development programs that focus on information literacy concepts. Faculty may sometimes resist changing their curriculum or adding elements that seemingly take away from their content learning outcomes. Approaching a professional development program that allows reflection on where metacognition already happens in their classrooms would increase their confidence that making a few small changes could make a difference in their students' content understanding and metacognitive awareness.

There are a variety of avenues to explore regarding metacognition and information literacy. The information landscape is complex and requires a layered amount of intentional thought to navigate it well. As librarians, we have an opportunity to imagine a different way of approaching information literacy instruction and assessment by engaging with metacognition more clearly and explicitly in our planning and outreach. Doing so will have a more lasting impact on those we instruct, increasing their confidence as information literate learners and deep metacognitive thinkers.

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