Article

Building a bridge between skills and thresholds: Using Bloom's to develop an information literacy taxonomy

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Abstract

Within the past decade, there has been a shift in how our guiding professional documents conceptualise information literacy (IL) — evolving from a skills-based conceptualisation to one emphasising ways of thinking and knowing. This has been both productive and disruptive. Our professional documentation does not provide a framework for making this shift or for scaffolding learning to develop complex and sophisticated ways of thinking and knowing. In this study, we apply Bloom's revised taxonomy for educational objectives to instructor descriptions of IL (n=51) to develop a draft taxonomy that attempts to build a bridge between these two conceptualisations. The data was drawn from a survey that was administered to instructors and instructional support staff immediately preceding their participation in a multi-day teaching professional development workshop related to IL. We believe that this model has implications

for how we approach the development of learners' IL with intentionality, both in collaboration with faculty and for our own teaching practices as librarians.

Keywords
academic libraries; bloom's taxonomy; faculty; information literacy; qualitative research; US

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1. Introduction

Within the past decade, there has been a shift from defining information literacy (IL) as universal and transferable skills and abilities to the articulation of the ways of thinking, knowing, acting, creating, and communicating that are valued in academe. This shift is particularly evident in North America with the sunsetting of the *Information Literacy Competency Standards for Higher Education* (Association of College and Research Libraries, 2000) and the adoption of the *Framework for Information Literacy for Higher Education* (Association of College and Research Libraries, 2015). Hicks & Lloyd (2021) have characterised the current phase of IL in higher education as the "second, constructivist wave," which has implications for pedagogy and instructional practices (p. 560). While many librarians have embraced this second wave (Hsieh, Dawson, & Yang, 2021), others have been vocal critics. In particular, many North American librarians were dismayed at the shift from a conceptualisation of IL that articulated clear and measurable outcomes to threshold concepts that are tricky to teach and assess. Threshold concepts, which have an element of troublesomeness and liminality, cannot easily be taught in a one-shot instruction session[1] even in a semester-long course (Association of College and Research Libraries, 2015). In many cases, it takes modelling, practice, and feedback over time for learners to develop the ways of thinking and knowing that are embodied within a threshold concept. Furthermore, skills and abilities are still essential, though there is less emphasis on the role they play in movement toward crossing the IL conceptual threshold.

If academic librarians are to successfully support the development of both the skills and ways of thinking and knowing associated with the first and second waves of IL, it is critical that we understand how the faculty[2] whom we support or collaborate with think about, define, and describe the concept of IL. Existing research has provided some insight into how faculty perceive or define IL (Boon et al., 2007; Bury, 2011, 2016; Cope & Sanabria, 2014; Dacosta, 2010; Dubicki, 2013; Gullikson, 2006; Guth et al., 2018; Kaletski, 2017; Moran, 2019; Pinto, 2016; Saunders, 2012; Tyron at al., 2010), and this research is foundational for considering how academic librarians can appeal to and partner with faculty with the goal of developing learners' IL. This research indicates that faculty perceive IL to be important, but they do not necessarily intentionally incorporate IL into their teaching practice, nor do they perceive that learners are developing the desired IL-related critical thinking skills. In addition, we have not identified literature that attempts to provide scaffolding to build a bridge between the first and second-wave conceptions of IL in a way that could be practically applied to our various teaching and

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[1] As Pagowsky (2021) notes, there has not been consensus about how the one-shot is defined. She defines the one-shot "as a standalone session, superficially (or not at all) connected to course content, that is tacked onto a class" (p. 300). Hammons (2022) has described the one-shot as "a librarian-led instruction session connected to a specific course or assignment. In most cases, with one-shots, the librarian has little involvement in the design of the course and has limited contact with the students outside of the session" (p. 24).

[2] In this article, we are using the term faculty expansively to include all individuals who teach at the university, including tenured and tenure-track faculty, associated faculty, contingent and adjunct faculty, graduate teaching assistants, and instructional support staff. Each of these play an important role in student learning and development.

instructional support activities. Such scaffolding is needed, since our professional documents only articulate the final learning goals and do not provide direction about how to scaffold learning throughout a curriculum or programme to help learners move toward mastery.

In this article, we report the findings of a study that explored instructors' perceptions of IL. To do this, we use Bloom's revised taxonomy (Anderson & Krathwohl, 2001) — a commonly used framework for the development of learning outcomes related to the complexity of cognition required to meet performance expectations — to explore faculty definitions and descriptions of IL. Through our analysis, we have developed an initial IL taxonomy, which we believe serves as a foundation for building a bridge between the second-wave abstract conceptualisations of IL, such as those found in the *Framework*, and the practical needs of the classroom that were addressed in first-wave documents like the *Standards*. This draft taxonomy accounts for both foundational IL skills and the threshold concepts that highlight valued ways of thinking and knowing. We believe that this model has implications for how we approach the development of learners' IL with intentionality, both in collaboration with faculty and for our own teaching practices as librarians. In particular, we believe this model can help instructors to articulate their IL-related learning outcomes and ensure that their expectations and criteria for grading are aligned with those learning outcomes, as well as supporting curriculum mapping of IL-related outcomes across programmes.

2. Literature Review

2.1 Shifting conceptualisations of IL

Within the past decade, there has been a significant shift in the way that IL is conceptualised within higher education as represented in the guiding IL documents that had been drafted by academic library professional associations and adopted by the academic library profession at large. Early guiding documents not only defined IL and identified its positioning within higher education, but also provided associated skills or indicators to determine if a learner was information literate or not. In other words, these documents provided a relatively concrete foundation for developing and assessing learners' IL skills, which were typically viewed as discrete skills that could be transferred to multiple contexts. Guiding professional documents that represent this early phase of IL in higher education include the Association of College & Research Libraries *Information Literacy Competency Standards for Higher Education* (ACRL, 2000) and the Society of College, National and University Libraries' *Information Skills in Higher Education* (SCONUL, 1999). Despite widespread adoption across the profession, this conceptualisation of IL as basic, discrete, transferrable, and universal skills had its critics (e.g. Tuominen, Savolainen, & Talja, 2005), arguing that IL should be considered within various sociocultural contexts (Lloyd, 2010). In addition to this criticism, Hicks & Lloyd (2021) highlight the emergence of IL-related empirical research and critical IL as factors that initiated a "second, constructivist wave of information literacy models for HE [higher education] settings" (p. 560). This constructivist wave focuses less on articulating particular skills or indicators that could be used to assess a learner's IL, but rather on presenting more abstract ways of thinking and knowing with associated attitudes and behaviours, such as reflection and metacognition (Hicks & Lloyd, 2022). Guiding professional documents that represent this current second wave of IL

include ACRL's (2015) *Framework for Information Literacy for Higher Education* and SCONUL's (2011) *The SCONUL Seven Pillars of Information Literacy.*

Critiques of the *Framework* document itself are plentiful, and many are related to this shift to a constructivist perspective. In many ways, the *Standards* were viewed as universal in nature, but the *Framework* indicates that librarians will have to tailor the content of the document to their local settings (Bombaro, 2016; Dalal, 2015). As such, the *Framework* is not a replacement of the *Standards*, especially in terms of thinking about the development of learning outcomes and assessing learners' IL (Bombaro, 2016; Dalal, 2015). Many librarians were concerned that they would lose a decade or more of progress of generating buy-in from faculty and administrators at their institutions (Bombaro, 2016; Dalal, 2015). Furthermore, some argued that the *Framework* contained educational jargon that is neither familiar nor helpful to librarians (Bombaro, 2016; Dalal, 2015), and the application of threshold concepts is not consistent or aligned with threshold concept theory (Bombaro, 2016). Others criticised threshold concept theory more generally (Wilkinson, 2014), which included arguments that threshold concepts are representative of those who hold the most power and privilege in a discipline (Beilin, 2015; Wilkinson, 2014). Morgan argues that the *Framework* presents an oversimplification of a complex concept, including the role of the learner, and that the *Framework* represents a "mining expedition" and is a form of "confirmation bias" (2015, p. 187). As a result, Bombaro (2016) suggests the *Framework* has created a division in the profession between practical librarians and philosophical librarians. Finally, many have critiqued the *Framework* for the lack of inclusivity and social justice (Beilin, 2015; Pagowsky, 2014; Rapchak, 2019; Saunders, 2017). Beilin (2015) writes that "the Framework necessarily concentrates its efforts on the solitary mastery of the existing system" ("A Critical Information Literacy Perspective," para. 4), thus encouraging learners to conform rather than critique or problematise the status quo.

While many of the critiques of threshold concepts and the *Framework* are valid, the way in which IL is conceptualised in the *Framework* does raise some important opportunities that the *Standards* did not. For example, Townsend, Brunetti, and Hofer argue that the identification of IL threshold concepts has the potential to help learners understand why their instructors might expect them to perform in particular ways, helping to answer questions like "Why do I need to learn about this database?" (2011, p. 856), in addition to developing the skills to perform a successful search. Furthermore, in the *Framework*, learners are no longer simply consumers of information; rather, they are potential "participants in the process of knowledge production" (Foasberg, 2015, p. 703). The *Framework* emphasises the importance of context to the use of information and the creation of knowledge. This framing elevates the status of learners and, depending on how it is implemented, empowers learners in a way that the *Standards* did not. While there are significant concerns about the lack of inclusivity and social justice in the *Framework*, as well as the seeming reproduction of the status quo, the *Framework* can be used as a starting point for articulating and making transparent the privileged and valued ways of thinking, knowing, acting, and communicating in the academy (Folk, 2019), which are harder to teach than basic skills and abilities. In other words, the *Framework* can be used to uncover and make transparent expectations for learners that may have remained tacit or part of a hidden curriculum when the guiding IL document was focused primarily on basic skills and abilities.

In addition, there are at least some indications that the concerns raised about librarians' ability to integrate the *Framework* in a practical setting may not be as significant as some have feared. For example, in a survey of more than 1,000 community college librarians, Wengler and Wolff-Eisenberg (2020) found that, although less than half had made significant or moderate changes

to their instruction based on the *Framework*, those that had adopted the *Framework* felt that it had proved beneficial to their teaching and were interested in additional integration. In interviews with 30 community college librarians, Gross, Julien and Latham (2022) found that only 8 (27%) said that they were not incorporating the *Framework*. Others reported finding ways to incorporate *Framework* concepts, even in one-shot sessions with significant time limitations.

2.2 Disciplinary faculty and IL

For decades, librarians have been working with disciplinary faculty to integrate IL into courses and curricula with varying levels of success. Because of this, there have been several studies that have explored disciplinary faculty's perceptions of or perspectives on IL, including the importance they place on IL as a concept and set of skills, their reactions to formal documentation, and their perceptions of learners' IL. In this section, we provide a brief overview of this literature.

Research indicates that disciplinary faculty believe that IL encompasses a range of skills and practices that are essential for success in college and beyond (Bury, 2016; Dacosta, 2010; Dubicki, 2013; Gullikson, 2006; Guth et al., 2018; Pinto, 2016, Saunders, 2012). While many disciplinary faculty perceive IL to be important, they do not always have a conceptualisation of IL that is aligned with that of librarians. For example, Saunders reported that some of the faculty she interviewed "conflated information literacy with technology or computer literacy," and others had narrow definitions related to "the use of library sources or the basic skills of searching" (2012, p. 230). Existing research has also explored faculty reactions to various aspects of guiding documents, such as the *Standards* (Dubicki, 2013; Gullikson, 2006) and the *Framework* (Guth et al., 2018; Kaletski, 2017), as well as locally developed documentation (Tyron et al., 2010). Most of these studies found that faculty believed the various indicators, skills, and knowledge practices contained in these documents were relevant and important, and the disciplinary faculty provided general affirmation for the ways in which academic librarians have characterised IL. For example, Kaletski found that "all knowledge practices [in the *Framework*] are considered to be at least 'somewhat important' by most respondents" (2017, p. 29). However, some faculty indicated that they found the language in these documents to be difficult to understand (Gullikson, 2006; Guth et al., 2018) or indicated that they found the phrase IL to be problematic (Saunders, 2012).

Although most studies found that disciplinary faculty value IL, previous research points to inconsistencies of how well IL-related learning outcomes are integrated in the courses that they teach. Several studies found low levels of IL-related teaching activity from disciplinary faculty (Dacosta, 2010; McGuiness, 2006; Saunders, 2012), though Saunders (2012) indicated that faculty who were familiar with IL-related standards were more likely to integrate IL into their courses. On the other hand, Dubicki (2013) found that disciplinary faculty did believe they were integrating IL-related learning outcomes into their courses, though she also reported high levels of awareness of IL among the participants in her study, with only 7% of the participants reporting that they were unfamiliar with it. In a review of over 10,000 syllabi at a research university in the United States, McGowan et al. (2016) found that the majority (79%) of these syllabi indicated the presence of IL in the course, either through learning outcomes or descriptions of assignments.

Previous research has indicated that some disciplinary faculty perceive that learners develop their IL progressively throughout their collegiate career. For example, Cope and Sanabria found

that community college faculty, who primarily focus on learners in their first or second years of college, seemed to emphasise the basic skills related to IL, and faculty teaching on four-year college and university programmes expected that learners had mastered basic skills and focused more on disciplinary aspects of research and writing with the goal of developing learners who could engage in "deep reflection and synthesis that leads to new forms of knowledge and analysis" (2014, p. 487). The disciplinary faculty teaching first-year students who participated in Dawes' study had two different approaches to teaching IL – (1) the consumer approach, in which faculty develop "experienced consumers of information" and (2) the discourse approach, in which faculty teach learners to become part of discourse communities (2019a, p. 557). Echoing Cope and Sanabria's (2014) finding about progression from skills to critical thinking, Dawes (2019a) found that faculty usually taught the consumer approach before the discourse approach. In general, disciplinary faculty also hoped that learners develop their IL so that they critically engage with information. In Bury's study, "the ability to evaluate information and its sources critically" was one of the top two themes that emerged from interviews with disciplinary faculty (2016, p. 241). Similarly, McGowan et al. (2016) found that learning outcomes related to the critical evaluation of sources were more likely to appear in upper-level course syllabi than lower-level course syllabi. Despite this, many studies indicate that faculty do not believe that learners are mastering the higher-order thinking skills associated with second-wave IL (Bury, 2011; Cope & Sanabria, 2014; Dawes, 2019b). For example, the faculty that Dawes (2019b) interviewed shared that learners often focus on minor details rather than holistically looking at the information context and purpose, which meant that differing perspectives were neglected, and the learners' voices were not integrated into their work.

Faculty value the higher-order thinking skills related to IL (Bury, 2011; Cope & Sanabria, 2014; Dawes, 2019b), and the perception that learners are not developing or mastering these skills is related to a novice-expert gap. It can be difficult for faculty to remember how they developed these skills (McGuinness, 2006), and "experts often don't consciously *know what they know* or think about it explicitly enough to explain it to someone else" (Adler-Kassner & Wardle, 2022, p. 3). When faculty believe that they picked up these ways of thinking over time and without formal learning structures (McGuiness, 2006), these ways of thinking and knowing become "tacit knowledge" (Adler-Kassner & Wardle, 2022, p. 3). As a result, faculty may design assignments that they believe to be basic and appropriate for a novice, but are actually quite complex and difficult (Leckie, 1996). Leckie (1996) argued that this results in learners developing a coping strategy rather than mastering basic information skills and cultivating more complex ways of thinking about information. As a result, many learners focus on the procedural details of an assignment, such as page numbers and font size, and fail to meet faculty expectations even though they put forth "legitimate effort" (Valentine, 2001).

2.3 Bloom's taxonomy and threshold concepts

As indicated in the previous section, many disciplinary faculty value and privilege the higher-order critical thinking skills related to IL, including the ways of thinking and knowing espoused by second-wave IL documents like ACRL's *Framework*. However, as most educators know, learning must be scaffolded, as these kinds of higher-order thinking skills are developed over time through modelling, practice, and feedback. Bloom's revised taxonomy (Anderson & Krathwohl, 2001) is a common tool that educators use to scaffold learning and articulate expectations for learning (i.e. learning goals, objectives, and outcomes). Originally published in 1956 and then updated in 2001, Bloom's taxonomy identifies six tiers of "objectives that teachers could use to guide their instructional activities," which are often depicted in the shape

of a triangle (Lang, 2016, p. 13). Each tier typically has verbs associated with it that educators can use to develop learning outcomes. At the base of the triangle are foundational skills, such as "recall facts and basic concepts" and "explain ideas or concepts" (Armstrong, 2010). At the peak of the triangle are higher-order thinking skills, such as "justify a stand or decision" and "produce new or original work." Some might be tempted to view the use of the triangle as producing a hierarchy of learning outcomes, with learning outcomes represented at the peak being more important than those at the foundation. However, Lang (2016) reminds us that all tiers in the triangle have an important role in learning and knowledge building, writing "one cannot get to the top levels of creative and critical thinking, after all, without a broad and solid foundation of knowledge beneath them" (p. 15).

While Bloom's taxonomy can be applied across various learning experiences in all fields and disciplines, it does not help to identify critical ways of thinking and knowing that tend to be tied to specific disciplines. These specific ways of thinking and knowing shape the ways in which learners and experts view the world and various phenomena, and shape how learners and experts communicate and build knowledge within a field or discipline. Meyer and Land (2006) coined the phrase "threshold concept" to describe these critical disciplinary ways of thinking and knowing. A threshold concept is "a conceptual 'building block' that progresses understanding of a subject" and has the following characteristics – transformative, irreversible, integrative, bounded, and troublesome (Meyer & Land, 2016, p. 6). Because these concepts are so foundational for disciplinary knowledge, "they often go unspoken or unrecognized by practitioners" due to their transformative and irreversible nature (Townsend, Brunetti, & Hofer, 2011, p. 854). In other words, experts in a field or discipline might take these for granted or forget that there was a time when they viewed the world or phenomenon differently.

Threshold concepts have played an important role in the constructivist second wave of IL. ACRL's (2016) *Framework* draws upon threshold concepts to articulate the foundational elements of IL as well as associated attitudes (i.e. dispositions) and ways of thinking and knowing (i.e. knowledge practices). As a result, IL was no longer conceived as a universal and discrete set of skills, which could be measured and assessed. Rather, the *Framework* articulates the ways of thinking, knowing, and acting that are valued and privileged within higher education. In some ways, it shifted the conceptualisation of IL from the foundational tiers of Bloom's taxonomy towards the peak; the *Framework* establishes the knowledge practices of experienced information literate learners but does not explain how a learner reaches that pinnacle. Furthermore, the *Framework* attends to the socially contextual nature of information creation and use, in a way that the *Standards* did not (Foasberg, 2015). As a result, learners are not necessarily meant to master a set of skills; rather, learners are meant to develop their IL over time as they are exposed to new and different kinds of learning and information contexts (Foasberg, 2015).

2.4 Summary and problem statement

As indicated in this literature review, the concept of IL has been valued by both librarians and disciplinary faculty for over twenty years. While the constructivist second-wave shift in our professional documents has been disruptive for many librarians, it is likely aligned with the learning goals that many faculty have for learners as they progress through college and complete their degrees. Despite this goal, faculty perceive that learners are not necessarily developing the desired higher-order critical thinking skills, which can result in an expectations gap. Based on our review of the literature, as well as our experience as librarian-educators, we

argue that we need a model of IL that includes both basic skills and complex ways of thinking and knowing (i.e. threshold concepts). While some scholarship has attempted to categorise IL-related learning outcomes (Hicks & Lloyd, 2022) or teaching practices (Dawes, 2019b) that encompass both of these, we have not identified any literature that attempts to provide scaffolding that helps to build a bridge between basic skills and threshold concepts in a way that could be practically applied to our various teaching and instructional support activities. Furthermore, our current professional documents only articulate the final learning goals and do not provide direction about how to scaffold learning throughout a curriculum or programme to help learners move toward mastery. In the remainder of this paper, we describe the development of an IL taxonomy that we believe begins to address the lack of integration of skills and threshold concepts for the purpose of scaffolding, that librarians can apply to their teaching and instructional support activities with both disciplinary faculty and learners.

3. Methods

The data used in this study were collected for a programme evaluation and research study of an instructor development workshop at The Ohio State University. For this programme evaluation, both in-person and online participants were invited to complete a pre-workshop survey that asked about their knowledge of the workshop's themes. The data analysed in this paper come from participants' responses to a single, open-ended question on the pre-workshop survey - "What does the term *information literacy* mean to you, if anything?" In this study, the term *instructor* encompasses many different roles at the university, including tenured or tenure-track faculty, associated or adjunct faculty, graduate teaching associates, graduate students interested in developing their teaching practices, instructional designers, and other instructional support staff. The workshop was also open to librarians and library staff, but their responses were removed prior to data analysis to ensure that the findings focus specifically on the responses of instructors who it is likely do not have the same level of familiarity with the concept of IL as library professionals and who come from a variety of disciplinary backgrounds.

Data analysis happened in multiple stages, and all four members of the research team participated in the entirety of the data analysis process. In the first round of analysis, each member of the research team individually read through the responses and inductively identified emergent themes. As a group, we identified similarities across our individual lists of themes and created an initial list of codes to apply to the responses. Using a shared Excel spreadsheet, we individually coded the responses, and then, as a group, discussed responses for which we were inconsistent in our coding. Through these discussions, we developed short definitions and descriptions, including examples, for each code and created a codebook. We then once again coded the data individually, and then collectively reviewed this work to determine the final codes. The responses were then officially coded in Dedoose (2021), a qualitative analysis platform.

As we started to analyse the data using these initial codes, we realised that some of the codes seemed to correspond with the different levels represented in Bloom's revised taxonomy (Anderson & Krathwohl, 2001). We thought this taxonomy could be an interesting framework for analysing the data and identifying subtle differences in instructors' expectations regarding cognitive complexity and IL expectations. After reviewing several versions of Bloom's revised taxonomy that were freely available on the internet, we decided to use a version available on Vanderbilt University's Center for Teaching's website (Armstrong, 2010). In addition to providing verbs that might be associated with different levels of the taxonomy, this version offered brief

but helpful descriptions of each level, which we have reproduced in Table 1. We found the brief descriptions in this version particularly helpful for thinking about how to apply Bloom's taxonomy to our data, because verbs can appear within multiple categories depending on the version of the taxonomy being used. The brief descriptions helped us to articulate the essence of each category, rather than a strict focus on verbs that may or may not have been used in the data we were coding.

Table 1: Reproduction of Vanderbilt University's Center for Teaching's Bloom's taxonomy (Armstrong, 2010)

Category	Brief description	Associated Verbs
Remember	Recall facts and basic concepts	Define, duplicate, list, memorise, repeat, state
Understand	Explain ideas or concepts	Classify, describe, discuss, explain, identify, locate, recognise, report, select, translate
Apply	Use information in new situations	Execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch
Analyse	Draw connections among ideas	Differentiate, organise, relate, compare, contrast, distinguish, examine, experiment, question, test
Evaluate	Justify a stand or decision	Appraise, argue, defend, judge, select, support, value, critique, weigh
Create	Produce new or original work	Design, assemble, construct, conjecture, develop, formulate, author, investigate

After we selected the version of Bloom's revised taxonomy that we wanted to apply to our data, our coding process was similar to the first round, though this time our coding was deductive. We first collectively coded each response as a team to discuss how the taxonomy applies to our data.[3] Each member then individually coded the data using the taxonomy, and we once again reviewed our individual work as a team to ensure consistency in our coding. At this point, we made the decision to remove the Evaluate category, as it was too confusing given the focus on IL, which often includes an element of evaluation. We then began to define each of the categories in the taxonomy as they related to our data and IL more generally (see Table 3). The responses were officially coded in Dedoose (2021) and then reviewed within each code

category as a team to ensure consistency in application, as well as to identify nuanced themes and patterns within individual categories. This process enabled us to further refine the emergent draft taxonomy that is presented in the results section of this paper.

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[3] *Responses could have more than one code applied. For example, one element of a response could be coded as "remember" and another element could be coded as "analyse."*

3.1 Participants

Since the first offering in August 2019, 81 instructors have participated in the Meaningful Inquiry workshop in either a face-to-face or fully online format. Of those participants, 61 (75%) consented to participate in the programme evaluation, with 56 participants completing the pre-workshop survey. Of those 56 pre-workshop responses, 51 (91%) responses were analysed in the current study and 5 (9%) were removed due to the participant's status as a library employee. Tables 2 to 5 provide details about the research study participants who responded to the question about IL on the pre-workshop survey (n=51). The majority of the participants were female (37, 72.5%) and white (42, 82.4%). Just over half of the participants were from departments in the Arts & Humanities or in the Behavioural & Social Sciences. Both Biological & Health Sciences and Physical & Computational Sciences were well-represented, comprising about a quarter of the participants. Almost half the participants were new to Ohio State, having been there for five years or less.

Table 2: Participants' gender (n=51)

Gender	Number of participants
Female	37 (72.5%)
Male	11 (21.6%)
Non-binary	1 (1.9%)
No response	2 (3.9%)

Table 3: Participants' race/ethnicity (n=51)

Race/Ethnicity	Number of participants
Asian/Asian-American	2 (3.9%)
Black/African-American	3 (5.9%)
Latinx	1 (1.9%)
Multiracial/Biracial	1 (1.9%)
White	42 (82.4%)
Other	1 (1.9%)
No response	1 (1.9%)

Table 4: Participants' academic department (n=51)

Department	Number of participants
Biological & Health Sciences	10 (19.6%)
Behavioral & Social Sciences	11 (21.6%)
Arts & Humanities	15 (29.4%)

Academic Support	4 (7.8%)
Physical & Computational Sciences	7 (13.7%)
Professional Disciplines	3 (5.9%)
No response	1 (1.9%)

Table 5: Years at institution (n=51)

Number of years at institution	Number of participants
Less than 1 year	3 (5.9%)
1-5 years	21 (41.2%)
6-10 years	11 (21.6%)
11-15 years	6 (11.8%)
16-20 years	5 (9.8%)
21-30 years	2 (3.9%)
31+ years	2 (3.9%)

3.2 Limitations

In this study, we did not create the conditions to get in-depth or nuanced definitions of IL from the participants, though we certainly did receive some responses that included this. Furthermore, we did not have the opportunity to ask for clarification or further details. As a result, the application of the codes to the data is based on our interpretations of the responses and might differ from what the participants were intending to convey. Furthermore, the way in which the question was phrased did not ask for the participants to share their IL-related expectations or learning outcomes either in general or in specific courses. Because of this, we are inferring what IL expectations or learning outcomes these participants might have, either for the students enrolled in their courses or for students who have completed college. Finally, our sample is limited to a small group of instructors at a single institution in the United States, and the findings of this study cannot be generalised to apply to instructors at other institutional settings and in other geographical areas. Further work must be done to understand the applicability of the resultant taxonomy to other institutional settings.

4. Results

In this section, we describe the IL taxonomy (see Table 6) that emerged when we applied Bloom's revised taxonomy to participants' descriptions and definitions of IL.

One reason that we reviewed the responses on the pre-workshop survey is that these would provide us with average instructor perceptions of IL, rather than perceptions that might be informed by participation in IL-related professional development programming. However, several of the study's participants were either enrolled in or had completed a companion workshop called *Teaching Information Literacy*, which introduces the *Framework* and how it can be used to inform teaching practice (Folk & Hammons, 2021). This companion workshop is facilitated by one of the Meaningful Inquiry workshop facilitators. It could have affected the perceptions of IL that these instructors shared, and due to this experience, these participants may have been more likely to use language from the Teaching Information Literacy workshop or from the Framework. These instructors represented only 16% (n=8) of the total sample for the

current study. We did notice some indications that participation in the companion workshop may have influenced instructor responses. For example, half of the "create" responses came from Teaching Information Literacy participants, and this tendency to view students as knowledge creators could relate to that participation, but the data does not allow us to make definitive statements about the impact of participation in the companion workshop on the responses to this survey.

Table 6: Overview of IL taxonomy and frequencies

Category	Brief description	All participants (n=51)	TIL participants (n=8)
Remember	Awareness	12 (20%)	3 (38%)
Understand	Basic skills	17 (33%)	2 (25%)
Apply	Skill competence	16 (31%)	4 (50%)
Analyse	Contextual application and meaning making	20 (39%)	3 (38%)
Create	Creating and presenting information	6 (12%)	3 (38%)

Note: Multiple categories could be applied to a single response, so frequencies in the "All participants" category do not add up to 51, nor do the percentages add up to 100%.

4.1 Remember (n=12, appearing in approximately 20% of responses)

The responses that were coded as "remember" were characterised by a general awareness, understanding, or knowledge of skills, dispositions, or knowledge practices related to IL. These responses did not directly address the ability to apply the awareness or understanding to a specific context or to execute a task, but instead indicated that IL required familiarity with certain concepts, resources, or practices. For example, some responses in this category included "knowledge of databases," "aware of how to check sources," "aware and knowledgeable about how to find and use information."

Although several responses were related to an awareness of what would be considered basic or foundational skills, some responses included an awareness of more sophisticated ways of thinking, similar to those outlined in the *Framework.* Examples of these responses include "understanding the differences and value of various types of information," "understanding the need to confront contradictions and multiple voices," and "aware[ness] of the larger context in which any piece of information exists". One response highlights the category's foundational nature for the ability to apply IL-related knowledge and skills to various contexts. The participant wrote, "The first facet is that the student should be familiar with the key concepts and theories of the discipline and how they are applied." In the remainder of their response, they indicated that this familiarity was essential for being able to "read and make sense of research in their discipline" and "to take knowledge they have learned and apply it to new situations that may different [sic] conditions than the examples they were presented in class". In this way, the "remember" category serves as a foundation for being able to think critically, make meaning of information in specific contexts, and devise an information-seeking and usage strategy in new contexts.

4.2 Understand (n=17, appearing in approximately 33% of responses)

The responses that were coded as "understand" were characterised by having basic skills related to IL. In these responses, there was evidence of generalised IL skills, but not necessarily high-level or advanced competency. For example, many of the responses use the words "ability" and "capability". Because of this, many "understand" responses mirrored *Standards*-based language and resembled first-wave definitions of IL skills that were used prior to the release of the *Framework*. Examples of this include: "ability to access, understand, use, and evaluate information," "the skills needed to find information and understand how it is used," "the ability to navigate and understand information," and "ability to find and use credible sources".

However, a couple of these responses incorporated elements that are more aligned with the *Framework*, echoing dispositions (i.e. attitudes towards information) and knowledge practices (i.e. behaviours that learners should engage in to develop their IL). For example, one response that resembled a disposition was that one should be "sceptical before accepting information as fact". Responses that resembled knowledge practices included "organizing thoughts (e.g. prior knowledge, argument)" or "discern the quality of information we are gathering" by asking questions like, "Is it biased? Is it opinion- or research-based? Can claims be substantiated?" These responses represent the emergence of the importance of critical thinking to IL, meaning that these kinds of attitudes and behaviours are foundational but not necessarily sophisticated or context-specific like those that we will see in more advanced stages of this taxonomy.

While the responses coded as "remember" indicate that IL requires an awareness of certain skills, practices, and ways of thinking, responses coded as "understand" go a step further to indicate that IL requires some capacity to put that awareness into action at a basic level. This means that learners are beginning to develop the capacity for these skills, practices, and ways of thinking, but they have not yet reached mastery of them. Furthermore, these responses often spoke about the enactment of skills, practices, and ways of thinking in a very general sense, much like the *Standards*. They were not as explicit about the importance of the information-seeking context and the ability to transfer them between different contexts as responses in the more advanced categories were.

4.3 Apply (n=16, appearing in approximately 31% of responses)

Similar to the "understand" code, the responses that were coded as "apply" were characterised by having basic skills related to IL. However, the responses in the "apply" category have some kind of adjective or qualifier indicating that learners are moving towards mastery of these skills, including "effectively," "appropriately," or "fluidly". Representative responses in this category include "being able to access information fluidly," "skills needed to effectively navigate online databases for research," and "to find, identify, read, understand, and use them appropriately". However, other responses indicate that learners were beginning to develop more nuanced understandings of these skills. Some of these responses included "the process of ethically consuming and generating information through research and scholarship" and "an ability to find and apply information judiciously". Learners are expected to consider the larger context of their information use and consider where and how their information use is appropriate.

Whereas other qualifiers were used only once throughout all these responses, some form of the word "critical" was used seven times, meaning it appeared in almost half of the responses that were coded in the "apply" category. While one response indicated that learners would apply

critical thinking skills throughout the entire research process — "the ability to find, assess, and use information critically" — most of these responses were related to learners' ability to evaluate and interpret information critically. For example, "ability to find information, understanding & critically assess its source" and "ability to think critically about the source of the information and use judgement before drawing conclusions about the information they have received". The responses in this category indicated the importance of active source evaluation, suggesting that learners are expected to be active participants in their use of information, not just passive consumers. As such, we begin to see an active role for learners here that does not appear in earlier codes.

Although responses in this category indicate the need for more than a basic understanding of skills, many of the responses still align more with a *Standards*-based conception of IL. Just like in the "understand" category, many of the responses in this category focused on finding, accessing, and using information; however, in "apply," learners are beginning to do those tasks effectively and efficiently. This continues to place learners in the category of information consumer, rather than as information or knowledge creators. However, with the prevalence of critical thinking in this category, we begin to see a shift from basic skills to more sophisticated and active ways of thinking about and interacting with information.

4.4 Analyse (n=20, appearing in approximately 39% of responses)

In the "analyse" category, the responses highlighted the importance of learners connecting the skills identified in the previous categories to a specific information need or context, such as exploring research questions or the development of an argument. There were two distinct yet related manifestations of this in the data. First, learners should recognise that they need to tailor the critical thinking skills to the specific information context. Second, learners should interpret and make meaning of information sources with respect to a specific context. In both cases, IL was not a universal set of skills that could be uniformly applied to every information need as implied in the *Standards*. The "analyse" code was the most frequently occurring code in our data, which suggests that the participants place a lot of value on the ways of interacting with information captured in this category — both applying information to a specific context and making meaning of information within a specific context.

In the "apply" category, the importance of critical thinking, particularly as it relates to source evaluation, was evident. The responses in the "analyse" category are more explicit about what this critical thinking might look like in practice. These responses suggest that learners have an understanding of their information need that goes beyond externally imposed requirements, such as for an assignment (i.e. requirements that they use a certain number of scholarly or popular sources), and learners use that understanding to identify which sources would be most appropriate to use for the specific context. In other words, learners are able to consider the ways in which a source might be part of creating a bigger picture. Responses that represent this theme include "being able to understand limitations and strengths of different sources of information," "identify when more information is needed and identify the ways in which to use that information," and "the use of information to formulate a well-researched argument".

Many of these examples suggest that relevance to the information context should be one of the evaluative criteria that are being applied to information sources, meaning that sources are not just inherently good or bad, and that learners will need to extend their evaluations beyond basic checklists. One of the responses highlighted the contextual nature of authority, "where to find

proper information [with respect to] the field of study and who (authority) to trust (in providing information)." These responses emphasise that source evaluation cannot or should not be divorced from the context in which the source will be used. The importance of context highlights how many of these responses represent a more *Framework*-based understanding of IL. Some of the responses align with dispositions and knowledge practices that are relevant to the "Authority is Constructed and Contextual" frame or the "Information Creation as a Process" frame.

The second theme in the "analyse" category — interpreting information sources and the meaning making of them — builds on the importance of contextualised critical thinking. In the data, meaning making is viewed as putting together disparate pieces of information to make a larger whole for the purpose of developing new understandings, perspectives, or knowledge. With meaning making, we begin to see a shift between learner as information consumer to learner as knowledge creator. Examples of these types of responses include "connecting the pieces of info to construct new meaning (=writing)" and "read and make sense of research in their discipline". There is an expectation that learners have moved beyond a skills-based understanding of research and can address their information needs within the context of a discipline, understanding the "cultural and social" implications, as highlighted by one participant, of information and its use. Meaning making is a progression within the category of "analyse", where learners have moved towards the higher-order thinking skills of the taxonomy.

More than just recognising the significance of the specific situation, the concept of transferring their skills across information contexts is also represented in some of the responses. For example, "students should be able to take knowledge they have learned and apply it to new situations that may different [sic] conditions than the examples they were presented in class" or "navigate the landscape of information be that regarding identifying the sources that would best suit a particular type of project" and also "both for personal inquiry and study and to meet legal and ethical standards". Responses such as these may represent an expanded understanding of IL that is not necessarily tied only to the academic world but transfers into other situations and scenarios.

In the responses in the "analyse" category, IL and research practices become less task- and skills-orientated, instead highlighting valued attitudes and ways of thinking, knowing, and making decisions. In other words, the responses in this category highlight that learners are beginning to cross IL thresholds related to IL, and the ways in which they think about, understand, evaluate, consume, and use information are beginning to transform. In the "analyse" category, learners no longer view information as discrete objects but as parts of a larger information landscape (Lloyd, 2010). The line between "apply" and "analyse" may be a threshold itself. Once learners move into the upper levels of Bloom's taxonomy, it is likely that they no longer conceptualise and interact with information in the same way as when their understanding was more related to skills development.

4.5 Create (n=6, appearing in approximately 12% of responses)

The "create" code, in many ways, represents the final aspects of the research process, in which learners are creating and, in some cases, sharing new information or knowledge. However, it was the code that was the least represented in the participants' responses. Five of these six responses were co-coded with other categories in the taxonomy; only one of the six was fully coded as "create." In the "create" category, we see a shift from information consumer to

information creator, in which learners are creating and presenting new information mostly to an external facing audience.

In the "create" category, there is a sense that the learner can now see and understand the information landscape as it relates to their research or information need and can translate that understanding or interpretation for a specific audience. Indeed, in at least two of the responses, "create" was situated within a more holistic ecosystem of information behaviour. For example, one participant shared "using available information sources to develop a research question, put together a search strategy, find appropriate sources, and present research to an audience". Another provided a similar yet more concise response — "find, understand, use, share, and create information." In these responses, "create" is the pinnacle of the research process and is dependent upon information skills and behaviours that are represented in the other taxonomy categories.

Several of the responses in the "create" category highlight delivering, sharing, or presenting information. They acknowledge, explicitly or implicitly, the presence of an audience and the need to present information in a way that is appropriate for that audience or situation. For example, one participant wrote "understand the interplay between the elements of rhetorical situation (audience, creator, purpose, topic, climate, culture, kairos)". The quality of the information shared is also mentioned in three of the responses, one indicating that it needs to be "truthful/non-biased", another that it needs to be "appropriate", and a third that it needs to be presented in an "equitable" manner. These types of statements highlight that as information creators, learners have certain responsibilities and expectations to uphold when creating or sharing information.

5. Discussion

The purpose of this analysis was to develop a draft IL taxonomy based on Bloom's revised taxonomy of educational objectives (Anderson & Krathwohl, 2001) to determine if it could provide a potential framework for bridging the gap between first- and second-wave conceptualisations of IL (Hicks & Lloyd, 2021). Faculty descriptions of IL were used as the unit of analysis, because the guiding IL documentation from our professional standards are written by and for librarians. Furthermore, the educational contexts and learning environments in which librarians are applying their expertise to develop learners' IL are typically, though not exclusively, designed and facilitated by non-library instructors. This means we also need a framework that can help bridge understandings of IL between librarians and disciplinary faculty/non-library instructors. The draft IL taxonomy presented here includes both skills and ways of thinking that are represented in the first- and second- conceptualisations of IL and provide both librarians and disciplinary faculty a scaffolded approach to draw upon in designing curricula, learning environments, and learning objects and resources.

We believe there are several interesting findings related to this analysis. We will discuss some of them in the following paragraphs and then highlight practical and scholarly implications of these findings. The most frequently applied categories were "analyse" (39%), "understand" (33%), and "apply" (31%). In all three of these categories, learners are active in developing and applying IL-related skills or ways of thinking and knowing or both. "Analyse" is the category in which learners really begin to develop more sophisticated and nuanced ways of thinking and decision-making regarding information use and begin to consider the specific information context and how that might affect their information usage. The fact that "analyse" is the most

frequently occurring category in our data is perhaps not surprising, given that the existing literature highlights that these are the higher-order thinking skills related to IL that many faculty value (Bury, 2011; Cope & Sanabria, 2014; Dawes, 2019b). These three categories also represent the midpoint of the taxonomy, a place where faculty may expect their students to spend much of their time. Faculty may expect students to enter their classrooms with a more than basic understanding of IL but may not expect students to operate at the same level as senior or graduate students.

The least frequently applied categories were "remember" (20%) and "create" (12%), which are the base and pinnacle tiers of the taxonomy triangle. Faculty may take for granted the significance of learners' awareness of the skills and ways of thinking, such as valued dispositions and knowledge practices, included in "remember", as they might assume that learners may have developed this awareness prior to college. However, as Lang (2016) reminds us, this awareness and the skills that build from it are critical for the development of higher-order thinking skills, and many learners probably are not introduced to discipline-specific ways of thinking and knowing prior to college. Therefore, not reinforcing awareness at the "remember" level could be detrimental to the development of the valued higher-order thinking skills included in categories like "analyse" and "create". "Create" was the least frequently applied category, which is interesting given that most instructors require learners to produce some kind of deliverable that is a culmination of the skills and ways of thinking represented in the other taxonomy categories and by which learners' abilities to meet instructors' IL-related expectations are assessed. It is possible that instructors associate the activities related to the development of some kind of product or artifact as being separate from IL, which could explain the underrepresentation in this data. One potential piece of evidence for this is that instructors who participated or completed the companion workshop, Teaching Information Literacy, were more likely to have this code assigned to their responses (38%) than the instructors who did not participate or complete their workshop (12%). Because of their participation in Teaching Information Literacy, it's possible that they have more complete or holistic understanding of IL and how it applies to their teaching practice. This could also be related to the expectations gap discussed in the literature review, in which faculty often value the more abstract elements of the research assignment, those that are difficult to articulate (Valentine, 2001). In other words, faculty may, in some ways, value the learning or research process more than the product, even though the product is what will ultimately be graded and shifts the learner from the role of information consumer to that of knowledge creator.

The application of Bloom's taxonomy to these descriptions of IL may have also surfaced the point in which IL-related learning goals or outcomes shift from basic or universal skills into threshold concept territory. In our analysis of the data, it appeared that there was a distinct shift between "understand" and "analyse" with "apply" seeming to serve as a liminal space between the two. "Apply" may constitute a space where learners encounter troublesome knowledge, an area where their information assumptions are confronted by information reality. Assignments and classes expecting students to navigate this expanse would require additional scaffolding and support for learners, providing deeper collaboration opportunities between disciplinary faculty and librarians. By identifying the types of IL actions and behaviours that prove troublesome, we can better describe what it means when students cross a threshold.

5.1 Practical Implications

We believe there are several significant practical implications for the framework provided in this draft taxonomy, and these implications relate to a variety of teaching and instructional support contexts in which librarians commonly participate, including the development of one-shot instruction sessions and associated resources, embedded librarian activities, curriculum mapping and design, and instructor development programmes. We believe that the taxonomy provides a structure for intentionally reflecting on learning goals for a one-shot session, an assignment, a course, or a curriculum by asking instructors to map their learning outcomes to the taxonomy categories, interrogate their assumptions about learners' prior learning and knowledge, and consider how they are going to model the expected skills and ways of thinking, as well as provide learners with opportunities for practice and feedback. For example, if an instructor of a lower-level undergraduate course has learning outcomes that are related to the "analyse" category, it would be appropriate to have a conversation about what learners will need to know to meet that learning outcome and how learners will acquire the necessary knowledge. This kind of discussion could happen as a librarian works with a faculty member to design a one-shot session or consider what an embedded relationship looks like, as well as the design and implementation of an instructor development programme offered to a wide array of faculty. Furthermore, this taxonomy could be paired with other commonly used pedagogical approaches that reinforce transparency for learners, such as Decoding the Disciplines (Pace & Middendorf, 2004) or Transparency in Learning and Teaching (Winkelmes, 2023).

We also believe that this draft taxonomy provides a framework for curriculum mapping exercises. Librarians could work with faculty in a particular department or programme that is interested in the intentional integration of IL into the curriculum to identify the current expectations of learners across a sequence of courses. This could help identify trends, such as front-loading higher-order learning outcomes without appropriate attention paid to foundational content or the absence of explicit teaching related to higher-order outcomes (i.e. a hidden curriculum). The benefit of this draft taxonomy, which is rooted in a commonly used learning taxonomy in higher education, is that librarians and faculty do not need to define commonly used categories such as basic, intermediate, and advanced. The draft taxonomy already provides a nuanced structure to which course and programme level outcomes could be mapped, which could be modified with institution-specific priorities. Through these discussions, librarians could help departments or programmes develop relevant course assignments that could be used to assess learners' performance at the various tiers of the taxonomy.

5.2 Future Research

As indicated in the literature review, this taxonomy was developed using data collected at a single institution, so additional research is needed to understand if this taxonomy is widely applicable, both in terms of institution type and geographical region, as well as continuous refinement and improvement. Particular attention should be paid to the frequency of the categories' occurrence in faculty responses and methods that allow for further clarification and nuance should be pursued. Specifically, an exploration of the "create" category and how faculty perceive knowledge creation and dissemination within their courses is warranted. Furthermore, with the identification of a potential liminal zone (i.e. the "apply" category) between first-wave skills (i.e. "remember" and "understand") and second-wave ways of thinking and knowing (i.e. "analyse" and "create"), additional research exploring if this is in fact true, what the experience of this liminal zone is like for learners, and identifications of best practices to aid learners in

crossing IL conceptual thresholds is needed. Finally, analysis about the utility of this taxonomy, from both the librarian and faculty perspectives, is warranted, as it will help us to understand if and how we might intentionally and strategically integrate IL into learning environments and our teaching practice.

6. Conclusion

The shift from the first-wave conceptualisations of IL, which were primarily skills-based, to constructivist second-wave conceptualisations, which are primarily related to ways of thinking and knowing, has been both productive and disruptive for librarians who teach. Our professional guiding documentation related to IL does not provide us with a guide about how to bridge these two conceptualisations or scaffold learning to help learners develop the valued ways of thinking and knowing related to IL. Furthermore, many librarians' teaching activities are embedded within learning environments that are designed and facilitated by teaching faculty. While previous research has indicated that disciplinary faculty, in general, value IL, they are not always intentionally teaching IL, nor do they believe that learners are achieving higher-order ways of thinking and knowing related to IL. In this study, we applied Bloom's revised taxonomy of educational objectives to instructor descriptions of IL to develop a draft IL taxonomy that both librarians and instructors could use to help bridge the gap between skills (i.e. lower-order thinking skills) and ways of thinking and knowing (i.e. higher-order thinking skills) and intentionally integrate IL into their assignments, courses, and curricula.

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