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Teaching "Format as a Process" In an Era of Web-scale Discovery

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Abstract
Purpose- Advancements in online discovery require academic librarians to develop new means of teaching and assessing information literacy, with an emphasis on having students employ critical thinking to evaluate sources.
Design/methodology/approach- This conceptual paper analyzes how the threshold concept "format as a process" could be incorporated into information literacy instruction sessions which address web-scale discovery services and other online search tools. General guidelines for applying this concept are included, along with potential classroom activities and assessments.
Findings- Format as a process provides a valuable framework for evaluating information, though librarians need to be mindful of how they present the concept to students. Instruction must be focused on fostering critical thinking skills, rather than how to perform tasks, and assessment must be qualitative in nature.
Practical implications- These changes in online searching mean that information literacy programs will need to alter their approach to instruction and move beyond the "one shot" paradigm. Critical evaluation is a sustainable, lifelong skill which will continue to serve students after graduation, but developing that ability requires academic librarians to fulfill new roles in the classroom and on campus.
Originality/value- The literature surrounding instruction of web-scale discovery is still limited, and does not incorporate the threshold concepts provided in ACRL's *Framework for Information Literacy in Higher Education*. This paper concentrates on one such concept, as well as discusses how future concepts could be addressed.

Introduction
The field of information literacy instruction, like much of academic librarianship, has seen rapid change in the last generation. As research tools have moved primarily from print sources to those which can be found online, instruction librarians have adopted a variety of approaches to teach users where and how to locate relevant and reliable information. Many libraries started initially by offering a "library tour," in which a librarian would show users where various collections were located in the building and how to use them appropriately. This approach was effective as long as students conducted all of their research in that specific library, and that library's print collections were enough to meet student research needs. Another means of instruction based on print highlighted specific kinds of sources, namely "scholarly" and "popular" articles, with the goal of teaching students how to evaluate sources based on visual cues. This kind of instruction was helpful for students as long as publications followed set rules of formatting and page layouts, and all sources fell into clearly defined categories.

The increase of online searching, however, required a substantial change in how librarians approached teaching. As print journal subscriptions moved to online repositories, "database instruction" effectively supplanted the "library tour." In this new paradigm, librarians offered a "one shot" session devoted to explaining an article database, putting an emphasis on where to click on the page and what functionality was available. Although this model of instruction remains popular today, circumstances have made it much less sustainable. The proliferation of database providers, and the frequency with which they alter content or update their interface, has meant few things are constant. Students might learn the skills necessary to complete their current assignment, only to have a database change its appearance or drop a collection it previously had included, leading to confusion in subsequent semesters. At the same time, students have come to rely increasingly on "open web" search engines to meet their information needs, and often conduct research without consulting library resources.

It is with this backdrop that web-scale discovery services have come into prominence. Though relatively new, they have been hailed as "an evolution holding great potential to easily connect researchers with the library's vast information repository," and that by consolidating physical and digital content from myriad vendors into a single index, these services "hold the promise to fundamentally improve and streamline end user discovery and delivery of content" (Vaughn, 2011, p.6). In practice, this means that researchers have access to a wide array of content through a single search box, designed to rival the interfaces of more popular web search engines. From an instruction perspective, librarians no longer need to teach different database options, as there is now a centralized resource which covers many (though not all) resources at once. Additionally, these interfaces have moved away from the more complicated search screens of past databases, and instead rely on a simple and familiar display which requires less explanation.

While these advances are in many ways liberating, they have meant that librarians and their users will have to grapple with ever-expanding results lists, where even obscure search terms can return millions of results. Adding to the confusion, thin and inconsistent metadata can skew relevance rankings and obscure collections (Ellero, 2013), causing frustration to users as they attempt to find appropriate sources. Despite these issues, discovery continues to expand in academic libraries, and with it, the need for information literacy instruction. Unlike past models of instruction, however, web-scale discovery requires that librarians engage students in the critical evaluation that forms the core of research, rather than rely on explaining an interface or giving a tour. This conceptual paper seeks to explain one such means of critical evaluation, the concept of "format as a process," and how it could be applied in order to improve student evaluation of information when using web-scale discovery services and other online resources.

Literature Review
Approaching Web-Scale Platforms
The literature addressing web-scale discovery at academic libraries is still relatively limited, though it continues to grow. Several studies have employed usability tests of different services, with students and faculty carrying out various search tasks while librarians observe or record their actions (Fahey *et al.*, 2011; Williams and Foster, 2011; Comeaux, 2012; Fagan *et al.*, 2012; Nichols *et al.*, 2014). The purpose of these studies is primarily to evaluate the discovery tools themselves, with an aim of helping libraries select a service and customize its implementation, rather than assessing user behavior to guide instruction efforts. Similar works by Gross and Sheridan (2011) and Swanson and Green (2011) look at how users navigate single search boxes embedded in library websites. Again, while useful, these studies provide guidance on if and how to integrate a discovery tool into a website's design, rather than how to teach students to use discovery effectively.

Beyond usability testing, several libraries have analyzed logs of search terms used in discovery tools in an effort to identify how students approach these interfaces. Lown *et al.* (2013) reviewed 1.4 million transactions over the course of two semesters to see how students used a single search box. Ballard and Blaine (2011) looked at several months of data to determine if users refined their searches differently on a discovery platform than they did in a more "traditional" catalog. McKay and Buchanan (2011) compared how students form keywords in different search systems, and Meadow and Meadow (2012) studied how keywords improved over time. These search log analyses provide researchers with a wealth of data regarding search behavior, and have largely indicated that, despite a simplified interface, students do a poor job of forming search queries. That having been established, these studies do little to inform librarians about why students selected those keywords in the first place, or what interventions could be done to improve keyword formation.

Teaching Web-Scale Discovery

When focusing on the instruction of web-scale discovery, several articles reflect the negative feelings surrounding the adoption of these services. Buck and Mellinger's (2011) survey of librarian perceptions towards discovery found that information professionals are largely ambivalent toward these tools, and have been hesitant to integrate them into instruction. Likewise, Grotti and Sobel (2012) write that librarians hold divided opinions of discovery, and that "truly formalized integration has not yet occurred" in library instruction (p. 21). A case study by Walker and Sims (2012) found that "some members of the instruction team have been reluctant" to include a discovery tool in sessions at their library, and a survey conducted by Howard and Wiebrands (2011) at their university revealed that while students and faculty had very positive feelings toward a new discovery service, librarians harbored "misgivings about its efficacy" long after implementation (p. 9). More recently, a survey by Kulp *et al.* (2014) indicated that nearly two-thirds of the instruction librarians at Association of Research Libraries member institutions either rarely or never teach students how to use their "one-box" search tools. The reasons for these negative feelings are mixed, but at least part of the hesitation evidently stems from the feeling that discovery platforms "dumb down" the research process (Rose-Wiles and Hofmann, 2013, p. 156). Despite these sentiments, statistics compiled by Breeding (2014) indicate that adoption of these services continues to grow, leading him to refer to discovery as "one of the main delivery vehicles for access to collections and services" in libraries today.

So while more and more institutions are adopting discovery platforms, and search log analyses reveal that students are poor at using these tools, much of the literature shows that librarians are not necessarily committed to web-scale discovery, and often choose not to teach these platforms to their students. As for those librarians who do seek to teach discovery, there is a shortage of guidance on how to approach the issue, with a couple of exceptions. Fawley and Krysak (2012) and Buck and Steffy (2013) both provide advice on how to plan instruction for students using discovery tools, with the latter providing several "promising practices" which were derived from a survey of librarians. These works are valuable sources to instruction librarians, but they do not aim to present specific classroom techniques, and instead provide more general guidelines.

One such guideline deals with focusing on critical thinking and evaluation, with Fawley and Krysak (2012) stating "[n]ow that librarians no longer need to spend valuable class time on explaining the intricacies of different search engines, instruction can focus on evaluating the search results" (p. 212). This is echoed by Cmor and Li (2012), who note that instruction sessions will now be able to focus on critical thinking, rather than explaining where to search. Gross and Sheridan (2011) came to a similar conclusion in their study, writing that "as librarians, our role in helping students understand how to use the interface to find data may be diminishing; but conversely, our role in helping them develop search strategies and evaluate what is useful information becomes even more important" (p.245). And in their study of discovery, Asher *et al.* (2013) ask the very relevant question, "will the ability to evaluate resources become a more highly needed and valued skill?" (p. 477).

Redefining "Information Literacy"
This pivot away from selecting appropriate databases, and focusing much more on evaluation of information, presents some challenges to the Association of College and Research Libraries (ACRL) *Information Literacy Competency Standards for Higher Education*, which were approved in 2000. In an editorial about discovery, Fagan (2011) states that these new tools "support some traditional information literacy outcomes, while failing to support others," and goes on to write that librarians "need to reconsider our information literacy standards, indicators, and outcomes. It has been [several] years since these standards were adopted by ACRL. Have there been shifts in the information world that suggest changes or additions to the standards or in their implications?" (p.

177). Asher *et al.* (2013) likewise point out that "the relationship between discovery tools and information literacy should be evaluated," and ask if the ACRL standards should be "rethought." (p. 477). It is also worth noting that calls for a revision of the standards go well beyond the discovery literature, with authors like Jacobs and Berg (2011) calling for a "critical information literacy" which addresses the "broader social, political, cultural, and economic contexts" connected to information (p. 392).

ACRL responded to these developments in online searching, and the subsequent requests for a "rethinking" of the standards, with the formation of the Information Literacy Competency Standards Review Task Force. Among many other things, this group's recommendations in 2012 acknowledged that the standards needed to move away from an implicit focus on format, and that "changes in scholarly communication and the evolving digital landscape" require libraries to "recognize the need to break down the hierarchical structures for disseminating information and level the information playing field" (p. 5). ACRL's *Framework for Information Literacy in Higher Education, Draft 1*, released in February 2014, made clear that the new document would be built around several threshold concepts, each with corresponding dispositions which ask that students "use more than their cognitive faculties" when learning about information (ACRL Information Literacy Competency Standards for Higher Education Task Force, 2014a, pp. 5-7). One of these threshold concepts, "format as a process," addresses the aforementioned changes in communication that are at the core of the evolving digital environment, and provides a new way to consider many of the questions raised by web-scale discovery and online search engines.

Format as a process
The concept of "format as process" was first introduced by Townsend *et al.* (2011). In a follow-up study, Hofer *et al.* (2012) explain that:

> What makes a book a book and a newspaper article a newspaper article has nothing to do with how one accesses it (print/digital), but with the process that went into creating it. Understanding this principle helps students navigate the information they find online and evaluate it according to the process underlying its creation, rather than by a set of memorized, constantly changing, inconsistent characteristics (p. 403).

The first draft of the *Framework* included a slightly different definition, stating that:

> Format as process refers to understanding that the processes of developing information resources originate from different needs, motivations, values, conventions, and practices, and result in different formats, but the underlying questions about value of the information and its potential use are more significant than the physical packaging of the information source (ACRL Information Literacy Competency Standards for Higher Education Task Force, 2014a, p. 15).

This definition is interesting in that it includes references to different "needs" and "motivations" for creating information, and how they influence that information's value and potential use. A later draft of the *Framework*, released in June 2014, updated the concept's title to "format as *a* process," and changed its definition to read that:

> Format is the way tangible knowledge is disseminated. The essential characteristic of format is the underlying process of information creation, production, and dissemination, rather than

how the content is delivered or experienced (ACRL Information Literacy Competency Standards for Higher Education Task Force, 2014b, p. 9).

Regardless of the exact definition, this concept is particularly relevant in an era of web-scale discovery, when simple search interfaces yield millions of results, representing a wide variety of formats that serve different purposes. The reality is that students no longer need help getting to the sources, but rather critically evaluating the sources that they find. Format as a process indicates that this evaluation of information should not be based on "inconsistent characteristics," which are unique to each database, but instead grounded in analysis of the underlying processes which led to the creation of that information. Much like the advent of online searching replaced many of the library tours of the past, the development of web-scale discovery has pushed information literacy beyond "teaching a database," and allows librarians to cater their instruction to the critical evaluation of information. The remainder of this paper outlines practices for integrating the concept of format as a process into research instruction of web-scale discovery services and other online search tools. Also included are recommendations for classroom strategies to achieve this outcome, as well as possible assessments which could be used to evaluate student learning. In keeping with the spirit of the *Framework*, however, this is not meant to be a prescribed lesson, and instead provides only general guidelines for librarians to consider as they develop their own curriculum.

Library Instruction as a Discussion of Process
The nature of format as a process shifts the emphasis in instruction sessions away from discrete tasks and instead asks students to employ critical reasoning. In order for students to evaluate a source for its applicability to their information need, they are no longer relying on a physical location, visual cue, or database limiter. Instead, students will need to consider qualities which are not readily apparent when looking at a source, a skill which can be troublesome. These are some ideas and guidelines for librarians to consider when teaching format as a process:

Focus on the process, not the format
Because this model of instruction asks students to evaluate information on the basis of process, it is important to build classroom sessions around the processes themselves, not the formats they create. For example, the content of a session should not focus on "scholarly journals." Instead, the session should be a discussion of the research, experiments, and peer-review which create those scholarly journals. This way, even if the notion of a "journal" disappears, students will still possess the ability to look for those things which give that source its benefits and limitations. It should also be stressed that the key to teaching format as a process is not to explain every format to students. Instead, students only need to consider the role of process when they are evaluating a source of information.

Discuss processes objectively
With the changing nature of publishing and online communication, not to mention the diversity of information available, it is important not to establish any one process, and subsequent format, as being the "best" source to use. Every process has its benefits and limitations, and classroom discussion should address them. In the case of peer-review, the process of verifying research findings with other scholars necessarily delays dissemination of those findings a matter of months or years. Likewise, a news editor might alter a report to improve its appeal, but at what point does that editorial process become censorship of an unpopular idea? The point of this kind of instruction is not for the librarian to instill their values in students, but rather equip students with the knowledge necessary to use their own values when evaluating information. Moreover, librarians need to take

this approach if they want to form a definition of information literacy which is "pluralistic" and "nonjudgmental" (Elmborg, 2006, p. 195).

Avoid visual cues; process is invisible

The reality of today's information economy is that the publication and formatting of electronic sources, scholarly or otherwise, is in near-constant flux. While print sources of the past may have followed set rules, many formats today are visually indistinguishable from one another, especially when discovery tools and search engines present them in their bare, HTML-only versions. Fawley and Krysak (2012) are correct when they state that "it is vital that students are taught to recognize the difference between formats" when using web-scale discovery, but they are wrong when they write that "[v]isual cues allow students to recognize different source types" (p. 212). Information literacy instruction needs to address the invisible processes which make different formats, not what those formats are "supposed to" look like.

Use process to discuss authority

Discussions of a source's authority are often tied to the identity of the author, such as their credentials or life experience. The model presented here moves the discussion away from the author and instead focuses on the process that created the particular source. For example, not everything a scholar writes is peer-reviewed research, so a definition of "scholarly" has to go beyond the author's position to include an investigation of the process through which they are communicating. This allows librarians to acknowledge that information is created in a variety of contexts, and its applicability and reliability are subject to a variety of factors. Once students grasp this concept, it will allow them to see the social and political aspects of information, and question why some formats are privileged over others. It also may very well empower them to be not just consumers of information, but also potential creators, if only they too are willing to engage in the process.

Engage in a process and create information

Much of the discussion of "process" can focus on abstract concepts like research or editing, which are not always visible to students. In order to make these concepts more tangible, it is beneficial to have them engage in processes themselves. There are several options which could take place in a single class period, such as editing a Wiki or posting a blog entry. Longer assignments could include in-depth research and double-blind peer review, ending with the assignment being placed in the library's digital repository. Indeed, the increasing ease of online publishing allows these kinds of active learning techniques to take place with minimal resources, and has the added benefit of opening discussions of other topics, such as the digital and media literacies which are included as part of Mackey and Jacobson's (2011) metaliteracy.

Use formats to explain the interface, not vice versa

Once students begin to form an understanding of different formats, and the processes that created them, instruction can turn to using the discovery platform itself. When describing the functionality of the tool, however, the focus should still remain on the information that it finds. Facets exist to help narrow results, but students should not equate the facet with the format. Put another way, instruction should stress that "peer-review" is not a facet, it is a process represented by a facet. Rose-Wiles and Hofmann (2013) make a similar point, explaining that showing students how to check boxes in a database will not teach them about the research which created those results in the first place (p. 148). To equate database functions with formats will lead students to base their evaluation of a source on a facet alone, rather than their own observations. This kind of evaluation does not transfer to other means of information-seeking, and will not serve students in the long run.

Connect skills to other search areas
Using format as a process to evaluate the results found in web-scale discovery services applies the same skills necessary to evaluate results found when searching on the open internet. Fagan (2011) points out that "college students will face a more Google-like world after graduation," and that discovery opens up new opportunities for information literacy instruction that will continue to serve students throughout their lives (p. 177). Likewise, Buck and Steffy (2013) point out that librarians should "emphasize the transferability of search skills" when teaching discovery, making the case that "the ability to critically evaluate search results" applies to myriad information seeking contexts (p. 78). Put simply, the ability to evaluate information is necessary wherever students are searching, be it a discovery tool, subject database, or search engine. This paper focuses on web-scale discovery, but these same concepts apply elsewhere.

Assess qualitatively
Because the desired outcome is that students are aware of process, and consider it when evaluating sources, assessment of student learning has to look at critical reflection. More traditional artifacts of learning, such as bibliographies, will indicate the types of formats that students have used, but not the evaluation that went into selecting them over other options. For that reason, instructors should base their assessment of this learning outcome on reflective essays that accompany research assignments, similar to the model used by Hoffmann and LaBonte (2012). One example prompt would be to have students select a source used in their research, then ask them: "What can you tell about how this source was made? What about that process makes this a 'good' source for you to use?" Responses to this prompt could then be evaluated with a rubric that rewards a student's ability to identify a formative process inherent to the format, as well as qualify how that process contributes to the authority or relevance of the source.

Discussion
The arrival of web-scale discovery services has altered the information landscape in academic libraries. Despite the fact that some librarians might not be convinced of their quality, discovery tools continue to proliferate, and research has found that both students and faculty have positive experiences with them. At the same time, studies have also shown that users will need instruction if they are going to perform their searches effectively. While there has not been much research regarding how to conduct that instruction, there is some consensus that librarians should be spending less time demonstrating interfaces, and more time teaching students how to think critically when evaluating search results. The threshold concept of "format as a process" provides a novel lens for planning this kind of instruction, and applies to both web-scale discovery and other forms of online searching.

Implications for practice
The concept of format as a process presents students with a new approach to evaluating the information resources they will encounter when conducting research. This skill is only one piece of the information-seeking process, however, and effective use of discovery tools requires scaffolded instruction (Buck and Steffy, 2013). If librarians are going to prepare students to succeed in an increasingly complicated information economy, there will need to be a push towards more involved classroom sessions. Whether this takes the form of embedded instruction, credit-bearing courses, or something else entirely remains to be seen. Grotti and Sobel (2012) note as much in their investigation of a discovery platform, asking whether tools like these need "a more distinctively tiered approach than other resources" when it comes to teaching. They go on to state that this

"could be implemented in information literacy courses or in institutions that have implemented library instruction across the curriculum, but may be more difficult to incorporate into library instruction programs that are characterized by the 'one shot' session" (p. 20). Rose-Wiles and Hofmann (2013) similarly state that a move to discovery requires a discussion of the larger research process, but that "it is unlikely that a one-shot session can adequately address" this concept (p. 157).

This paper only addresses format as a process, but the adoption of ACRL's new *Framework for Information Literacy* will almost certainly encourage librarians to revisit their instruction programs and attempt to incorporate additional threshold concepts. Whether these concepts are included in the *Framework* itself, or are identified by individual librarians, they will all put a greater emphasis on critical thinking and reflection than on rote memorization and simple tasks. Considering the complications inherent in this kind of instruction, the librarians tasked with teaching these concepts will need to advocate for increased involvement and resources on their campuses. The shift to discovery has meant that these professionals are free to move away from explaining the nuance of database interfaces, but they will now need support to develop the new pedagogies and assessments necessary to teach critical evaluation effectively. They will also need to communicate with their campus stakeholders, explaining that in order to develop the kinds of research skills necessary to succeed in the future, students will require in-depth, recursive instruction. This kind of instruction goes well beyond the "one shot" paradigm which has been so pervasive in library instruction.

Conclusion

Perhaps the greatest asset of teaching students to think critically about how information is made is the sustainability of the lesson. Regardless of what new research tools are developed, or how the publishing industry is altered, the formative processes which lead to the creation of information will continue to determine the relevance and credibility of a source. Rose-Wiles and Hofmann (2013) are absolutely correct when they write that discovery tools "can help us highlight and demonstrate skills and issues that will be relevant to the student in their post-assignment… lives" (p. 162). If the goal of libraries, and the institutions they serve, is to develop and promote lifelong learning, instruction centered on critical thinking and reflection is the key to achieving that outcome.

Of course, developing this kind of critical consciousness in students does not end with only the evaluation of sources. Indeed, as students develop their understandings of how information has been produced, librarians should encourage them to be critical not just of the sources, but the processes which create and distribute those sources, and why certain processes are seen as more valuable than others. As Elmborg (2006) writes, information literacy "is more than a set of acquired skills. It involves the comprehension of an entire system of thought and the ways that information flows in that system. Ultimately, it also involves the capacity to critically evaluate the system itself" (p. 196). Considering the rate of change in the world of information, students will undoubtedly need to evaluate new processes for creating and disseminating information, and consider how those processes can be used to empower or suppress. This model of teaching format as a process, and how it can be employed in an era of web-scale discovery, is far from fully addressing this issue. Instead, this paper presents a model for how the new *Framework* might help librarians merely begin to "bridge the gap between the larger goals of information literacy and their daily work" (Jacobs and Berg, 2011, p. 386). In other words, this paper is not meant to answer a question, but rather start a conversation about how both librarians and students might develop a more complete understanding of the power of information.

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