## Evidence Based Library and Information Practice

*Article*

## Information Literacy Articles in Science Pedagogy Journals

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**Abstract**

**Objective** – This study sought to determine the extent to which articles about information literacy-related topics have been published in science pedagogy journals. It also explored the nature of these references, in terms of authorship, Association of College and Research Libraries (ACRL) information literacy competency standards addressed, and degree of emphasis on information literacy topics. In addition to characterizing information literacy in the science pedagogy literature, the study presents a methodology that can be adopted by future efforts to explore representations of information literacy in the literature of additional academic disciplines.

**Methods** – The *2011 Journal Citation Reports® Science edition* was used to identify the 15 journals with the highest impact factor in the "Education—Scientific Disciplines" subject category. Initially Web of Science was searched to identify occurrences of "information literacy" and related terms in the journals of interest during the 10 year period 2002-2011. This was supplemented by a title scan of the articles to ensure inclusion of relevant items that did not include library-centric terminology. Abstracts and, where necessary, full papers were reviewed to confirm relevance. Only articles were included: editorials, news items, letters, and resource reviews were excluded from the analysis.

Articles selected for inclusion were read in their entirety. Professional designations for each author were identified to characterize the authorship of this body of literature. Articles were also

classified according to levels developed by O'Connor (2008), to indicate whether information literacy was a "Major Topic," "Substantive Focus," "Incidental Mention," or "Not Explicitly Named." Further analysis mapped each article to the ACRL information literacy competency standards (2000), to provide more detailed insight into which standards are most frequently addressed in this body of literature.

**Results** – Articles on information literacy-related topics appear only sporadically in science pedagogy journals, and that frequency varies depending on the specific subject area. Overall, librarians contribute a relatively small proportion of these articles, and are more likely to co-author with teaching faculty/graduate students than to publish alone or with other librarians. The degree of focus on information literacy topics (O'Connor level) varies depending on article authorship, with librarians more likely to treat information literacy as the "Major Focus" of their work. Additionally, the articles tend to cluster around ACRL information literacy standards two, three, and especially four, rather than addressing them equally.

**Conclusions** – The presence of some articles on information literacy-related topics in science pedagogy journals suggests that there is a willingness among these journals to publish work in this area. Despite this, relatively few librarians have pursued this publication option, choosing instead to publish articles on information literacy topics within the library and information studies (LIS) literature. As a result, librarians are missing out on the opportunity to share their published work in venues more likely to be seen and valued by subject faculty, and on the chance to familiarize science educators with information literacy topics. Future research should focus on: librarians' rationale when selecting target publications for their information literacy writing; science educator interest in writing and reading about information literacy topics in their pedagogical journals; and the impact of articles about information literacy in these journals on subject faculty perceptions of the topic's importance.

The methods used in this research have implications for the study of information literacy in other academic disciplines, and demonstrate that the study of information literacy in the literature of academic disciplines can provide valuable insights into representations and characterizations of information literacy in diverse fields of study. A better understanding of how subject faculty think and write about information literacy in their scholarly literature could have a significant impact on how librarians approach and collaborate with faculty in all fields of study.

## Introduction

Thousands of journal articles, books, standards, and other documents have been written on the topic of information literacy over the past two decades. Library and information studies (LIS) venues have published the vast majority of this work, where it is read primarily by librarians with a pre-existing interest in the topic. This body of literature is certainly important, as it has promoted information literacy to a wider LIS audience and helped to refine the profession's understanding of the concept.

Of particular interest to the current study, however, is the degree to which information literacy has permeated the pedagogical literature in the academic disciplines; that is, the literature that is most likely to be read by teaching faculty. Research has repeatedly demonstrated that curricular integration of information literacy competency development is essential to its success, and such integration cannot happen without the willing participation

of faculty teaching in the disciplines (Kearns & Hybl, 2005; Lampert, 2005). This study approaches pedagogical literature in the disciplines as one measure of the interest in and uptake of information literacy among educators. In addition to quantifying information literacy's presence in the science pedagogical literature, it also attempts to characterize the nature of this work. It is hoped that the results will provide guidance and insight to librarians, whether they are considering publication venues for their own information literacy writing, or trying to identify connection points between information literacy and pedagogical discussions in the disciplines.

**Literature Review**

In 1992, Jacobson and Vallely undertook a study to determine the prevalence and authorship of articles about "library instruction" in the "journals that faculty members read" (p. 360). They did not specify any subject area limitations in their research, and the databases searched indicate that they included a wide range of disciplines. The term "information literacy" was not yet in widespread use in the period covered by their search (1980-1990), so they used "bibliographic instruction" and other keywords and subject headings (outlined in detail in appendix A of their article). They found 74 articles about library instruction in non-library journals, with approximately 50% written by librarians alone, 25% written collaboratively by librarians and faculty members, and another 25% authored by faculty members alone. Jacobson and Vallely expressed general disappointment, not only with the small numbers, but also with the quality of the articles retrieved, noting that there was "not much . . . novel or surprising" (p. 360) in the articles by librarians, and that faculty-authored articles revealed, "a remarkably superficial notion of who we [librarians] are and what we do" (p. 362). They ended with a call for librarians to increase publication about the value of library instruction in journals read by faculty members.

Still's 1998 article followed six years after Jacobson and Vallely's early effort to use non-library literature as a barometer for interest in and uptake of library instruction. Like her predecessors, Still looked at subject-specific pedagogical journals across disciplines, and found that only 33 of 13,016 articles discuss library instruction or library-related assignments. She highlighted specific articles within four broad subject categories: Sciences, Humanities, Social Sciences, and Nursing/Social Work, but did not characterize the literature in any systematic way. In Sciences, the category most relevant to the present study, she lauded the creation of the "Chemical Information Instructor" column, edited by a librarian, in the *Journal of Chemical Education*. Her conclusion, however, was sobering: "If the library and library instruction have been integrated into the academic curriculum, there is little evidence of it in the discipline specific teaching journals studied" (Still, 1998, p. 229).

Nearly a decade after Still's article, Stevens (2007) was the first author to analyze discipline-specific pedagogical literature in the era of widespread adoption of the term "information literacy" and the ACRL information literacy competency standards. Even with the broadening of her focus from "library instruction" to "information literacy," Stevens found only 25 information literacy articles published from 2000-2005 in the 54 pedagogy journals included in her study. Like Jacobson and Vallely, Stevens was particularly interested in the authorship of these 25 articles, and found that 7 were written by librarians, 12 were faculty/librarian collaborations, and 6 were written exclusively by faculty. She concluded that, while information literacy had not made significant inroads into the disciplinary pedagogy literature overall, there were some bright spots. She noted the growing presence of information literacy in the nursing pedagogy literature, presenting it as an example that illustrates the value of publishing this work in disciplinary journals. Stevens was also the first author to mention the ACRL standards in her

analysis; while she didn't delve down to use of specific standards, she did note that some articles, "use the ACRL Standards as a framework for defining IL competencies, designing assignments, and assessing student learning" (p. 262). Ultimately, like Jacobson and Vallely and also Stills, Stevens concluded with a call for librarians (either alone or collaboratively with faculty) to capitalize on the potential of discipline-specific pedagogy journals to interest faculty in information literacy.

O'Connor (2008) was the first, and to date only, author to conduct a more in-depth study of information literacy in the literature of a specific discipline. She searched business literature (broadly, not just pedagogical journals) in order to assess the "diffusion" of information literacy in business studies. She located 159 relevant works (unlike previous studies, O'Connor included trade publications in addition to scholarly journals) and her analysis revealed that disappointingly few were written by librarians. She also developed and applied a scale for delineating the extent to which the works addressed information literacy topics, a scale that has been adopted for the current study. She found that most of the information literacy articles she had identified gave the topic "Incidental Mention," although there were also a significant number in which information literacy was the "Major Focus." O'Connor's application of Rogers' Diffusion of Innovations Theory led her to the conclusion that the low and relatively stable level of information literacy publications appearing in the business literature over time indicated that it is in the "earliest phases of adoption . . . and has not yet reached the tipping point" (2008, p. 120).

The present study, like O'Connor's work, is based on the premise that detailed examination of the literature of specific fields provides a deeper and more nuanced understanding of information literacy, while also recognizing that there is value in being able to conduct some comparisons among similar fields. It shares earlier authors' interest in the number of

information literacy-related articles appearing in non-LIS literature over time and their curiosity about the authorship of these articles. It also offers a deeper level of analysis, not only characterizing this body of literature by applying O'Connor's levels, but also, for the first time in this type of study, mapping journal articles to the ACRL information literacy competency standards.

**Aims**

This study aims to answer the following research questions: To what extent are information literacy competencies addressed by science pedagogy journals? What is the nature of these references, in terms of authorship, ACRL standards addressed, and degree of emphasis on information literacy?

**Methods**

The term "information literacy," despite its widespread use among librarians, lacks a single, accepted definition. Professional associations in different countries have variously defined it as "knowing when and why you need information, where to find it, and how to evaluate, use and communicate it in an ethical manner" (Chartered Institute of Library and Information Professionals, 2004), or as being "able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (American Library Association, 1989). The author of this study used the ACRL's five competency standards as the basis for her definition and conceptualization of information literacy, primarily because they have been so widely adopted in the North American academic library sector where she works.

The researcher used the *2011 Journal Citation Report (JCR) Science® edition* to identify high impact journals in the "Education—Scientific Disciplines" subject category. While the problems inherent in using journal impact factors as a proxy for journal quality have been

well-documented (Lozano, Larivière, & Gingras 2012; McVeigh & Mann 2009, among others), this provided a convenient way to identify journals across scientific disciplines whose reach is significant, thereby serving the purpose of this study. The analysis included the 15 non-medical journals with the highest impact factors, and the study considered articles published in the most recent 10-year period for which complete data was available (2002-2011), with the sample obtained in April 2013. Only articles were included; editorials, news items, letters, and resource reviews were excluded from the analysis. This created a large pool of 10,743 articles for analysis, providing broad coverage across scientific disciplines, and covering a time period of great change in information retrieval and usage practices. The study used the online versions of the articles, relying on print only in cases of missing content or access restrictions.

Efforts to identify articles from this pool of 10,743 publications that address information literacy-related topics were two-fold. The researcher initially conducted keyword searches of *Web of Science* to identify occurrences of the terms "information litera*" or "information fluen*" or "library instruction" or "information competen*" from within the large pool of articles. She then supplemented this by personally scanning the titles and, where necessary for clarification, the abstracts and/or full text, of the original pool of 10,743 articles. This ensured the inclusion of relevant articles that did not contain library-centric terminology in describing information-literacy related concepts, as well as articles that focused on specific competencies (such as plagiarism, searching) without including an umbrella information literacy term. In an attempt to ensure consistency and quality control in the selection process, the author selected only articles that could be correlated to specific components of the ACRL competencies/ performance indicators/outcomes. Additionally, articles had to focus on inculcating these competencies in students, rather than mentioning them in other contexts. For example,

an article about instructor strategies for detecting plagiarism was also excluded as the focus was not on educating students about the topic.

The researcher read articles selected for inclusion in their entirety to ensure accurate categorization. She created a standardized template in Excel and extracted data from each article as it was read. The entry for each article included details about the professional designations for every author in order to characterize the authorship of this body of literature; in cases where this information was not provided in the article, the researcher located it through Web searches and, in a small number of cases, email follow-up. The template also required entry of the publication year and the broad scientific subject area of the journal in which each article was published. Additionally, the template also required that the researcher classify each article according to the levels developed by O'Connor to indicate the nature of the work's attention to information literacy concepts. The four levels are:

> texts in which IL [information literacy] is explicit and a major focus (IL–Major topic); texts in which IL is explicit and treated substantively, but is not the focus of the article (IL-Substantive Treatment); texts in which IL is explicit, but only mentioned in passing, possibly with a very brief definition provided (IL–Incidental Mention); and texts in which IL competencies are clearly being discussed, yet IL is never explicitly named. (O'Connor 2008, p. 113)

Finally, the template required the researcher to assign each article to the appropriate ACRL information literacy competency standards for higher education (2000) to provide more detailed insight into which standards are most frequently addressed in this body of literature. The researcher coded articles as addressing up to four individual standards, while coding those addressing all five standards or information literacy generally as "IL—General."

**Results**

A total of 10,743 journal articles met the criteria of articles published from 2002 to 2011 in the target 15 journals. The researcher first reviewed article titles in order to determine relevance of the papers, which revealed that the vast majority of these did not address information literacy topics in any notable way. In 430 instances where titles were ambiguous or suggested information literacy-related content, the researcher read abstracts to glean a better

understanding of the article. This allowed further refinement of the article set, and left 218 articles to be read in their entirety. Ultimately, only 156 of the original 10,743 articles (or 1.5%) addressed information literacy-related topics. The names of the journals included in the analysis, the number of citations under review from each journal, and the number/percentage of information literacy-related references found in each journal are outlined in Table 1. These numbers clearly indicate that articles on information literacy-related topics appeared only sporadically in science pedagogy journals.

Table 1
Information Literacy Articles by Journal

| Journal | Total articles | Number of information literacy articles | % of information literacy articles out of total |
|---|---|---|---|
| *Journal of Engineering Education* | 228 | 6 | 2.6% |
| *Advances in Physiology Education* | 358 | 15 | 4.2% |
| *Studies in Science Education* | 52 | 1 | 1.9% |
| *CBE—Life Sciences Education* | 325 | 18 | 5.5% |
| *IEEE Transactions on Education* | 659 | 13 | 2.0% |
| *Physical Review Special Topics— Physics Education Research** | 143 | 0 | 0 |
| *Journal of Science Education and Technology* | 459 | 13 | 2.8% |
| *Chemistry Education Research and Practice* | 277 | 4 | 1.4% |
| *Biochemistry and Molecular Biology Education* | 566 | 19 | 3.4% |
| *European Journal of Physics* | 1213 | 0 | 0 |
| *Journal of Chemical Education* | 3057 | 39 | 1.3% |
| *American Journal of Physics* | 1702 | 3 | .2% |
| *International Journal of Engineering Education* | 1260 | 8 | .6% |
| *International Journal of Technology and Design Education* | 198 | 7 | 3.5% |
| *Journal of Biological Education* | 246 | 10 | 4.1% |
| Total | 10,743 | 156 | 1.5% |
| * Publication began in 2005 | | | |

Journals were also grouped according to specific scientific discipline, based on "Subject Category" assigned in the *2011 Journal Citation Report (JCR) Science® edition*, in an effort to uncover any differences in the frequency of information literacy articles by subject area. Figure 1 shows that, of the scientific disciplines represented in the 15 journals under review, biology/life sciences journals were most likely to have addressed information literacy topics (4.2% of articles). Science (general), chemistry, and engineering journals published somewhat fewer articles on information literacy topics, and information literacy articles were virtually non-existent in the physics education literature, with only .2% of journal articles under review addressing the topic.

The researcher also analyzed journal articles to determine the level or depth with which they focus on information literacy topics. Application of the levels developed by O'Connor (1998) revealed that, when addressed in science pedagogy journals, information literacy is most frequently the "Major Topic" of a journal article,

with O'Connor's category "IL Substantive Treatment" a close second (Figure 2). This is not to imply that the term "information literacy" itself was used in the articles; in fact, this phrase is absent in the vast majority of articles. Instead, it indicates that the *concept* or its constituent parts (as articulated in the ACRL *Information Literacy Competency Standards for Higher Education*) were represented at the specified level. Thus, the category "IL Not Explicit" does not refer to the absence of the term "information literacy," but most often indicates that a learning activity was developed to foster several skills, of which information literacy is one.

The researcher further broke down the journal articles on information literacy-related topics by publication year over the 10 year period. Figure 3 reveals a general increase in the number of articles addressing information literacy topics from 2002-2008. After peaking in 2008, the number of articles on information literacy topics declined precipitously in 2009, followed by a more gradual decrease in 2010 and 2011. Figure 3 also reveals that over the years, information
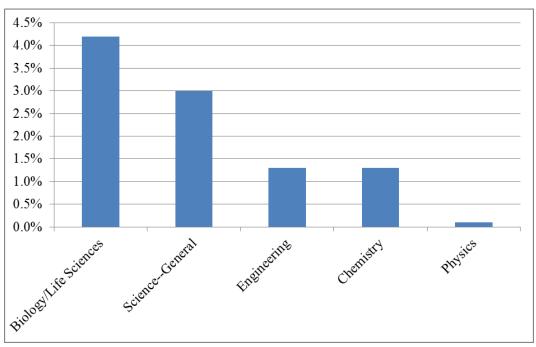


Figure 1
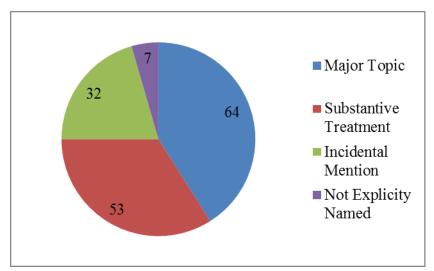Information literacy articles by subject area.

Figure 2
Number of articles by O'Connor level.

literacy topics have become increasingly likely to be a "Major Focus" of journal articles, whereas in the past there was a more even split in the depth with which articles addressed the topic.

Analysis of authorship patterns of the information literacy-related journal articles revealed that subject faculty and/or graduate students wrote the vast majority of these works. Figure 4 shows that librarians (writing either alone or with other librarians) wrote only 4 of the 156 information literacy-related articles. Collaborations between librarians and subject faculty/graduate students were somewhat more productive, resulting in 13 articles. One unexpected finding was the number of publications written by educational developers and other teaching centre employees (either alone or in conjunction with subject faculty/graduate students). This category was not included in the initial analysis but was added when it become apparent that these staff contributed information literacy-related articles in numbers comparable to librarians.

Results also revealed that the O'Connor level of articles varied depending on the authorship of

the article. Articles written by librarians (either alone or in collaboration with others) were much more likely to address information literacy topics in depth, as demonstrated in Table 2. Table 2 also shows that articles written by those other than librarians were spread much more evenly over the O'Connor levels, particularly "Major Focus," "Substantive Treatment," and "Incidental Mention."

The researcher also categorized the articles under review according to the ACRL information literacy competency standards that they addressed. She assigned up to four standards for each article as applicable, assigning articles addressing all five standards or information literacy generally to the category "IL--General." Standard two (accessing information effectively and efficiently), standard three (evaluation of information) and particularly standard four (using information to accomplish a specific purpose) were most frequently the topic of the articles under review. Standard five (ethical and legal use of information) was addressed less often, and Standard one (identifying an information need) was only infrequently the focus of articles in the science pedagogy literature.
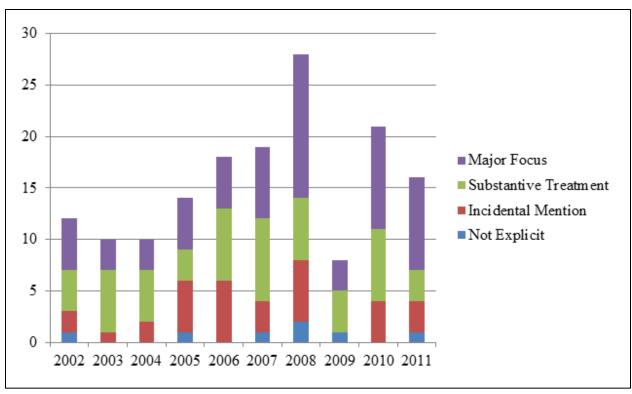
Figure 3
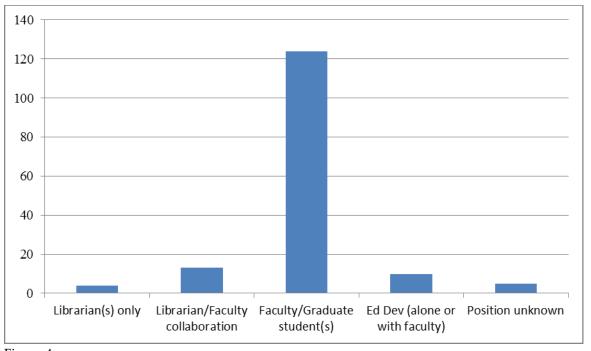Articles by publication year and O'Connor level.



Figure 4
Authorship of articles.

Table 2
O'Connor Level of Articles by Authorship

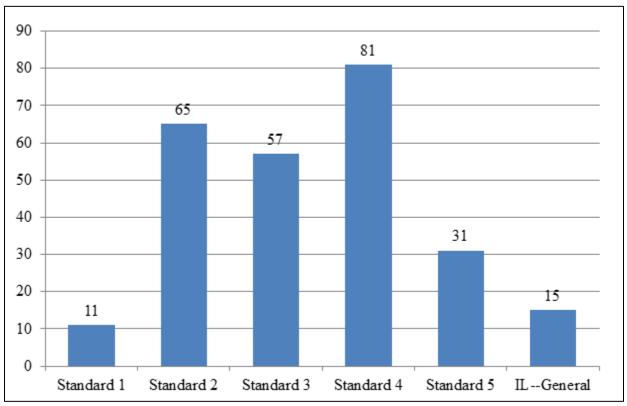|  | Librarians (#) | Librarians (%) | Non-librarians (#) | Non-librarians (%) |
|---|---|---|---|---|
| Major Focus | 16 | 94% | 48 | 35% |
| Substantive Treatment | 1 | 6% | 52 | 37% |
| Incidental Mention | 0 | _ | 32 | 23% |
| Not Explicitly Named | 0 | _ | 7 | 5% |



Figure 5
ACRL standards addressed by articles.
Note: As some articles address more than one standard, the sum of the numbers in this chart exceeds the 156 articles categorized.

## Discussion

The number of information literacy-related journal articles published in the science pedagogy literature is quite small and in this regard similar to findings in earlier studies of information literacy in the non-LIS pedagogical literature. It is difficult, however, to draw more detailed comparisons between these results and those of previous studies because their searching practices did not provide a denominator that gave a sense of the percentage of articles that

were information literacy-related. The one study by Still (1998) that did determine that less than .5% of articles studied addressed information literacy initially seems to suggest that the current study's findings of 1.5% of articles in the science pedagogical literature may be an improvement. In fact, the present study's use of the broader concept of information literacy (rather than Still's use of library instruction), as well as its supplementation of keyword searches with more inclusive title/abstract scans, may in fact mask a decline in the overall percentage of articles being published on information literacy topics in pedagogical literature. Despite the difficulties of comparing rates between studies, it can be claimed with certainty that the rate of information literacy-related articles in non-LIS journals always has been and remains disappointingly low.

Variation in the prevalence of information literacy-related journal articles among the specific scientific disciplines represented in the journal set are likely the result of several factors. Undoubtedly, some of these are complex issues embedded in the nature of the disciplines themselves; awareness of differences among practices and beliefs in different subject areas has been growing ever since the 1989 publication of Becher's book, *Academic tribes and territories: Intellectual enquiry and the culture of disciplines.* Although the disciplines included in this study are all "sciences," there are likely deep-rooted differences in the ways that researchers use the literature of the field, as well as varied expectation levels about the information literacy capacity of incoming students. Some disciplines may simply not view developing student information literacy levels as part of a university instructor's responsibility. On a more pragmatic level, some differences in information literacy-related publication levels seem to be related to publication practices of the journals in the various subject areas. "Special" topic issues of journals, examples of which include a "Special Issue on Plagiarism" from *IEEE Transactions on Education*, and regular

columns (for example "Chemical Information Instructor" in the *Journal of Chemical Education*) account for a significant proportion of the relevant articles published by these journals. Future research, focussed on developing a better understanding of the different perceptions of information literacy among faculty in these disciplines, may provide insight into how information literacy can have more of an impact, on both teaching practices and the pedagogical literature in these fields of study.

The data revealed that librarians contribute only a small proportion of the information literacy-related articles in science pedagogy journals, with subject faculty or graduate students responsible for the lion's share of this work. This finding suggests that interest in the topic extends beyond the LIS sphere, and to at least some of our target audience of teaching faculty in the disciplines. Viewed less positively, it also indicates that librarians may not be leading the charge (or even be visible) in efforts to improve student information literacy levels and advocate for the importance of these competencies. The few faculty or graduate student-authored articles that do mention a librarian simply do so in passing "after the librarian taught students how to x," or credit them in the acknowledgements section of the paper. Without further follow-up, it is unclear whether this is because librarians declined further involvement in the writing of the journal article, or because they are regarded simply as a "service" rather than an academic partner. It is, however, an important question for future research to ask as it gets to the heart of how librarians see themselves and are seen by teaching faculty as contributing to the teaching mission of the university.

Librarian collaboration with subject faculty and graduate students was more fruitful in terms of publication output than librarians working alone or with other librarians. As thorough course integration is integral to the success of information literacy competency development (ACRL, 2012), the collaborative librarian/faculty

projects documented in these publications are a positive development. The wide variation of O'Connor level by authorship (librarians involved in articles in which information literacy is a "Major Focus" vs. a more even spread among "Major Focus," "Substantive Treatment" and "Incidental Mention" in non-librarian articles) is telling of the difference perspectives on information literacy held by these populations. It suggests that librarians treat information literacy as a standalone activity, while subject faculty view and write about it as an integrated component of coursework and the larger curriculum. The unexpected finding that educational developers and those working in teaching centres contribute a significant portion (more than librarians writing alone) of the information literacy-related articles in these journals suggests that this is another campus group with whom librarians could be collaborating, both in terms of program development/delivery and of co-authorship.

The heavy focus on ACRL information literacy competency four, "uses information effectively to accomplish a specific purpose," in the journal articles under review was interesting. Standard two, "searching for information," is the information literacy element that librarians "most often address and teach within our professional domain, as illustrated by the large body of professional literature addressing methods for teaching and assessing skills in information search and retrieval" (Adams, in press, p. 11). While standards two and three are addressed by a large number of the journal articles, it is standard four that receives the most attention in these works. This illustrates a disconnect between subject faculty emphasis and that of librarians, as there is little evidence in the literature that librarians at large engage in teaching or assessment related to this information literacy competency. The reasons for and implications of this finding are unclear but important; it may mean that librarians and/or subject faculty view standard four as best left to the subject experts, or it could suggest that librarians and faculty members have not figured

out the best way to collaborate on student development of this competency. Further research into the roles around this standard may help subject faculty to recognize potential librarian contributions to the development of this competency, as well as help them to situate it in the larger context of information literacy.

It is difficult to draw connections and see trends between this study and past works because the concept of interest ("information literacy") did not exist or was not in widespread use when past works explored the narrower notion of "library instruction." As well, the decision to scan all article titles in addition to searching for specific terms changes the nature of the study; while it helps to illustrate the occurrence of the information literacy concept independent of variations in terminology, it does make it almost impossible to compare the occurrence of information literacy in this study with findings of previous works. Another limitation to this study is that a single researcher conducted the searches and screened the titles; while efforts were made to apply standard criteria, a second selector may have reduced any potential bias or consistencies. It should also be noted that journal articles in the science pedagogy literature are just one measure of information literacy uptake in the sciences; there are undoubtedly instances of information literacy competency development that are not written up in articles in traditional journals (such as editorials, news items, letters, and resource reviews, which were all excluded from this analysis), or are published in other formats (e.g., news items, conferences, blogs). Finally, authorship is just one way that librarians may contribute to information literacy articles; passing references to their contributions to projects, or acknowledgements, are not accounted for in this study.

**Conclusions**

This paper set out to discover the extent to which science pedagogy journals address information literacy competencies, and to

characterize these information literacy articles in terms of authorship, ACRL standards addressed, and level of detail. Results indicate that information literacy has a very low profile in science pedagogy journals overall, with only 1.5% of articles addressing information literacy competencies. Perhaps even more concerning is the fact that the number of information literacy-related articles in these journals appears to be declining over recent years, suggesting that more needs to be done to keep information literacy on the minds of those reading these publications.

The study also reveals some potential avenues to increase the prevalence of information literacy publications in these journals. Rates varied by specific scientific field, from a high of 4.2% in the biological/life sciences, to a low of .2% in physics. Further exploration of the reasons for the relatively high levels in some subject areas may provide clues to increasing interest in information literacy in other subjects where levels were low. The study also found that special issues of journals as well as dedicated columns help to increase the number of information literacy-related journal articles, findings that may encourage those interested in the topic to seek these publication opportunities, or even to suggest or implement them themselves in science pedagogy journals.

Findings also highlighted tensions between librarian and subject faculty conceptions of information literacy. Subject faculty, sometimes aided by graduate students, have written the vast majority of articles about information literacy in these journals, although they very rarely adopt the LIS term "information literacy" to describe their work. Terminology is not the only difference; while librarians tend to write articles about information literacy as a "standalone" major topic, subject faculty more often favour "Substantive Treatment" or

"Incidental Mention," characterizing information literacy as one component of student learning experiences. Librarians and subject faculty also seem to focus on different information literacy competencies, with the latter particularly interested in "using information effectively."

While this study focused on information literacy in the science pedagogy literature, it may also have implications for other disciplines. The methods used in this work suggest that the study of information literacy in the literature of academic disciplines can provide valuable insights into representations and characterizations of information literacy within diverse fields of study. Future research into information literacy in the literature of other fields of study has the potential to illuminate faculty perceptions across disciplines. It would be interesting to learn if the science literature paints an entirely different picture of information literacy than that found, for instance, in the humanities or social sciences. A better understanding of how subject faculty think and write about information literacy in their scholarly literature could have a significant impact on how librarians approach and collaborate with faculty in all fields of study.

Librarians need to redouble their efforts to publish and raise the profile of information literacy in science pedagogy journals, either alone or collaboratively with subject faculty and even with educational developers/teaching centre staff. In doing so, they need to remain mindful that the term "information literacy" may not resonate with those outside of LIS, ensuring that their profession's preferred language doesn't become a barrier to collaboration. Librarians need to extend the reach of their information literacy work by using language and publishing in venues that will turn the LIS profession's information literacy monologue into a dialogue with subject faculty.

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