Librarians in the Midst: On the Need for Librarians with a Background in Science to Collaborate with Science Instructors in the Science Classroom

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Abstract

The author explores the need for science librarians to have a formal academic background in a science discipline as well as the need for such librarians to collaborate with science faculty in the classroom. Examples that support these assertions are from personal observations and scholarly research. The author's personal observations stem from having been a science instructor for many years as well as more recently a reference and instruction science librarian.

Introduction

Academic librarians are often called on to be generalists, to be able to answer reference questions from any academic discipline. This can pose a challenge to an academic librarian stationed at a reference desk after regular hours with little back up except the subject guides created by colleagues or the databases themselves. It is even more challenging when librarians are asked to present an instruction session outside of their own academic field (many academic librarians hold a second master's degree in a subject discipline). Although there is debate within the library community about the necessity of a second advanced degree (Beck & Callison, 2006; Petrinic & Urquhart, 2007; Smith & Oliva, 2010), it is generally agreed that a subject-specific advanced degree will enhance an academic librarian's position, both professionally (promotion, advancement, tenure, etc.) and for collaboration with teaching faculty (Grosch & Weech,1991; Mayer & Terrill, 2005). While librarians are generally well equipped to meet the needs of patrons outside their own discipline, I believe that the full extent of a librarian's knowledge and skills are used best when applied to their own academic discipline. This is particularly true in the science fields. Having been a full time faculty member in a science department at a community college for many years, as well as more recently a science liaison librarian, my personal observations support the need for specific training in the sciences, and for the need of librarians to be embedded with a course or a portion of a course.

The Case for an Academic Science Background

Why do science disciplines in particular need subject librarians with an academic background in science? Because the language and practice of science is its own unique semiotic domain. Indeed, based on a recent study of science librarians, Schmidt and Reznik-Zellen (2010) point out that "in order to partner with researchers generating data sets—the basic

component of e-science, big or small—librarians must be aware of the research trends in their fields. Moreover, librarians must be familiar with the methodologies used in different disciplines in order to effectively collaborate with and earn the trust of researchers."

Gee (2003) defines semiotic domain as "any set of practices that recruits one or more modalities (e.g., oral or written language, images, equations, symbols, sounds, gestures, graphs, artifacts, etc.) to communicate distinctive types of meanings" (p. 18). Whatever the language of communication, science teaching qualifies as a semiotic domain based on the symbols, graphs, equations, etc. that are used universally in science classrooms. Indeed, Lee & Frado (1998) insist "Science is a way of knowing that distinguishes itself from other bodies of knowledge" (p. 17).

Therefore, in order to succeed in today's modern university science classrooms, regardless of the students' ethnic backgrounds and cultural beliefs, they must become "border crossers," (Aikenhead, 1996) entering the world of the scientific semiotic domain with ease (while maintaining their cultural beliefs separately). Border crossing is not a new art for most people. Aikenhead (1996) asserts "in our everyday lives we exhibit changes in behaviour [sic] as we move from one group of people to another...we effortlessly negotiate the cultural border between professional conferences and family reunions." (p.6). Jegede & Aikenhead (1999) sum up the concept well in *Transcending Cultural Borders: Implications for Science Teaching*:

> "It is evident from the literature that pupils experience at least two types of culture when they study science in a formal Western type educational setting: the culture of school science and the culture of their life-world. To make meaning out of their experiences in science classrooms, pupils need to negotiate a cultural transition from their life-world into the world of school science. The ease or difficulty with which pupils make

> the transition (that is, the ease or difficulty with which they cross cultural borders) will determine their understanding of the subject" (p. 24).

While some find the transition impossible, for those who do manage effective border crossing, the science classroom can become a safe space in which to explore scientific explanations for natural phenomena, sharing the feeling with classmates of belonging to a specialized subculture. But this "border crossing" will require a "translator," in this case, a librarian who is familiar with both the ever-increasing reliable sources of science information and with the "language of science," best learned and understood through a path of formal science education. For example, Alpi (2003) points out that "The terminology of bioinformatics is enough to frighten away the uninitiated," and that Norman "recommended that medical librarians should have a basic understanding of the type of information contained in key genetic information resources and know how to search them. Generally, librarians with a science background or a liaison relation with science or IT departments find it easier to develop these roles" (cited in Alpi, 2003). Despite numerous articles asserting that a formal science background is not necessary to function well as a science librarian, recent surveys show that a full 60% of science librarians have either a bachelor's and/or an advanced degree in a science discipline (Beck & Callison, 2006).

More recently, Cataldo, Tennant, Sherwin-Navarro, and Jesano (2006) describe "the information specialist in context (ISIC) or informationist, a new career path evolving in health sciences, integrates hybrid specialists with formal training in both information management and a particular subject discipline or other expert training into clinical or research teams." The informationist position, therefore, requires that the librarian (or information specialist) have some formal training in the subject discipline, in this case, usually health sciences.

In order for the librarian to have the greatest impact on student learning, the librarian should be "embedded" in the course, either physically or virtually, as a co-teacher, thereby being able to supply the best solutions for point-of-need information.

Science Classroom Collaborations: Embedded Librarian

Based upon my own observations both as a graduate student in the Library and Information Science program at the University of Iowa (SLIS) and as a full time science instructor at a community college in eastern Iowa, as well as observations and conclusions by others, it is evident that Information Literacy (IL) in a science course will be most effective if it is delivered point-of-need.

The point-of-need argument has been well established in the library literature. (Becker, 2010; Donham, 2004; Herrington, 1998; Lipow, 2003; Malenfant, 2004; Mery, Newby & Peng, 2012; Smith, 2003) Additionally, I have witnessed first-hand the need for point-of-need instruction, both as an instructor and student. While enrolled in the SLIS program, I observed two courses incorporating information literacy at the University of Iowa in the fall of 2006. The first observation was in "Library Research in Context," a one-credit course. According to the University's online course registration system, ISIS, this course is: "an activity-based course that develops an understanding of how library resources can be used to support individual courses of study. Designed for sophomores, juniors, and seniors, the course introduces students to the basic research process, research conventions in a specific field, and how to integrate information skills and concepts to accomplish course goals." Two librarians taught the course comprised of students from a single section of Communication Studies. It was a small class (four students attended), and it was relatively early in the morning (for college students, that is), but it was evident that the students were engaged. They were developing skills necessary for a research

project they were required to complete for the Communication Studies course. Throughout the session, the students stayed on task, answered questions, made suggestions, created concept maps and generally seemed interested in the instruction. As Smith (2003) points out, "Discipline-specific information literacy is important for several reasons. First, embedding information skills within a disciplinary framework establishes context, meaning, and relevance for learners."

Conversely, the second library instructional session I attended did not seem to engage students or keep their attention. This was a "one shot" College Transitions session taught by two other university librarians. The instructors (librarians) were enthusiastic and knowledgeable, but the majority of the students in this session exhibited disinterest. They were first shown some very general searches, without reference to any specific need or context, and were asked questions that were overly simplistic for today's students, such as "Which is more reliable, a blog or a scholarly journal?" Some of the students followed along on their computers, but others checked e-mail or navigated to other websites during the session. Overall, the class was reluctant to participate. Presumably, these students, all freshmen, had different majors and goals overall. This particular session was not being graded, other than for attendance itself.

My personal observation was that the session that focused on a required assignment garnered much more attention and motivation by the students. Likewise, the literature supports my observations:

Valentine (2001) conducted a study of sophomores' research methods for a major class assignment. According to her results, "students seemed to base a commitment to an assignment on the need for a good grade and its value as a good personal or academic learning experience. For many the grade was the major motivation. ...The credit for the course and the weight of the

assignment in the course also contributed to students' assessment of the effort to be given to the project" (p. 109). I also observed this many times as an instructor. I taught biology and environmental science for eleven years at a community college, and my courses emphasized information literacy, with a particular focus on evaluating online information. There is an unfathomable amount of information online about and related to scientific concepts, but not all of that information is reliable. I felt that it was very important for students be able to distinguish reliable information from "junk." A few semesters, I invited one of the college librarians to conduct an instructional session in my classes, with a focus on evaluation of websites and how to use subscription databases to find scholarly articles. The librarian did a fine job, but due to our conflicting schedules, the session was not associated with an immediate assignment. When it came time for students to conduct research for an assignment, many seemed to have forgotten the library instruction, and I found myself repeating much of what the librarian had already taught. Eventually, as I was training to be a librarian while still teaching full time, I began conducting my own IL sessions with my students at exactly the time they needed it: as I described an assignment and when a clear deadline was looming. Accordingly, students were more engaged and asked specific, pointed questions. I don't have any data here to support my observation that students were more engaged and produced research with higher quality resources, but student comments on course evaluations were overall positive about the assignment and related instruction.

The information literacy literature is full of examples of the need for collaborations among science faculty and science librarians (Brown & Krumholz, 2002; Courtois & Handel, 1999; Dearden, et. al., 2005; Huerta & McMillan, 2000; Kobzina, 2010; Laherty, 2000; Lankford & Saal, 2012; Pritchard, 2010; Scaramozzino, 2010;

Smith, 2003). Most of these articles include three main themes: the need for librarians to be very familiar with the principles and vocabulary of science, the necessity of those discipline-specific librarians being "embedded" in the course, and the fact that the burden of forging successful collaborations often rests on the librarians.

As asserted earlier in this paper, the science classroom is a semiotic domain, with its own design grammar, including unique vocabulary, symbols, equations, etc. It is not readily accessible to the general public, or even to people well educated in different disciplines. If an instructional librarian is to provide the best instruction in science information literacy, he or she must be ideally a part of that semiotic domain. For example, Alpi (2003) and Courtois & Handel (1999) all express the need for librarians familiar with the discipline within genetics known as bioinformatics. Bioinformatics has been described as the "science of managing and analyzing biological data using advanced computing techniques." (Alpi, 2003, p. 2). Therefore, bioinformatics makes heavy use of databases and is intimately associated with libraries in general. For example, the producer of GenBank, a large, widely used database of gene sequences, is the National Center for Biotechnology Information (NCBI), a subsidiary of the National Library of Medicine (p. 2). It has proven difficult for more generalist librarians to help students with specific questions about how to use this database, and, as Alpi (2003) has noted, "Bioinformatics has become established as a discipline with its own vocabularies, professional journals, and training programs. There is currently a lack of librarians well versed in the discipline to fully explore opportunities in collaborative teaching in this area" (p. 3). According to Smith (2003), the main reasons that discipline-specific information literacy is important are the establishment of context and meaning, the approach to seeking and using

information are dependent on the structure of that discipline, and that disciplines frequently rely on specific types of data and search processes.

In addition to librarians being educated within a specific discipline of science, successful practices indicate a need to "embed" librarians within a course, for at least the duration of an assignment that requires information literacy skills, but preferably for the entire course. Pritchard (2010) describes three "models" of information literacy: supplemental, integrated, and embedded. In the supplemental model, instruction occurs outside of the course curriculum, perhaps through online tutorials or a library workshop unaffiliated with an academic course. The integrated model requires the librarian to have a relationship with the course instructor and be involved with providing instruction for one or more assignments throughout the course. Finally, the embedded model asserts that the librarian is an intricate part of the course, perhaps even as a co-teacher with assignment-grading privileges. While I believe all three are important, I also think to have the greatest effect on student learning, the librarian should be either integrated or fully embedded. These latter two models require that the librarian develop a trust relationship with the classroom instructor; this is often a huge obstacle, with faculty citing many reasons for their reluctance to forge this relationship, often lack of time to include additional topics, and not viewing the librarian as an academic equal (Leckie & Fullerton, 1999; McGuinness, 2006).

Many colleges and universities would have difficulty funding the payroll to provide a full-time librarian in every classroom, but even shorter embedded instructional sessions can be successful. Brown and Krumholz (2002) report a classroom research project involving IL instruction in a microbiology classroom in "Integrating Information

Literacy into the Science Curriculum." Their results show that "Incorporation of an information literacy component into a senior-level geomicrobiology course at the University of Oklahoma successfully enhanced the undergraduate students' information literacy level based on the ACRL standards when assessed using a self-reporting survey" (p. 119). Likewise, researchers in Australia (Dearden, et. al., 2005) found that collaboration between the School of Zoology and the Science Library had very positive results when the information literacy units were embedded "vertically," in courses the students take as freshmen, sophomores and juniors. They collected much data as the students' progress in information literacy in sciences was followed for three years, and report that such collaborations demonstrate the benefits of "sound, consistent liaison and outreach initiatives by librarians to discover and explore shared teaching and learning interests with academics" (P. 151). Courtois and Handel (1999) describe collaboration between a genetics professor and a science librarian. In this case, the librarian sat in on the full course. This helps fill in gaps in the librarian's knowledge of bioinformatics, allows the librarian to establish first-name relationships with the students, and to establish the librarian as an integral part of the teaching team.

There are obstacles reported in creating these collaborations between librarians and science instructors, primarily, the reluctance of the science instructors to work closely with librarians. Smith (2000), for example, laments "One major difficulty I have encountered in accomplishing this [incorporating discipline-specific content into information literacy courses] is stimulating interest and assistance from the disciplinary faculty" (p. 2). This situation appears to be ameliorating; however, as the need for more information literacy arises as students are faced with increasing access to exponentially

growing amounts of information stored in databases. Smith (2000) sums it up well: "From my review of the literature...I discovered numerous librarians who report successful collaborations with science faculty in achieving information literacy within the various science disciplines. The literature strongly suggests that we need to ...integrate [IL] into the disciplinary curriculum" (p. 2).

Based on these observations, personal experience, and many research articles, it is apparent that library instruction in information literacy will be more effective if it is within the context of a course and specifically in conjunction with specific assignments. Science students face an ever-increasing bombardment of information and need much help in the search and evaluation process. A librarian with a science background is best equipped to perform this role, while fully participating in the science classroom, collaborating as a peer with the course instructor.

References

Aikenhead, G. S. (1996). Science education: Border crossing into the subculture of science. Retrieved from internal-pdf: //Aikenheadborder-1670054400/Aikenheadborder.pdf

Alpi, K. (2003). Bioinformatics training by librarians and for librarians: Developing the skills needed to support molecular biology and clinical genetics information instruction. *Issues in Science and Technology Librarianship, 37*

Armstrong, J. (2010). Designing a writing intensive course with information literacy and critical thinking learning outcomes. *Reference Services Review, 38*(3), 445-457. doi:10.1108/00907321011070928

Beck, D. M., & Callison, R. (2006). Becoming a science librarian: Accident, serendipity, or purposeful plan? *Science & Technology Libraries, 27*(1/2), 71-98. doi:10.1300/J122v27n01-06

Becker, B. W. (2010). Embedded librarianship: A point-of-need service. *Behavioral & Social Sciences Librarian, 29*(3), 237-240. doi:10.1080/01639269.2010.498763

Brown, C., & Krumholz, L. R. (2002). Integrating information literacy into the science curriculum. *College & Research Libraries, 63*(2), 111-123. Retrieved from internal-pdf://BrownKrumholz2002-1000648192/BrownKrumholz2002.pdf

Courtois, M. P., & Handel, M. A. (1998). A collaborative approach to teaching genetics information sources. *Research Strategies, 16*(3), 211-220. doi:10.1016/S0734-3310(00)80006-3

Dearden, R., Dermoudy, J., Evans, C. E., Barmuta, L. A., Jones, S. M., Magierowski, R. H., . . . Waters, D. (2005). *Aligning information literacy with the faculty teaching and learning agenda.* Australian Library and Information Association). Retrieved from internal-pdf://Dearden2005-3868537877/Dearden2005.pdf

Donham, J., & Green, C. W. (2004). Perspectives on … developing a culture of collaboration: Librarian as consultant. *The Journal of Academic Librarianship, 30*(4), 314-321. doi:10.1016/j.acalib.2004.04.005

Gee, J. P. (2002). Learning in semiotic domains: A social and situated account. Paper presented at the *Yearbook-National Reading Conference, , 51* 23-32. Retrieved from internal-pdf://gee_51-0362386453/gee_51.pdf

Grosch, M., & Weech, T. L. (1991). Perceived value of advanced subject degrees by librarians who hold such degrees. *Library & Information Science Research, 13*(3), 173-200. Retrieved from http://ezproxy.gvsu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=lxh&AN=ISTA2701818&site=ehost-live&scope=site

Herrington, V. J. (1998). Way beyond BI: A look to the future. *Journal of Academic Librarianship, 24*(5), 381. Retrieved from http://ezproxy.gvsu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=1314511&site=ehost-live&scope=site

Huerta, D. (2004). Reflections on collaborative teaching of science information literacy and science writing. *Resource Sharing & Information Networks, 17*(1-2), 19; 19-28; 28.

Jegede, O. J., & Aikenhead, G. S. (1999). Transcending cultural borders: Implications for science teaching. *Research in Science & Technological Education, 17*(1), 45-66. Retrieved from internal-pdf://Jegede-1772167957/Jegede.pdf

Kobzina, N. G. (2010). A Faculty—Librarian partnership: A unique opportunity for course integration. *Journal of Library Administration, 50*(4), 293-314. doi:10.1080/01930821003666965

Laherty, J. (2000). Promoting information literacy for science education programs: Correlating the national science education content standards with the association of college and research libraries information competency standards for higher education. *Issues in Science and Technology Librarianship, 28*

Lankford, D., & Saal, F. V. (2012). Converting a biology course into a writing-intensive capstone course: Using collaboration between a professor and graduate teaching assistant. *Journal of College Science Teaching, 41*(4), 14-22. Retrieved from internal-pdf://2519657985/72661954.pdf

Lipow, A. G. (2003). The future of reference: Point-of-need reference service: No longer an afterthought. *Reference Services Review, 31*(1), 31-35.

Malenfant, C., & Demers, N. E. (2004). Collaboration for point-of-need library instruction. *Reference Services Review, 32*(3), 264-273.

Mayer, J., & Terrill, L. J. (2005). Academic librarians' attitudes about advanced-subject degrees. *College & Research Libraries, 66*(1), 59-73. Retrieved from http://ezproxy.gvsu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=lxh&AN=15914633&site=ehost-live&scope=site

McGuinness, C. (2006). What faculty Think–Exploring the barriers to information literacy development in undergraduate education. *The Journal of Academic Librarianship, 32*(6), 573-582. doi:10.1016/j.acalib.2006.06.002

Mery,Y., Newby,J. & Peng,K. (2012). Why one-shot information literacy sessions are not the future of instruction: A case for online credit courses. *College & Research Libraries, 73*(4), 366-377. Retrieved from internal-pdf://1291045873/Mery2012.pdf

Petrinic, T., & Urquhart, C. (2007). The education and training needs of health librarians—the generalist versus specialist dilemma. *Health Information & Libraries Journal, 24*(3), 167-176. doi:10.1111/j.1471-1842.2007.00717.x

Pritchard, P. A. (2010). The embedded science librarian: Partner in curriculum design and delivery. *Journal of Library Administration, 50*(4), 373-396. doi:10.1080/01930821003667054

Saunders, L. (2009). The future of information literacy in academic libraries: A delphi study. *Portal: Libraries and the Academy, 9*(1), 99-114. Retrieved from internal-pdf://3559535950/9.1.saunders(1).pdf

Scaramozzino, J. M. (2010). Integrating STEM information competencies into an undergraduate curriculum. *Journal of Library Administration, 50*(4), 315-333. doi:10.1080/01930821003666981

Schmidt, M., & Reznik-Zellen, R. (2010). Get on your boots: A model for low-cost, regional professional development for science librarians at the university of massachusetts.

Smith, D. A., & Oliva, V. T. (2010). Becoming a renaissance reference librarian in academe: Attitudes toward generalist and subject specific reference and related profession development. *Reference Services Review, 38*(1), 125-151. Retrieved from http://ezproxy.gvsu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=lxh&AN=48721159&site=ehost-live&scope=site

Smith, E. M. (2003). Developing an information skills curriculum for the sciences. *Issues in Science and Technology Librarianship, 37*(1)

Tobin Cataldo, T., Tennant, M. R., Sherwill-Navarro, P., & Jesano, R. (2006). Subject specialization in a liaison librarian program. *J Med Libr Assoc, 94*(4), 446-8. Retrieved from internal-pdf://Cataldo-2996384004/Cataldo.pdf internal-pdf://i1536-5050-094-04-0446-1324924421/i1536-5050-094-04-0446.pdf

Valentine, B. (2001). The legitimate effort in research papers: Student commitment versus faculty expectations. *The Journal of Academic Librarianship, 27*(2), 107-115. doi:10.1016/S0099-1333(00)00182-8