



How to Be a Subject Specialist When You Aren't: Engineering Librarianship for the Non-engineer

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Background

Ask any library manager with an open engineering librarian position and they will tell you that recruitment is challenging. While there are over 150 engineering branch libraries across the United States [1] and Hackenberg's [2] survey found that 72% of sci-tech librarians indicated that a course in sci-tech librarianship was offered at their graduate school, the results also showed that only 57.2% actually took the course. In fact, "the standard thinking from the literature, going as far back as 1968, has been that "in general, lack of background is a handicap" for sci-tech librarians and that "the ideal candidate...would be a graduate in appropriate sciences who is also a qualified librarian [2]." Since this type of qualified candidate is somewhat akin to the proverbial "holy grail," hiring managers find themselves in the position of hiring promising young librarians without sci-tech backgrounds, who are eager to gain a foothold in the wonderful world of engineering librarianship.

We must also add to this dearth of promising candidates the fact that engineering faculty and students also use the library differently from their liberal arts, and even science counterparts. In a study from North Carolina State University, librarian researchers found that "engineers like to search for information themselves rather than go through a librarian or other intermediary [3]." The successful engineering librarian may need to target services and products differently and present a la carte, just-in-time resources that the independent engineering students can easily locate and utilize on their own, while still being made aware of who they can consult if further help is needed.

Enter into this challenging environment the new engineering librarian, often with little to no knowledge of the discipline to which assigned as a subject expert. Is all hope lost? Indeed not! The new librarian without engineering expertise can successfully navigate a new career with the assistance of the proper tools and support. This paper will delineate the process for gaining both a "common knowledge" vocabulary and an understanding of engineering research specialties. As in liaison librarianship across the spectrum, building relationships with faculty and administrators in engineering departments is paramount. The authors will recommend steps and actions to help build and sustain partnerships.

The Discipline

The types of typical assignments that engineering students have in their classes varies by discipline and university, potentially adding even more confusion for the new librarian. One of the authors has observed that her engineering students find most of their class content within their assigned texts and are mostly involved with problem solving and learning textbook theory, supplemented by additional reading provided by the professor. The denseness of required curricula for these undergraduate engineering majors often results in more traditional forms of

library-based research papers being waived in favor of weekly problem sets and classroom discussion. The other author has experienced a different situation at her university, where engineering students regularly produce papers and other research products requiring skills in library research. Biomedical engineering students, for example, incorporate the current journal literature into their project or problem-based courses beginning with their very first discipline-specific class.

On the graduate and Ph.D. level of both universities, original research and professional publication come again to the forefront. In recent years, there has been a growing push on many campuses for additional Undergraduate Research programs where not only graduate students, but also undergraduate students take an active part on current faculty research, including, in some cases, co-authoring with faculty on research articles. This changing environment offers new opportunities for information literacy training and engineering librarian partnerships with research groups.

This diversity of needs means that the new engineering librarian must take time to carefully study the engineering college's website and to have probing conversations with professors of the college to determine the specific culture and expectations that the faculty place on students in their disciplines. Asking to view the class syllabus of students needing a consultation can provide additional insight into the types of services that will be most useful to the engineering student body of a particular university. Similarly, close scrutiny of lab group webpages and posted associated publication lists will help direct the librarian in the creation of a portfolio of services and resources to support student research enterprises.

Each engineering school/department has its own culture and environment, with sub-cultures that provide opportunities to interact with faculty based on their status in the academic hierarchy. Successful approaches for the new engineering librarian will often include capitalizing on niche groups, at both the faculty and student level, that may have been previously over-looked or underserved. In conjunction with these relationship-building approaches, there are myriad opportunities to recognize and capitalize on the engineering curriculum – leading to in-person teaching opportunities, and/or potentially profitable junctures for tutorials, class-specific research guides, and project/assignment-based consultations with students.

Getting Started

Perhaps the most reasonable place for the new librarian to start is with the discipline itself. “The terminology of engineering is enough to frighten the novice librarian without science background away from academic engineering librarianship [4].” When I first began my position as Industrial & Systems Engineering (ISYE) Librarian, I had little to no knowledge of the engineering profession, much less the terminology. I began with the following sources.

- The Occupational Outlook Handbook [5] from the Bureau of Labor Statistics provided a career overview.
- An “Introduction to Industrial Engineering” book was located in our library stacks. Just reading the introduction and reviewing chapter and section headings was a valuable way

to familiarize myself with some of the terminology that would be important to my ISYE students and me.

- A newer avenue for quickly building up expertise should include Engineering MOOCs from universities such as MIT and Berkeley. Watching just a few videos can greatly deepen a librarian's appreciation and familiarity with engineering topics in the area of support. There are also several new librarianship MOOCs available [6].
- Professional organizations and governing bodies such as American National Standards Institute (ANSI) and ASTM International also have online training on engineering specific formats such as technical reports and standards. [7]. For example, IEEE's Standards University [8] offers a treasure-trove of videos, articles, tutorials and a free e-magazine on the importance and use of standards across the engineering realm.
- Industry newsletters, such as ASEE's *First Bell*, which is self-identified as "a digest of the most important news selected from thousands of sources by the editors of Bulletin Media, [9]" are an excellent way to keep abreast of policies, news, research & development trends, and issues in education in engineering. It helps the novice engineering librarian pick up on the insider lingo as well.
- When it comes to terminology, Google is your friend! Google can quickly uncover explanations of technical terminology.
- Professional blogs and research guides at other universities can all be rich sources of information for the new engineering librarian and students alike.

Googling "industrial engineering societies" soon led me to the Institute of Industrial and Systems Engineers [10]. I had stumbled upon one of the most important resources for engineering students: professional engineering societies. Each discipline will have at least a few critical societies that may warrant periodic monitoring. These societies keep their members up-to-date on current topics in engineering, publish a significant percentage of both practical and scholarly writings of engineers, organize regular conferences and often offer student memberships and student satellite clubs on many major engineering school campuses. Such a student group, if it exists, can be a great place to start outreach efforts. If such a group does not exist, it would behoove the new librarian to consider finding a faculty member who might be interested in working together to begin such a group on campus. The American Association of Engineering Societies maintains a fairly robust list of Student Engineering Competitions [11] and helping to organize or market for one of these competitions can be a good way to get a foot in the door.

Instruction and Consultation Work

A common responsibility for a subject liaison is that of teaching information literacy classes for the discipline. How these opportunities arise differs from university to university. Sometimes a robust culture where faculty actively request librarians for class presentations will turn this challenge into one simply of learning the most valuable resources within the library for engineering students and then demonstrating these tools. If there are other engineering librarians at the new librarian's school, peers can be an invaluable source of guidance and support. For the solo engineering librarian, more proactive measures will be necessary to quickly ramp up one's knowledge.

- Search the vendor sites of major engineering databases and electronic libraries at your school such as Compendex, IEEE Xplore Digital Library, and Knovel Engineering Library. Many have wonderful tutorials and supplemental information to get the new librarian up to speed quickly.
- Searching Google for engineering research guides will return many example guides from other libraries that will help the new librarian to pinpoint key resources for the discipline. It might be particularly instructive to obtain a list of peer institutions from library management as checking the guides created at these institutions can be particularly instructive.
- When creating class-specific workshops, reading the class description from the university course catalog, or requesting a syllabus from the course professor can be very instructive. Often topics gleaned from such documents can result in meaningful test searches to perform for the classes in question.
- A discussion with the professor regarding expectations is also key. Is this library session linked to a particular assignment for the students? Is there an expectation that a certain type of research is to be performed (such as an annotated bibliography of scholarly articles) or certain library resources to be emphasized (such as technical reports, citation managers, or patents). This information will help structure any information literacy session.

But what if professors are not coming with instructional requests? This is one arena where relationship building with your engineering schools and professors really comes into play.

Outreach and Developing Partnerships with Engineering Faculty

A critical aspect of the successful engineering librarian's job is the ability to conduct successful outreach and develop fruitful partnerships with engineering faculty. Oud [12] reported that establishing successful relationships with faculty is frequently cited as a common area of difficulty with new librarians. This can be especially true for new engineering librarians. Engineering faculty are highly pressured on both the research and teaching side, expected "to perform miracles by doing more with less, producing more and better research, and graduating highly employable individuals [13]." This pressured environment can make approaching the engineering professorate daunting for the new librarian. Is the university environment more informal or formal in its method of communication? This can affect the tone of any interactions the new librarian may have with professors in each discipline. Baer [14] reminds us that "identifying common ground is the starting point for building a synergistic relationship." Different professors will respond to different overtures.

- Offer to help professors get their latest article publications loaded to the university's institutional repository where they can be found by other researchers with a Google search, hence increasing visibility.
- Check the schedule of classes and target a research theories class instructor with an offer of an instruction session for that class, or links to online materials to help guide students to higher quality research.

- Take a field trip to the university bookstore and browse the textbooks for engineering classes. This can be a long, but very profitable afternoon. The tables of contents for textbooks can be a rich source of engineering terminology for the new engineering librarian to identify and then utilize both for searching terms in sample database searches as well as topics to help add to the library's collections while making collection development selections for liaison areas.
- If the school offers online engineering courses, create library modules in the school's course management system that help students find the best engineering resources for their disciplines and offer links so professors can easily add them to their course packets. An offer to customize for specific needs can accompany the more general module.
- Read the website of all liaison departments. The departmental website can be a treasure trove of information about the professors, departmental events to attend, research currently going on in the department, etc. All of these could be ways that the new librarian could target specific professors or research groups and provide niche-specific assistance to them.
- Read the instructor's vitae or stated research interests. Search the literature and send articles or new book notices on topics of interest along with an offer to help with further literature review searches. Even better, offer to show ways to have database alerts set up to bring new articles of interest directly into the professor's email.
- Identify Assistant and Associate Professors who are preparing for formal review of their tenure and promotion portfolios. Offer to show them how to obtain their citation counts or H-scores. Also be sure to target brand new professors who would be eager for help with classes or starting their research.
- For more seasoned faculty, offer to introduce them to the world of Altmetrics and PlumX Metrics to obtain data on alternative (e.g. social media) ways others are interacting with their scholarly output, and to expand their interpretation of "usage."
- Attend open events hosted by the engineering school, such as student presentations, visiting professor talks, or shared research presentations and use the opportunity to meet and converse with the faculty and student body [15].

New librarians can learn a huge amount directly from the professors and students that they serve, but they also need to actively seek out other engineering librarians and engineering librarian communities such as ELD to help them build their craft.

Collection Development

Collecting new resources in engineering when still learning the discipline is another challenge that new librarians will most likely face. Wray [16] provides insight on four challenges to address in these situations: understanding the user population, understanding the collection, awareness of developments in subject area research, and "overcoming a crisis of confidence". Collectively, these four components ring true for the novice engineering librarian and can be considered the initial steps to follow to gain basic proficiency in collection development in the engineering realm.

In order to understand the user population, Gelfand et al. [17] suggests the new librarian attend departmental events (e.g. seminars, locally hosted conferences, faculty meetings) and utilize other effective liaison connection points to learn about collection needs. Combine with this the utilization of major databases such as Web of Science or Scopus to determine where faculty publish, and what topics/areas of research are prevalent. Any of the activities or strategies previously noted for establishing a productive liaison relationship will also inform the librarian's collections-related work. In addition, following grants received, (the office of Sponsored Programs can often provide campus awardee lists by funding agency) and theses/dissertations authored by graduate students in a department will also provide insight into the complexities of the research underway in a given department. Review of the publications by assigned faculty and graduate student groups, with particular attention to the bibliographic citations, will help determine not only where faculty publish but what resources they use. Depending on the engineering discipline, conference proceedings, standards, patents and technical reports may be as or more important than journals and books. The particular flavor of each will vary, depending on the discipline. Setting up alerts in several of the relevant databases (e.g. Compendex; Web of Science, Scopus, INSPEC) is one way to harvest this information on a regular basis. The controlled vocabulary in databases such as Compendex and INSPEC can also be another resource for learning the specialized dialect of your discipline.

Browsing both the circulating and reference stacks can help illuminate the library's collection strengths and perhaps deficits [1]. Given the growing e-book collections at many engineering libraries, this may now provide more of a retrospective view of the collection; however, this is still a worthwhile endeavor. A similar approach can be taken in the online environment, browsing e-book holdings, e-journals and the myriad engineering databases in use at the librarian's institution.

For the journal collection, a specialized resource like Clarivate's Journal Citation Reports (JCR) can provide information on the top (most impactful) journals in a subject (category), and can also help determine future potential additions to the collection. JCR provides ranking of journals in the areas of science, technology, and social sciences, for titles indexed in the Web of Science. Similarly, the journal rankings from SCImago Journal & Country Rank (SCIMAGOJR) would be of interest. SCIMAGOJR is a publicly available portal that includes the journals and country scientific indicators developed from the information contained in the Scopus database (Elsevier).

These sorts of ranking systems, in combination with awareness of research trends in the local department and in the field in general, can help direct collection decisions, particularly for journals. However, following the trends, both locally and globally, in the research and curriculum of an engineering discipline will also guide the selection of monographs and other resources (e.g. standards, technical reports). Physically and virtually browsing the collection will highlight not just content areas of importance, and changing trends in these areas over time, but will also shed light on critical publishers and vendors for the particular discipline.

Above all, don't let the "crisis of confidence" hinder the efforts. Wray [16] points out that a motivated novice can often bring an unbiased, data informed and successful approach to

collection development, and there are “definite advantages to collecting in subject areas in which you have [at least in the beginning] limited emotional attachments.”

Mentoring:

The choice of an expert guide is often the difference between success and failure. For the new engineering librarian, knowing who to seek out for advice/assistance, and when, can make the journey considerably smoother.

We cannot overemphasize the value of mentoring for the new engineering librarian. We have gained great benefit from mentoring relationships at various points in our careers: while still in school, as newly minted engineering librarians, and at mid-career. Mentoring can be both formal and informal. Formal programs available to the new engineering librarian include, new employee mentoring at one's place of work as well as mentoring programs offered by ALA's New Member Roundtable, ACRL's STS section [18], and right here at the ASEE's ELD [19]. Local or state chapters for ALA, SLA, or ACRL are also an excellent option if attendance at national meetings is not possible, and many of these chapters sponsor locally focused mentoring programs or activities. I participated in the STS mentoring program during my first year of work and was lucky enough to be matched with another engineering librarian across the country. The relationship allowed me to explore many different areas of engineering librarianship with a neutral third party and the relationship is one that endures to this day.

The University of Toronto Libraries (UTL) [20] is one example of a library system that has a robust suite of internal mentoring programs. Drawing on the availability of its own library school, they created a rich program for Graduate Student Library Assistants (GSLs) who worked the reference desk. Classes on science and engineering databases, complete with homework, were provided for the GSLs group. This was very similar to the internal mentoring that I received upon beginning my position. Various engineering subject librarians each presented workshops on specific databases, technical reports, standards, and patents to the new employees. The detailed homework worksheets allowed me to practice the skills presented in the workshops and to have a reference sheet to return to later as needed.

The University of Idaho Library [21] offers a different structured approach to mentoring academic librarians – a formal Community of Practice (CoP) designed specifically for the library faculty members. The mentoring-focused CoP incorporates "collaboration across departmental lines, support from senior library faculty, a space to safely develop innovative ideas, in addition to the established focus in the literature on both the psychosocial and career functions of each member." Meetings of this collaborative and supportive library group included formal research presentations, writing workshops to receive feedback on publications in progress, and practice time for upcoming presentations - along with opportunities to share calls for papers, announcements on new resources and tools and other news of interest. Participants, overall, indicated the Community was effective, and also beneficial to their professional development and growth as academic librarians.

However, to limit oneself to formal mentoring opportunities is to short circuit the possibilities for growth and development. Both short term and long term mentoring relationships can be

developed between co-workers. The alert new librarian will observe other co-workers in the course of their job, noting experts in various fields; most librarians are happy to share their knowledge with others. Also, “Field trips” to other area libraries to visit librarians in engineering or technology specialties can lead to immediate tips and tricks you can employ back at your home library. The opportunity to meet with engineering librarians at other institutions in this way can also result in informal mentorship relationships that will be invaluable as your career progresses. As with your co-workers, librarians at other institutions will usually be delighted to share their wisdom and their personal journey.

Another non-traditional form of mentoring was discussed by Keyse, Kraemer & Voelck [22] in their article on their Untenured Librarians Club. This informal group resulted when a group of peer librarians, all on their tenure track, began meeting to discuss and support one another through the tenure journey. If such a group does not exist at the new engineering librarian’s school, there is nothing to prevent starting one!

Other fertile grounds for locating mentors are professional organization meetings and conferences, state library conferences and, more recently, at one of the many Science Boot Camp conferences popping up around the country [23]. Science Boot Camps typically have specific disciplines chosen to highlight each year. For example, in 2016, the New England Science Boot Camp chose engineering as one of its focus points. The link in the references [24] will allow the interested reader to watch two of the Civil Engineering Professors who presented at that Boot Camp provide a salient overview of that discipline for their audience.

Conference attendance at non-librarian conferences and discipline-specific professional memberships should not be overlooked when considering profitable avenues for the new engineering librarian to increase subject knowledge and make valuable connections. Bennett tells us that “The benefits of [non-library professional] membership include improved current awareness of the discipline, both its research trends and issues of practical concern; opportunities to interact with non-librarians as colleagues; enhanced prestige among disciplinary faculty; insight into other perspectives on the role of the library and librarians in academia; cultivation of librarians’ identity as subject experts; and new avenues for professional service and scholarly activities [25].”

Professional engineering conferences are also an ideal place to meet representatives from subject specific presses. While the presses are likely well known in their niche, they often will pass up attending ALA, which tends to draw the largest, and often most generalist publishers to their vendor pavilions [26]. These connections with smaller specialty presses often prove to be extremely valuable when collection development decisions are being made, and may be the only place to locate adequate resources on some topics.

Conclusion

The life of the engineering subject specialist is an exciting one, characterized by lifelong learning and continual professional development. In addition to core responsibilities, today’s engineering librarian must also remain abreast of the more recent trends in scholarly communications and the open access movement as well as data management and most recently, data visualization. The

wise librarian understands that the moniker of “subject expert” is not a destination, but an epic journey that uncovers new challenges and further learning at each turn along the road. Neither is the journey a solo venture; instead, the most satisfying aspect of the trek is often found in the interesting, creative, inventive people that the engineering librarian has the opportunity to work with and serve. In the end, the librarian who chooses to take the plunge into the unfamiliar and perhaps scary waters of engineering librarianship finds a sense of gratitude for making the best career decision possible.

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