

# Tips from the Experts

## Engineering Tourism: Sightseeing across the Curriculum for Non-STEM Librarians

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### Abstract

Advice for librarians' professional development sometimes includes encouragement to attend classes, but the benefits for STEM librarians have not been well defined. This article describes a study in which engineering librarians at the University of Vermont and Montana Tech of the University of Montana observed class sessions across first-year engineering programs. The study provided numerous insights into the orientational design of these programs, the scope of the curriculum, building relationships with different groups, the importance of relating instruction to professional success, opportunities for integrating library services, and the ability of non-expert librarians to support STEM programs. This article also provides suggested best practices for an observational project of this kind.

### Introduction

In this article, we describe the lessons learned as non-engineer librarians from observations of courses and class sessions across first-year engineering programs. As we conducted this project, we often called it "engineering tourism" because it allowed us to visit an environment that was unfamiliar to us and learn a lot about it in a short space of time.

We are liaison librarians supporting multiple engineering departments and programs at the University of Vermont (UVM) and Montana Tech of the University of Montana. These

responsibilities include a typical combination of instruction, reference, outreach, and collection development. We have each taken on these liaison responsibilities in the previous two to four years and our STEM backgrounds were modest. We have humanities backgrounds and no professional engineering experience.

Librarians who want to familiarize themselves with their subjects and programs are encouraged to attend classes ([ASCE Engineering Libraries Division \[date unknown\]](#); [Blake & Warner 2012](#)), but the specific benefits have not been well defined.

Our review of the literature identified only one detailed report of an auditing project, which described the objectives, implementation, and results of auditing an art history course ([Pollock 2009](#)). The primary objective was to understand students' information use in context to better anticipate their needs. "Auditing helped me to gain a better understanding of the information hunting-and-gathering habits, the time constraints, and the heavy work load [sic] of undergraduates" ([Pollock 2009](#)). In this instance, acquiring subject knowledge was a secondary goal. A valuable but unplanned outcome was the development of relationships with students and faculty. "Being physically present in the classroom on a twice per-week basis gave me the opportunity to interact regularly with the students and instructor of the course and to cultivate a congenial, professional relationship with both" ([Pollock 2009](#)).

The benefits of observing classes in a STEM context have not been explored to the same degree. Fritzler ([2006](#)) provides some useful insights based on his experience taking undergraduate courses as a continuing education student. "Further awareness and insight into the technical language, culture and ethos...scientific foundations, methods, and terminologies" enabled him to improve demonstrations of database searches and make better-informed decisions in collection development. Like Pollock, Fritzler reported that being present in a class led to familiarity with students and faculty, and opportunities to provide or promote library services.

## Objectives

Our primary objective was to determine what specific lessons and outcomes can be reasonably anticipated by a librarian observing or auditing STEM classes, specifically introductory, first-year engineering courses.

Another objective was to generate ideas for how library services can support engineering students' academic needs. We hoped to learn more about the context in which students are introduced to engineering information and research methods. In doing so, we expected to identify opportunities for library liaisons and the library generally to engage with these classes. We anticipated that these opportunities might span library instruction, research assistance, integration of library collections, and promotion of library facilities.

Our last objective was to address feelings of mild imposter syndrome that arise performing the duties of an engineering librarian without the benefit of an STEM background. We self-identified as "accidental" engineering librarians ("librarians who do not have professional training in designing, delivering or facilitating STEM education yet wind up providing these services for the library" - [Baek 2013](#)), and sought to test our level of subject expertise and examine this self-identification by adopting the perspective of first-year engineering students.

## Methods

In both cases, we audited first year seminars during the Fall 2017 semester: the First Year Seminar (FYS) at UVM and the Freshman Engineering Seminar (FES) at Montana Tech. These classes are required courses for all first-year engineering majors, and are designed to introduce students to the specializations available as they make their individual selections within their program. The courses are structured around guest speakers, often faculty, who have particular perspectives within the engineering field. We selected these courses for this auditing project because they are the courses in which engineering students transition into their programs and because of their comparatively low technical content.

We communicated with the course instructors prior to observing class sessions. We stated clearly that we were not assessing or evaluating their instruction or their students. We followed up with the course instructors at the end of the semester with brief interviews to supplement our observations and reflections.

## Lessons Learned

### *Mapping the curriculum*

Observing these introductory courses provided a detailed picture of our respective curriculums. These fundamental courses were practice-based orientations to engineering in an academic environment. As librarians, observing these presentations was an opportunity to learn about current research topics and anticipate the program content and academic expectations that students face.

UVM's FYS was particularly valuable as a map of the structure and content of engineering programs. It was designed to orient incoming students to the engineering departments' mission, curricular content, requirements and expectations. According to one co-instructor, the course "orients students to all the different possibilities within engineering. In high school...they're told they should be engineers, but they don't know what that means" ([Tuff Dunn 2018](#)).

Guest faculty provided overviews of each engineering program, designed to help students choose, confirm, or switch their major. To do this, several presentations addressed common assumptions. Mechanical Engineering faculty framed their program as going beyond classical mechanics ("wrenches and gears") to encompass atomic-scale mechanics, astronautics, biomechanics, robotics, and big data.

Montana Tech's FES was similarly structured. As at UVM, the course was designed to expose students to the realities of the available engineering concentrations, and to put the importance of their academic pursuits in context. Each week featured a different engineer who spoke about their background, their education and professional development, and the day-to-day realities of their engineering practice or teaching. Many of the speakers placed no emphasis on academics whatsoever, while others expounded the virtues of research opportunities and late nights in the library. In part due to interest expressed through this project, the instructor incorporated a library lecture into the curriculum.

### *Professional success*

Both of these introductory courses are designed as an orientation to career paths and professional success. UVM's FYS included guest presentations from alumni who are now professional engineers in the local area. These guest presentations create a natural place in the curriculum for students to learn about the practicalities of entering the profession, what students need to do and think about in their first year, and how their college supports

them in this. In this case, course assignments required reflection on "where you are now" and "where you want to go," while class sessions repeatedly stressed the importance of developing a distinctive skill set (such as programming, business, or languages).

Montana Tech's FES was designed much the same way. Professional engineers from a variety of disciplines offered a glimpse into the day-to-day realities of their specialization, and noted the process that led them to their current position. Through past outreach, the library secured one of these slots prior to midterms to introduce students to research practices and library resources. It is the only mandated information instruction the students receive as part of the FES.

Both courses emphasized the importance of networking. Several UVM FYS presentations encouraged students to join an association-led chapter (ASCE, IEEE, ASME, AIA, etc.) or engineering club to develop technical skills (e.g., CAD, welding, machining), gain professional experience (e.g., teamwork, working to specifications, managing finances), and network with faculty, alumni, regional/national association chapters and employers. The social benefit of connecting with other students ("find your tribe") was another aspect that many speakers wanted to share with the first-year cohort.

Having observed this emphasis, we believe it would be beneficial to keep abreast of engineering organizations and recruiting practices to find opportunities for library engagement. The library could collect membership materials for professional organizations, for instance. The Montana Tech Library partners with the Career Services department to provide free resumes during career fairs. There may be an opportunity to promote this service during symposiums, expos, and other engineering events as well.

However, in both courses, presenters' advice about professional success raised questions about the relative importance of research, scholarship and academic achievement. At Montana Tech, nearly all speakers directed students to network aggressively and suggested that connections developed through self-promotion were more professionally advantageous than academic achievement. Students were encouraged to do research as a means for networking, and to present at conferences as a means for traveling. The library was endorsed as a work space rather than a research space. At UVM, alumni presenters described technical courses as professionally useful only in minor areas, and less important than ways of thinking, communication skills, membership of groups and clubs, and internships.

#### *Building relationships with students*

As in the experiences of Pollock and Fritzler, being in the classroom presented opportunities to connect directly with students and build relationships. In the UVM FYS, on several occasions students approached the librarian to request information or assistance relating to an assignment in that course, or sometimes a different course altogether.

Our project also facilitated relationships with students beyond the Fall semester. When working with engineering courses the following Spring, many students already knew and recognized us. This rapport was a useful icebreaker that made it possible to present ourselves as a familiar face, talk with students about their progression through their programs, and build on a shared experience.

#### *Building relationships with faculty*

We found that our project served as a signal to faculty that the library is available to support their instruction, which in turn led to some reframing of relationships with engineering faculty.

At both institutions, arranging the observations and conducting the reflective interviews prompted the instructors to reexamine first-year courses as they relate to information and research. They were receptive and willing to identify instructional needs and missed opportunities, particularly in this positive, active context. One instructor expressed regret for failing to schedule a library lecture that semester, and arranged to include one in the coming term.

The exercise brought perspective to relationships with supporting and complementary programs. Montana Tech faculty acknowledged their heavy reliance on the writing program to do the heavy lifting regarding instruction in writing and research skills. Montana Tech's library has a well-developed and expanding relationship with the writing program, so the library has been supporting information science in the engineering programs in exactly the courses engineering faculty have relied upon.

Pollock ([2009](#)) described how an observation project led to collaboration with faculty on assignment design and an embedded role in the course. This was not our experience, but we saw great potential for collaboration with faculty in the observed courses and beyond.

### *Connecting with support services*

Young's overview of engineering librarianship ([2012](#)) encourages early-career librarians to make connections with "people entry points" who can provide information and guidance distinct from faculty and students.

The UVM FYS was such a point of connection with support services and administrators. It was co-taught by the college's Assistant Dean of Student Services, with additional instruction by academic advisors, a career readiness advisor, and a graduate students coordinator. One member of this team acknowledged they had been unaware there was an individual librarian assigned to support engineering.

Observing the FYS was also an opportunity to learn about support services' roles and their support for engineering students. Their content in the course included "cognitive and organizational tools" for effective study and program completion, the mechanics of taking courses, academic integrity, behavioral expectations, and career planning.

### *Promoting library services*

As noted, one of our objectives was to identify how library services can support engineering students' academic needs. The courses' need for resources from library collections was modest, reflecting their orientational nature. According to instructors at Montana Tech, it also reflects the students' lack of time for in-depth research, and their lack of motivation to use resources beyond those directly endorsed or required by the instructor, such as specific ASTM standards.

However, these low levels of resource use prompted productive discussions with instructors about collaborating on library guides tailored to individual courses or concentrations. Instructors had worked with the library in the past to produce tutorials and videos for integration into their course management pages, and the observation exercise revived that pursuit.

The library may also serve as a resource for identifying grants for research and travel, in cooperation with institution research offices and graduate schools. A Montana Tech presentation dedicated to research encouraged students to seek out research opportunities and present at conferences and symposiums. In the UVM FYS, we observed significant student interest in Engineers Without Borders, association chapters' projects overseas, and

similar opportunities to do service work in developing countries as an engineer. There may be an opportunity for the library to demonstrate the value of research by connecting it to opportunities for broadening horizons and gaining distinctive experiences through travel.

Opportunities for collaboration and outreach like these will likely vary from campus to campus, depending on each institution's programs, courses, and library services. But we think it is a reasonable expectation that any auditing project could identify similar opportunities where programs and library services have the potential to intersect.

### *Adjusting self-perceptions*

We reflected throughout the project about what it means to be an engineering librarian without a substantial academic or professional background in a STEM field. We were anxious about our ability to understand, teach, and collaborate with engineering faculty, students, researchers, and administrators. Through observation, we found that our prior basic science knowledge gave us a competent grasp of much of the math that first-year engineers are doing. While upper-division and graduate-level engineering coursework may be beyond the comprehension of a non-scientist, we developed confidence in our ability to engage with, and relate to, undergraduate STEM students as they acclimate to the academic rigors of higher education. What is more, we came to see that hesitation or insecurity on the part of new STEM librarians risks depriving students of much-needed and highly qualified support at the moment they can benefit from it most.

## **Conclusions**

Engineering tourism offered us a range of insights into the programs and communities we serve, in a process that we considered time-effective, interesting, and enjoyable.

In our experiences, we learned many things about students, faculty, support services, the curriculum, the profession, and ourselves. These included aspects of disciplinary instruction, learning, research, study habits, and student behaviors. Some of these takeaways would have been challenging to learn in a different format of professional development.

Observing foundational courses clearly offers benefits for a librarian starting a new position or new set of liaison responsibilities. But engineering tourism in upper division courses could also be an opportunity to gather insights into the curriculum and student and faculty needs. Technical upper-division courses would require a basis of STEM experience. Capstone design courses - where students usually depend on more library support - may be more accessible due to their project management and business aspects.

Besides enriching our knowledge and understanding, our project had numerous practical benefits for the services we provide, spanning instruction, research assistance, integration of collections, and more. We see engineering tourism as a form of outreach that has enabled us to connect and collaborate with students, faculty and support services.

Suggested best practices for engineering tourism:

1. Consider undertaking a project like this as soon as possible after starting in a new position in order to gain knowledge and build relationships early. Also, an observation project may be more feasible when starting a new position and before responsibilities accumulate. We agree with Pollock ([2009](#)) that the optimal time is the first year in the position.

2. But also consider undertaking a project like this even when settled in a position. Programs, learning outcomes, course content, faculty, and the student mindset all change over time.
3. Coordinate with faculty early and seek their input on which courses and sessions would be most useful.
4. Plan your objectives and use them to create a framework for your observations, questions and takeaways. Consider how these might translate into an action plan.
5. Develop and validate your observations and reflections through discussions with instructors and students.

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