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Collaborative Data Literacy Education for Research Labs: A Case Study at a Large Research University

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Keywords

data literacy, data management, faculty collaboration, research laboratories, engineering, library instruction

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Collaborative Data Literacy Education for Research Labs: A Case Study at a Large Research University

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Abstract

Data literacy education for graduate students can take place in many contexts. One-shot instruction sessions and credit-bearing courses are a common mode of instruction for the graduate student audience, but both share limitations regarding best practices for adult learning theory. This case study explores the benefits of data literacy education in a research lab setting and highlights the collaborations among data librarians, a liaison librarian, and research faculty that enable effective learning experiences in labs or other applied settings. The authors share the design of the curriculum, facilitation of the instruction, and the assessment of student learning, as well as their approach to collaboration as an essential component of the project.

Keywords: data literacy, data management, faculty collaboration, research laboratories, engineering, library instruction

Introduction

The nature of research has seen significant shifts in light of new and robust technologies that enable new modes of data collection, analysis, visualization, storage, and sharing. These technologies have transformed research methods in diverse disciplines from the sciences to the humanities, inciting new research questions and findings. Conversely, these new approaches generate additional complexities for researchers and demand a greater understanding of data management practices than ever before. While technology and methods for data-intensive research continue to grow, data management education or data literacy becomes a critical skill for students and faculty alike.

Academic libraries have a significant role to play in data literacy education. As experts in the collection, organization, storage and dissemination of information, libraries and librarians are uniquely positioned to teach fundamental data

literacy concepts that support research efficiency, collaboration, and reproducibility. However, it can be difficult to know where librarians can make the most of their expertise and achieve the greatest impact as data educators. Data librarians are often individuals or small teams who lack the capacity to scale data literacy instruction for all students and faculty. Moreover, data librarians cannot be experts in all aspects of data across multiple disciplinary contexts. Therefore, it is essential for data librarians to identify collaborations within the library and on campus in order to pool expertise and target high impact learning opportunities.

This case study describes a collaboration between data librarians, a subject librarian, and research faculty to design and implement data literacy instruction for a material science engineering laboratory at Texas A&M University (TAMU). The authors describe the content, delivery, and assessment of the instruction and discuss the importance of collaboration for data literacy in applied settings such as research laboratories, institutes, or centers.

Data Literacy Education for Research Laboratories

Data literacy education has been a component of the academic library portfolio for some time and further codified by the Data Information Literacy (DIL) project—a collaboration between Purdue University, Cornell University, the University of Minnesota, and the University of Oregon that called attention to strategies and approaches for library-led data information literacy programs in applied settings. Through this multi-year, Institute of Museum and Library Services (IMLS)-funded project, Carlson et al. identified twelve competencies of DIL, created an interview guide for librarian- led discussion on data literacy, and provided a suite of case studies describing data literacy education models across institutions.[1]

In a 2013 project update, the co-investigators posit that graduate students are a natural audience for librarian-led data literacy education. This is especially true in the science, technology, engineering, and mathematics (STEM) disciplines where graduate students are often expected to carry out most data management tasks for their own research, and frequently participate in data activities to support lab/team projects.[2]

In a review of possible avenues for instruction, Carlson et al. share that modes of data literacy education typically fall into two categories: stand-alone credit courses or one-shot workshops. The former requires a significant commitment from students who are already overburdened by demanding coursework and may appear only theoretical. The latter often fail to address the disciplinary difference in data management, which provides more meaning, context, and motivation for the learner.[3]

The lack of disciplinary context was also noted as a drawback in one-shot workshops in a similar study at the University of Massachusetts, Amherst. In this study, librarians discovered through workshop feedback that students felt a need for discipline-specific examples of data management best practices or issues.[4] The deficiencies of the credit course and the one-shot workshop methods outlined by these examples from the literature align with concepts and practices of adult learning theory, which emphasize learning experiences with learning goals that address an immediate need with clear practical application.[5]

In a 2013 case study, biomedical engineering researchers described a collaboration to deliver data literacy instruction to graduate students tasked with sharing data between the researchers' respective labs.[6] This study notes that graduate students often learn data management haphazardly from fellow graduate students and lit-

tle or no formal training in laboratories is offered. Guadette and Kafel argue that implementing formal data literacy instruction into a lab setting not only increases productivity, but also fosters a culture of sharing data both within a lab and with external collaborators.[7]

More recently, a data librarian and graduate students in the earth sciences program at Oregon State University conducted interviews with research faculty and staff in scientific labs in order to identify opportunities for data literacy instruction. Data collected from these interviews were leveraged to create internal data sharing guidelines to assist library-led instruction for laboratories. The instruction focuses on four key areas of internal research data management: data management plans, roles and responsibilities, acknowledgement of data use, and workflows. The guides and workshop materials for labs were shared by the authors in a GitHub repository.[8] This collaboration allows librarians to integrate data literacy instruction into applied laboratory settings. Again, this approach parallels that of the DIL project to position data instruction where graduate students may benefit from a highly-contextualized and applied framework when learning best practices for data management.

Collaboration for Data Literacy

One theme of the data literacy education literature described above is the emphasis on collaboration. The DIL project was comprised of five teams including a data librarian, a subject librarian and at least one faculty researcher from a science or engineering discipline recruited for the project. One relevant example is the case study at the University of Minnesota led by a data librarian, the subject librarian for engineering, and a faculty member in the College of Science and Engineering. Librarians and faculty co-created online instruction for graduate student research assistants in a structural engineering lab. Through a formal needs assessment, the librarians and faculty member developed a suite of online learning modules addressing basic research data management skills. The authors of this case study highlight the mutually beneficial partnership of this engagement as the librarians bring expertise in organizing and managing information, while the civil engineering faculty member targets the skills that will speak to the students' experiences within the disciplinary norms.[9]

Additionally, the Llebot et al. study was a local collaboration between a data librarian and two graduate students from STEM fields to interview members of research labs in a variety of disciplines.[10] While the authors do not state collaboration as a strength in their research products, their collaboration allowed them to create a collection of resources that can be applied to diverse disciplinary contexts. Gaudette and Kafel also stressed the value of research data management education to advance research collaborations across laboratories.[11] Indeed, collaboration among large distributed teams requires effective data literacy instruction in order to maintain the integrity of the data produced.

Collaboration provides disciplinary or professional contexts which play a key role in creating authentic learning experiences in step with adult learning theory or andragogy. Andragogical theory indicates that for adults, learning must be coupled with clear goals. Similarly, adults prefer learning experiences that can be applied to real-life situations and thrive when given the opportunity to learn by solving problems rather than via teacher-driven strategies such as lectures or teacher-student discussions on theoretical topics from the disciplinary domain.[12] By situating the data literacy learning experience in the laboratory rather than the classroom, graduate students are more likely to see the direct connection of data literacy principles to their work and, in turn, more readily perceive the value of data lit-

eracy. Additionally, research faculty who manage the laboratory may see this service as an opportunity to increase productivity and dissemination of their research.

The authors posit that the laboratory is an ideal context for data literacy instruction; however, as the examples above demonstrate, these opportunities flourish where there is collaboration between research faculty, data librarians, and subject librarians.

Data Literacy at Texas A&M University Libraries

Founded in 1876, TAMU is a Carnegie R1 research institution and one of the first universities to be designated a land, sea, and space grant institution. The College of Engineering (CoE) offers twelve undergraduate and graduate programs in fourteen departments. The 696 CoE faculty members represent approximately 20% of the TAMU faculty overall.[13] Of the 69,465 students at TAMU, 29% are enrolled in the CoE. The student enrollment in CoE for fall 2019 was 16,035 undergraduate, 2,072 masters, and 1,756 doctoral.[14] Research areas include: Autonomy and Robotics, Energy Systems and Services, Education and Training, Health Care, Information Systems and Sensors, Infrastructure, Materials and Manufacturing, and National Security and Safety.[15] In addition to CoE, there is also the Texas Engineering Experiment Station (TEES). Some of the CoE faculty have joint appointments with TEES. There are 180 centers and institutes at TAMU. Many of the institutes are multidisciplinary that bring faculty together from across campus, including the National Corrosion and Materials Reliability Lab (NCMRL), which is part of the Center for Infrastructure Renewal.[16] The NCMRL "provides solutions to the corrosion needs of industry and government...to preserve and extend the integrity of the structures, such as buildings, bridges, pipelines, roads, ports and off-shore platforms…" through research, education, and training.[17]

Liaison Librarians

Liaison librarians (or subject librarians) serve an important role as a link between academic departments and the libraries. At many libraries, the liaison librarian has a multifaceted role that often includes collection development, instruction, outreach, reference, and increasingly other functional roles. Historically, subject expertise has played an important role in fulfilling the position responsibilities and building credibility with academic departments on campus. The relationship between the liaison and faculty in the departments develop over time through various communications, meetings, and other interactions. While the role of the librarian liaison is evolving at some libraries with more focus on functional roles, central to that liaison librarian role is that of a facilitator.[18] The liaison is not only building relationships between themselves and academic departments, but between libraries and academic departments by connecting them to other librarians, resources, and services. When questions arise, especially those that faculty members believe the libraries might be able to solve, it is only natural that they would contact their liaison librarian.

Research Data Management Services

The Research Data Management Services (RDMS) unit was established by the University Libraries in 2019. The unit is comprised of three dedicated library faculty members specializing in data management. Members of the unit have responsibilities in data literacy, data curation, and data management plan consultations, but remain discipline agnostic as they work with students, faculty, and staff across multiple colleges and campus units.

One of the first initiatives of this unit was to establish a series of one-shot, data management workshops open to all students, faculty and staff. In step with national trends described by

Carlson et al., these workshops are not discipline specific. Rather, each workshop provides core data management principles and practices that are generalizable to any discipline or research project. However, they do not follow the best practices outlined by the DIL project, whereby the content includes disciplinary data standards and practices, nor do they follow the andragogical principles for addressing an immediate need of the learner.[19]

One of the pitfalls of data literacy instruction that is coordinated, designed, and led by a sole data librarian is the capacity for understanding and aligning the disciplinary context to learning experiences for multiple audiences. While the data librarian may be highly skilled in multiple methods and tools for data collection, analysis, visualization, and curation, it would be impossible to acquire the expertise in all discipline-based data standards. This disciplinary expertise may not be essential for the one-shot, multidisciplinary workshop, but it becomes a key component of instructional design in applied settings such as a scientific laboratory. If data librarians who are discipline agnostic seek to advance instructional impact by following best practices for data literacy education and andragogical principles, collaboration with liaison librarians becomes essential. The subject expertise of liaison librarians provides a deeper understanding of the research lifecycle and the professional standards of the disciplines they serve. Additionally, subject librarians can offer unique perspectives on the needs of the students and faculty based on observations, interactions, and trends in their area of librarianship. The combined expertise of the data librarian and the subject librarian can provide core skills, as well as discipline-specific training to provide more meaningful learning experiences.[20]

Origin of Collaboration

In this case, the engineering faculty member submitted a question seeking ways to structure data produced in the NCMRL to make it easier to retrieve and organize for further analysis. It quickly became clear to the Science & Engineering Librarian that the data issues were beyond their expertise, but they were interested in learning more and believed there were some insights they could provide in terms of subject expertise. An initial meeting was held between the engineering faculty member, two members of the University Libraries' RDMS unit, and the Science & Engineering Librarian. During this initial meeting, the authors learned more about the NCMRL and gained a better understanding of their needs. The NCMRL works with a number of industry partners; testing materials under various conditions, and ultimately needed to make the data accessible to those partners.

Another challenge they were experiencing was that a number of postdoctoral fellows, graduate students, and undergraduate students conduct the testing and they needed a better approach to the organization and retrieval of the data. After some discussion, it became clear that NCMRL's current storage solution (Google Drive) would continue to meet their needs, but all agreed that several areas required further examination. The areas were: file naming, documentation, roles and responsibilities, and training. In a subsequent meeting, involving the parties above and two NCMRL postdoctoral fellows, the authors confirmed that those were indeed the areas that needed to be addressed.

Curriculum

To determine the focus of the research data management curriculum, the authors had two in-person meetings with postdoctoral fellows serving as lab managers to learn about the needs of the lab. These meetings included a brief overview of the research data management lifecycle and what services the authors could provide. They also included the lab managers describing the types of data and other products the lab produced and the various audiences who would

use the data. Due to the COVID-19 pandemic, the meetings originally scheduled as in-person with all lab employees quickly transitioned to video conferencing and email communications. Despite this change, the lab managers and authors established a set of data management goals. Next, the authors designed a curriculum tailored to meet the goals of the lab. In planning the curriculum, the authors applied andragogical best practices, because most of the lab employees were at a graduate level or higher. Allen provides four best practices for adult learners for online learning. These are

1. Tailoring course design to students' needs, life experiences, and interests;

2. Help learners construct knowledge rather than transmit knowledge;

3. Foster peer-to-peer and peer-to instructor interaction, and

4. Create authentic learning environments and assessments.[21]

To follow these online adult learning best practices, the authors created "chunks" of information to be presented to the lab employees that, when combined, would achieve the end goal of having better organized data for sharing with stakeholders. Major explains that information chunking calls for instructors to, "create information nuggets that are just the right size for cognitive processing, [and] linked to relevant larger learning objectives."[22] For the lab managers, the authors chunked research data management into the following modules: File/folder management, metadata and the purpose of documentation, and data storage; all issues of concern as a result of student research assistant turnover. Also covered were file naming best practices such as leading zeros and numerical date ordering for chronology as well as elements to consider as part of the file name.[23] When the curriculum was finished, the authors met with the lab managers again to discuss the tailored research data management training. After this training, the lab employees were asked to develop file naming rules for the types of data their projects produced. They were also introduced to batch renaming software, so that previously created data could follow the new file naming convention.

The next information chunk was about documentation using README files. Since the lab has multiple researchers ranging from faculty and postdoctoral fellows to graduate and undergraduate students at any one time, the authors were informed by the *Data Management Implementation Plan* template created by Llebot et al. at Oregon State University.[24] This template contains sections on data documentation, file storage as well as roles and responsibilities with a focus on research labs. The template includes detailed instructions on how to complete each section. The authors used the guided questions in the template to inform the creation of a similar data management implementation document designed specifically for the lab. By doing so, the authors fulfilled the adult learning best practice of helping learners construct, rather than transmit, knowledge. The *Data Management Implementation Plan* template formed the foundation for the associated data documentation. From this template, the lab employees could create standard README documents for file organization, and file naming for their individual projects. The lab managers were encouraged to work with one another in filling out the templates and brought templates back to the authors for discussion and suggestions for improvement. This portion of the project allowed for peer-to-peer and peer-to-instructor interactions to solve the data management and accessibility challenge the lab was experiencing.

Finally, authors provided a workshop for all lab employees, this time including all student research assistants, on the basics of research data

management. The authors were the main presenters. While the information was a review for the lab managers, the setting allowed them to answer student research assistant questions and their participation highlighted the importance of organizing data, the new procedural changes in the lab, and how to use the new README files. This workshop was derived from the RDMS unit's discipline agnostic workshop on best practices for data management, but was tweaked to include specifics on folder organization data file naming and preferred file formats from the lab's new README files as examples. Slides from this workshop were shared with everyone as reference material.

Delivery

With the exception of the initial meeting with the faculty member, all meetings and instruction for the NCMRL lab were conducted synchronously online using the Zoom video conferencing software. Librarians scheduled weekly meetings with NCMRL lab managers using personal Zoom meeting rooms and shared each invitation using the Outlook calendaring system. In addition to synchronous meetings and instruction, all templates, guides, and implementation documents were shared in Google Drive where the authors and the lab managers could collaborate simultaneously to complete the content for each module and store the final documentation.

The combination of Zoom and Google Drive allowed for greater flexibility for both librarians and the lab managers who could join the meetings and instruction session from any location. Google Drive was a valuable tool for sharing documents during and between meetings. This was especially helpful in enabling continuous peer feedback among the lab managers as well as feedback from the librarians and the research faculty member serving as the principal investigator of the lab.

Assessment

After the final workshop for all lab employees, the authors sent a survey to participants. Of those who completed the survey, one identified as *Principal investigator*, one a *Postdoctoral fellow*, six *Research assistants/graduate student*, two *Research assistants/undergraduate student* and one *Staff* member (Table 1).

The lab employees were asked to rank what was most and least helpful for them from the training. The top two topics that participants found the most helpful were *File naming and organization* and *Documentation* portions of the training. Next selected were *File formats*, *Storage solutions* and *Tips and tools*. The two topics of *Data lifecycle* and *Roles and responsibilities guidelines* were listed as least helpful (Table 2).

Subsequently, lab employees were asked to rank which training materials were most helpful. *Templates and guides* along with *Presentation slides* were the highest ranked, and *Implementation plan summary* and *Getting feedback* were noted as least helpful (Table 3).

When asked how easy or difficult they thought it would be to implement the data management plan, two answered *Extremely easy*, four answered *Moderately easy*, one answered *Slightly easy* with the rest answering *Neither easy nor difficult*. None of the participants selected any of the *Difficult* ranks provided in the question (Table 4).

Table 1. Workshop Participants

Participants	Count
Principal investigator	1
Postdoctoral fellow	1
Research assistants/graduate student	6
Research assistants/undergraduate student	2
Staff	1
TOTAL	11

Table 2. What information from this training was most helpful?

Most Helpful Information	Helpful Information	Least Helpful Information
File naming and organization	File formats	Data lifecycle
Documentation	Storage solutions	Roles and responsibilities guidelines

Table 3. What training materials were most helpful to you?

Most Helpful Materials	Least Helpful Materials
Templates and guides	Implementation plan summary
Presentation slides	Getting feedback

Table 4. How easy or difficult will it be to implement this data management plan?

Implementation Rating	Frequency
Extremely easy	2
Moderately easy	4
Slightly easy	1
Neither easy nor difficult	4
Slightly difficult	0
Moderately difficult	0
Extremely difficult	0

One question was open-ended and asked "What is the most challenging data management skill or concept to implement?" Seven of these responses focused around file naming and organization. Consistency was also mentioned, and renaming was also listed as a major issue. The lab needed to rename old data to comply with the new standards in the data management plan. README files were also mentioned and concern was expressed over the time it will take to implement the new standards. The lab employees were also asked what aspects of data management they would like more training or infor-

mation on. Several employees did not have suggestions, but one member wanted to know how to track who uses the lab's data and how to track citations to it. One wanted training on how to use batch file renaming software. Another person wanted to learn how to better secure data, and one participant noted that they needed to write a standard operating procedure document so that the data management plan would be implemented. Eight of the participants replied they would recommend data management services to colleagues, and noted that they believed their colleagues would benefit from learning how to organize and share data. One lab member mentioned having an, "awareness of the importance in data management." Unfortunately, none of the lab employees answered the final question which was how could the authors improve the training, but instead provided two thank-you remarks.

Discussion

Both the authors and the lab managers found this collaboration to be a positive experience. By meeting with the lab managers in stages to introduce them to research data management, then provide them with templates to apply what they learned, they were able to achieve good data management practices in their lab. The feedback sessions for the lab managers after they worked on their data management documents served as a good time to provide more detail and clarification, again chunking the instruction at point of need. Waiting to hold the workshop for all lab employees (graduate and undergraduate student research assistants) to introduce them to data management concepts and demonstrate how they would be applied in the lab helped make the instruction relevant to current roles rather than as an abstract concept.

The feedback from the assessment survey was positive, but there were some limitations with the data due to the layout of the survey. Some of the questions were not applicable to the student research assistants who only attended the final workshop, which may have skewed the results of some of the ranking questions on what topics were most helpful. Two surveys would have been better in order to receive more meaningful feedback. One survey would provide more in-depth questions for the lab managers who worked on the templates and met multiple times with the authors, and a general survey addressing the final workshop for all lab employees. The authors would learn from these surveys what needed to be discussed in more detail to better meet the needs of the participants at the proper information learning stage.

In addition to the survey, informal feedback from the lab managers was positive. They found the implementation less challenging since they had developed the templates and examples themselves. The lab managers discovered that by developing templates and creating file naming and organization conventions, they had more confidence in their ability to achieve the main goal of the lab, reusable data that was easy to locate, even if the student research assistants who created the data had moved on.

Data from the survey indirectly support multiple aspects of the collaboration. Responses indicated that data management plan implementation was not perceived to be difficult. This response from lab employees may be due, in part, to the close collaboration with the lab managers who worked closely with the authors to pilot and later guide the implementation of the data management plan for lab employees. Additionally, the survey data indicate that lab employees found the file naming and documentation information most valuable. The liaison librarian to the Department of Materials Science & Engineering had already met the research faculty and was somewhat familiar with their corrosion research, but was less familiar with the activities of NCMRL. Previous work experience in testing laboratories and a background in chemistry provided some insights into the testing occurring in

the NCMRL. One specific example includes questions the liaison posed to lab managers about elements in the file names and testing protocols used in NCMRL. These questions assisted in illuminating information needed in the README files that made the data more understandable and reusable. The authors identified a correlative parallel between the most helpful information identified in survey data and the collaboration with the liaison librarian, whose deep understanding of engineering standards and tests provided more focused guidance regarding discipline-specific file naming conventions as well as accurate and detailed documentation in the README files. To that end, this information may have been considered more valuable to lab employees due to the expertise and guidance attained through collaboration with the liaison librarian.

The authors also noted variances between the applied, project-based learning experience afforded by the context of the lab and the general, lecture-based workshops offered by the RDMS unit. General workshops are panoptic, sixty-minute sessions designed to scale to multidisciplinary audiences with limited capacity for applied learning activities, while the learning experience with lab employees was entirely applied to a project outcome. The RDMS unit occasionally receives requests for discipline-specific data management workshops that address disciplinary conditions, but is unable to meet demand due to lack of subject expertise as generalists. However, collaboration with the lab managers and the liaison librarian allowed the RDMS unit to create a discipline driven, applied learning experience to meet a need that may have otherwise gone unfulfilled.

Furthermore, the liaison librarian benefited from the collaboration as a means of professional development in research data management principles and a deeper connection to researchers in the College of Engineering. Without the collaboration with RDMS, the liaison may have directed the researchers to the data repository or the Division of Information Technology. Due to an expanded awareness afforded by this experience, the liaison can now make informed referrals to the RDMS librarians and participate in RDMS services moving forward. Therefore, the success of the collaboration was brought to bear by the reciprocal benefits of those involved and the new opportunities to expand this service to other labs.

Conclusion

The collaborative nature of this pilot was essential to the successful integration of data literacy instruction. The lab managers assigned to the pilot were crucial partners as their understanding of the data lifecycle within the lab and the related workflows allowed them to choose the most appropriate data management solutions for their team. Moreover, both lab managers oversaw the work of the lab employees, therefore, played a key role in following through with the application of the new data management plan and communicating the feasibility of the new data management practices to the employees. Lab managers and the research faculty member were also instrumental in selecting the relevant data literacy content and sharing feedback with the authors in order to customize the file naming elements and README documentation. Similarly, the collaboration with the lab managers allowed the authors to provide constructive and iterative feedback in accordance with best practices for andragogical high-impact practices.

The collaboration with one of the liaison librarians to engineering was also key to a deeper understanding of the data lifecycle, methods of analysis, and the variables used in the lab. This disciplinary knowledge allowed the authors to ask more directed and meaningful questions regarding the pertinent information necessary for appropriate documentation management. The nature of questions posed indicated some

knowledge and experience in laboratory testing, which demonstrated to NCMRL that they were meeting with individuals who understood the research being conducted and further strengthened the collaboration.

At the end of the pilot and after the training session with the lab employees, the authors met to review the process and discuss the outcomes of the assessment. The authors agreed that the impact of the work was co-equal to their time and attention spent on this project. However, in order to scale highly customized instruction of this type, some content and workflows should be standardized. If the libraries were to offer this service to other labs and research centers on campus, a formal roadmap and best practices for collaboration should be established by the RDMS unit and expressed in some formal documentation. As a result, RDMS librarians developed templates for all stages of the collaboration. Templates include guiding questions for the initial interview, instructional materials, and an implementation guide. These templates are posted in a shared Google Drive for the RDMS unit as well as liaison librarians. The authors presented the outcome of the collaboration and the templates to liaison librarians across the University Libraries to raise awareness of the services and attract researchers from other disciplines.

As data librarians seek new modes of data literacy instruction, collaboration with liaison librarians becomes an integral part of both outreach and instructional efforts. In addition to offering disciplinary expertise, liaison librarians can leverage their relationships within liaison areas to raise awareness and garner interest in new data services. The authors propose that data literacy education is effective when delivered in applied settings where the learner can better internalize the information based on their individual research contexts, but this type of instruction is best suited for collaborative partnerships rather than the lone effort of the data librarian.

While similar case studies from the Data Information Literacy Project and Oregon State University exist, there is a paucity of examples in the literature of library-led data literacy initiatives in applied laboratory settings. The authors conceded that this type of instruction can be time and resource intensive for the librarian and the learners, but this method is perhaps the most effective strategy for impacting the skills and awareness of target audiences.

This case study documents a concrete example of library-led data literacy in a research lab, but several limitations of this example are clear. This collaboration was a unique opportunity influenced by the context of the university, libraries, and laboratory. A similar collaboration may not be realistic at other institutions. Additionally, the assessment of the instruction did not lead to a robust analysis of the impact on student learning or directly measure the success of the collaboration. This case study is not meant to serve as a standard or best practice for data literacy collaborations. Rather, it is a snapshot of one possible approach rooted in andragogical principles that may further discussion regarding library-led, data literacy instruction in applied research settings.

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