IJDC | *Conference Paper*

From the Research Cycle to the People Cycle: Humanizing Digital Curation

Lauren Geiger Kathryn C. New

Carolina M. Siniscalchi

Mississippi State University

Abstract

In this paper, we argue that digital curators need to move beyond explaining technical jargon and workflows to collaborate with researchers to meet them where they are at when educating them on digital curation skills. At Mississippi State University, we teach students, staff, and faculty about digital curation by connecting it to the skills they already have and cut out complicated jargon to get to what really matters: knowing how to manage data so it can be understood and used. We focus our pedagogy on strengthening the curation skills they already have and bringing in newer concepts by framing them within areas they are already familiar with. We hope that by adding a people lifecycle to the research lifecycle, we can empower our researchers to be proactive in digital curation and feel confident to continue developing these skills.

Submitted 31 January 2025 ~ *Accepted* 20 February 2025

Correspondence should be addressed to Lauren Geiger, Email: lgeiger@library.msstate.edu

The *International Journal of Digital Curation* is an international journal committed to scholarly excellence and dedicated to the advancement of digital curation across a wide range of sectors. The IJDC is published by the University of Edinburgh on behalf of the Digital Curation Centre. ISSN: 1746-8256. URL: http://www.ijdc.net/

Introduction

Digital curation is a series of steps and active maintenance to preserve and establish perpetual access to all forms of digital materials (Digital Curation Center, n.d.). For the last decade, conversations around digital curation techniques and its relevance in the library and information science field have consistently been growing (Yu, 2017; Yang, 2016; Poole & Todd–Diaz, 2022; Johnston et al., 2024). This has been happening alongside conversations about how data-heavy fields can successfully transition into a digitally focused world (Cofield et al., 2024; Garstki, 2022; Zhou et al., 2023; Rzepa, 2023; Levine & Krtalic, 2016). Some of these conversations discussed how digital curation skills learned in library and information science programs can be applied to specific fields (Cofield et al., 2024; Garstki, 2022). While these papers demonstrate how digital curation skills benefit their specific fields, there is little literature looking at how to broadly apply these skills to faculty, staff, and graduate students, and even less on scaling the teachings to incorporate undergraduate students.

Mississippi State University (MSU) is a Carnegie Research 1, land-grant institution. A core value of land-grant universities is to "provide a broad segment of the population with a practical education that had direct relevance to their daily lives" (Association of Public & Land-Grant Universities, n.d.). While originally focused on agriculture and technical education, technology and digital innovation are now a part of everyday life. MSU believes in practical education and is invested in providing an "innovative, hands-on learning experience" (Mississippi State University, 2023) for all its students, while balancing the needs of its extensive research network. The current Quality Enhancement Plan (QEP), the Bulldog Experience: Engage, Reflect, Create, focuses on providing these 'hands-on' opportunities by providing a range of co-curricular and credited course options for the students that provide real world experiences (Mississippi State University, 2024).

As digital curation practitioners, Geiger, Siniscalchi, and New work with all members of Mississippi State University's community. We teach credited and non-credited courses that are focused on or have significant elements of digital curation. One of the most common challenges that we face is that many individuals outside of the library world do not understand the terminology and jargon used when teaching digital curation skills. Even after explaining or expanding on the definition, the initial confusion can cause those attending the session to 'shut down' and not be as receptive to learning new skills, even when they build upon skills they already have. Here, we argue that digital curation pedagogy needs to move beyond jargon-based lectures to interactive experiences that are focused on understanding where the audience's knowledge level is, explaining why and how these skills are useful, and using language and ideas they are already familiar with to teach digital curation skills.

Literature Review

Discussions about digital curation in libraries and to what extent libraries should be involved in the overall digital curation services offered by U.S. universities have been ongoing for over a decade. The conversations developed as requests for data assistance increased with federal requirements around data sharing (Hofelich Mohr et al., 2016) and the amount of digital or digitized data in projects (Garstki, 2022). As more grant-funded projects incorporate graduate students, who may be tasked with collecting or analyzing data, the audience for digital curation expands well beyond faculty or staff (Swygart–Hobaugh, 2018). Graduate assistantships and placements on grant projects are limited, which means that graduate students who have some skills will be more marketable than

those without. Therefore, it is just as critical to provide undergraduate students with scaffolded learning opportunities focused on these skills as it is to provide these opportunities to graduate students (Mississippi State University, 2024; Garstki, 2022).

The need for digital curation that is focused on research data has resulted in several academic libraries creating research data management (RDM) services (Harvard Medical School, n.d.). According to a 2017 environmental scan, RDM services fall into two areas: one that focuses on consultive and reference support for projects; and one that focuses on providing technical support for uploading papers and data to repositories (Yu, 2017). However, more recent literature argues that a combination of the two groups is what libraries need to succeed (Hofelich Mohr et al., 2016; Faniel & Connaway, 2018; Ackers et al., 2020; Zhou et al., 2023). Moreso, there is growing discussion around the need for RDM services to move beyond libraries and incorporate the whole of the university's resources to most effectively assist individuals (Hofelich Mohr et al., 2016; Rod, 2023). These discussions align with research projects using multiple resources at a university to collect, analyze, and publish their data (Rzepa, 2023). This literature review will discuss how diverse professions need digital curation skills, how education for potential digital curator experts can evolve to match the needs, and how collaboration is a critical component when implementing scaffolded digital curation pedagogy.

Collaboration

Hofelich Mohr et al. (2016) argue that work around RDM goes beyond the library and should incorporate several areas of a university, including offices of research development; copyright and legal counsel; high performance computing; information technology services; and more. Moreover, this incorporation should not just be connecting individuals to resources, but a legitimate and ever developing collaboration between the units of the campus (Hofelich Mohr et al., 2016). This advocacy for interconnectedness on a campus is echoed by Rod (2023), who discusses how creating a sweeping RDM service would benefit not only faculty, staff, and students, but all units involved in the collaboration, as they would learn about each other's roles. This overlap of knowledge would then loop back to benefit the individuals as the partners learned more about the RDM services at their institutions (Rod, 2023). In large collaborations that involve multiple, dispersed units, there needs to be one unit that takes on the role of 'facilitator' between all the groups. Matusiak and Sposito (2017) discuss how libraries in Europe or based on an European model take on this role. This approach is also reflected in some institutions in the United States, such as the Research Alliance at Montana State University, where members of their RDM team have either office hours or offices in the university library (Montana State University, n.d.).

While most of the literature focuses on collaborations within a university, Faniel and Connaway (2018) point out that there are also off-campus stakeholders who are critical to RDM workflows. They cite Open Context and VertNet, online data repositories, as necessary for their researchers' projects (Faniel & Connaway, 2018). Open repositories are used in institutions around the world and are necessary for the longevity of research data and outputs. They are independent of a singular institution's RDM workflow, but rely on institutions, whether they are in higher education or the private sector, to generate the data they will house. In return, researchers from across the globe can use the data in their own research. These loops of collaboration and communication demonstrate that it is not only digital curation pedagogy that requires collaboration, but entire fields and professions as their work increasingly relies on digital data.

Professional Need

Data creation and management are growing in many fields, and their professionals need assistance. A 2023 environmental scan of how prepared archaeology repositories are to

handle digital data and records showed that 88% of respondents are "responsible for in-perpetuity care of digital associated records…" (Cofield et al., 2024). Respondents were also concerned about the lack of resources and expertise to manage these materials and the systems required for proper storage (Cofield et al., 2024). While there are a plethora of digital archiving and curation guides available for anyone to use that address these concerns, the terminology can "be intimidating… and read like a foreign language to archeologists…" (Cofield et al., 2024). This confusion in the face of terminology extends to digital curation services, Johnston et al (2024) explain how the simple phrase "level of curation" can be interpreted multiple ways, causing confusion between the managers of the repository and the data depositors.

To assist in eliminating confusion around terminology as much the actual work of digital curation, some courses are incorporating or heavily focusing on digital curation skills in the context of their specific fields. Rzepa (2023) discusses how his computation chemistry course has incorporated digital curation skills in the chemistry department at Imperial College London. From an initial DSpace repository set up in 2005 to working with their High Performance Computing to create electronic notebooks, to creating a new repository focused on complex metadata workflows and embedding an array of permanent identifiers, the evolution of Rzepa's (2023) work demonstrates the increasing complexity of digital curation as digital data increases.

Digital curation techniques not only assist in the management of recently collected data but can also determine how older data is reused. Garstki (2022) notes that a lack of digital and data literacy in the archaeology field results in data that is underused. To change the narrative, he developed a dual undergraduate and graduate course specifically focused on digital records and data reuse in archaeology at the University of Wisconsin-Milwaukee (Garstki, 2022). The course topics and skills used by both Rzepa (2023) and Garstki (2022) are comparable to the topics that Yang (2016) surveyed in library science digital and data courses. Along with the traditional model of subject librarians, those who specialize in a specific area such as English, History, Medicine, or Engineering and provide workshops tailored to those skills and resources, now there is a new model of librarians within digital curation that work with many departments, courses, or individuals on education on digital curation skills and resources. This division of labor and not having all the responsibility on one individual allows students to gain the most knowledge from all areas.

Digital Curator Education

To keep up with digital curation services, among other areas of their jobs, librarians must stay up to date on technology and trends. One way to accomplish this is through increased course work involving digital curation methods, standards, technology, and software. In 2016, Yang reviewed four courses—two on data curation and two on digital curation—at three different library science programs to identify common themes. The digital curation courses focused on themes of acquisition, collection, digitization, format, and preservation, while data curation focused on metadata, policy, theory, workflow, and quality control. When comparing the programs broadly, the themes of "digital libraries", "digital preservation", and "preservation", were seen across all the courses (Yang, 2016). This idea of overarching theories being disseminated in different ways was reflected at the 2013 DigCurr Experts' Meeting, where it was discussed whether digital curation was a "field" or a "discipline" and how choosing a theory to focus on impacted the skills taught (Poole, 2013).

There is a growing shift as programs are moving away from separating data vs. digital and focusing on wholistic digital curation programs. This stems from a growing recognition that library and information professionals need these skills for a majority of library or technology jobs (Acker et al., 2020). The tension between specific and wholistic digital curation skills is ongoing as professionals debate how to best set up students for

real-life problems while acknowledging that education in this area is ongoing (Poole, 2013; Ackers, 2020; Poole & Todd–Diaz, 2022). This trend is not just centered in the United States but can be seen worldwide as more universities are focusing on how to handle the increase of born-digital and digitized materials (Levine & Krtalic, 2016).

At Simmons College, Harvey and Bastian (2012) discuss how students learn about wholistic digital curation and specific skills by collaborating with two other universities (Mid Sweden University and University College) to prepare and upload files into their Digital Curation Laboratory, a virtual space where students can interact with digital records through specific scenarios. The students learn to think critically about the overall digital curation lifecycle, while gaining knowledge of learning how to do it by completing exercises with specific software and tools. They also gain real-world experience as each semester's class gets to work with the files that were created by and processed by the previous semester (Harvey & Bastian, 2012). Working with someone else's records and then learning how to correct or document what was done to the records harkens back to the overarching idea of collaboration in digital curation workflows. Nothing is done in a vacuum, and the more experience digital curators gain through collaboration, the better prepared they can be to assist others with digital curation needs.

Scaffold Learning

Students and learners have changed greatly in the last decade, and teaching styles have had to evolve to match them. Today, students prefer to learn through interactive experiences, which has caused teaching methods to change from "teaching to the test" to guiding students towards understanding. This active-learning approach is well established as being among the best pedagogy approaches for a student's education (Harkins et al., 2011; Rosen, 2018; Winn, 1995; Fisher & Justwan, 2018), but it requires knowing the learners and where they are at. Too often, faculty or supervisors assume that an individual knows the jargon or has the skills necessary to accomplish the project or task that is given to them. To navigate this disconnection, there is a need for heightened communication between learner and instructor to establish a user-centered approach (Harkins et al., 2011). Incorporating this user-centered, active-learning approach helps to meet students where they are, which is the first step in demystifying the digital curation education process.

Scaffolded learning, in particular, has been crucial to the work that we do to demystify the technical jargon used by the field. This instructional framework, when done correctly, encourages the students or learners to take ownership of the final product by motivating and employing their own creativity (Vacca, 2008). This process has theoretical roots reaching back to the 1970s, to Lev Vygostky and his Zone of Proximal Development, which looks at the distance between where the student or learner currently is and where they could be through collaboration and guidance (Winstone & Millward, 2012; Billings & Walqui, 2021). In other terms, scaffolding is the support structure that students or learners are given as they progress through the learning process. Scaffolding can be broken into two types: structural and procedural. Structural is the more planned or ritualized portion of learning, whereas procedural is the "in the moment" during the learning process (Billings & Walqui, 2021).

Problem Statement

As explained in the Introduction, MSU's current QEP, with its focus on real-world learning and expanding learning opportunities to beyond the traditional credit system, creates an opportunity for librarians to make a real difference on students' formation. With this goal, we have worked on incorporating more digital and data curation skills into credited

courses and on offering specific workshops and services on digital curation. These current experiences form the foundation of our argument: digital curators need to move past technical jargon, represented by the research cycle, towards the individuals involved in digital curation, our faculty and students, thus representing the people cycle. Our paper will cover the many ways we cut through jargon to meet the students, faculty, and staff at their current level of digital curation experience and then build upon those skills, demonstrating that digital curation is not a singular process but a life-long learning process.

Methods

To achieve our goal of making digital curation more accessible and understandable, we implemented two methods. The first was to redefine how we use the words "data" and "digital". We have found that at MSU these words are used interchangeably at times, but many assume that 'data' refers to science and technology research while 'digital' refers to humanities-based research (as in digital humanities, digital scholarship). By creating clear definitions, we can mitigate these unintentional biases and thoughts around digital curation. The second method was to form partnerships on campus to understand the full lifecycle of research data at MSU. The more we can understand about staff and faculty's day-to-day work with research, and what skills they expect their graduate and undergraduate students to have, the better we can assist them.

Redefining Data

To make digital curation pedagogy more accessible, we worked on redefining how to explain "digital" and "data". From conversations with faculty, staff, and students at MSU, we learned that when most individuals discuss or talk about "data", they refer to the output of research in social, physical, and life sciences, technology, or engineering. Very few faculty, staff, and students in arts and humanities programs viewed their work as "data". They believed that "data"-oriented services were not created for them or would not be beneficial for their work. The few times they discussed research in an online or non-analog format, they used the word digital to describe the work, methods, or techniques used.

The distinction in the ideology and meaning around the words—data vs digital—is also seen within the library science field. As discussed in the Literature Review, some library science programs differentiated between skills learned in "data" vs "digital" courses. However, all the skills taught in these different tracks are necessary for a complete digital curation program (Hofelich et al., 2016; Faniel & Connaway, 2018; Zhou et al., 2023). The distinction that is made between the two words adds to the impression that "digital" and "data" are different, even though most of the ways individuals interact with the materials are the same. According to Yang (2016), when looking at the focus of each program, those with "data" in their title appear more aligned with traditional STEM disciplines, while the "digital" courses are more aligned with traditional humanities. New and Geiger both attended library science programs during this time of transition; therefore, they also had to reflect on and adjust their own biases around the terms "data" and "digital".

To overcome this notion that "data" and "digital" are polar opposites, we worked together to consolidate the idea that data is more than numbers, models, graphs, or collected samples of organic materials; or even the results of text analysis of literature. The literature itself is data. Photographs, artwork, sculptures, diaries, letters, and text are as much data as plants, rocks, or chemicals. They are all objects that can be studied and analyzed. Data is not inherently digital; it can be analog. Therefore, when discussing these

terms, we use "digital curation" as we are focused on teaching faculty, staff, and students how to curate their digital materials, for example their data tables and experiment results, but that also extends to supplemental files, gathered literature, read-me files, notes, etc. Therefore, we discuss "data" as a part of the overall digital outputs of a specific project or workflow, regardless of the discipline to which the project belongs.

Creating Partnerships

Digital curation is not something that can be done in a vacuum. Partnerships are critical for long-term success, but developing partnerships within the library and across the institution can take years (Rod, 2023). The collaborative teams involved in digital curation at MSU, including us, did not follow the model of taking years to develop, but rather, most of these groups saw the need for greater digital curation methods, especially concerning RDM services, and quickly formed initial partnerships around those goals. Partnerships between different organizations and centers at MSU have been crucial for good digital curation, because of the decentralized and sometimes siloed nature of our institution. Geiger, New, and Siniscalchi are members of several teams, so even though the united effort is decentralized, the chance of miscommunication decreases as we share information from partnership to partnership and the different teams we belong to.

The main collaborator is the Scholarly Communications team at the Libraries. Geiger and Siniscalchi are members of this team, along with Julie Shedd, Director of Open Scholarship Initiatives, and Megan Bean, Copyright and Information Policy Specialist. The formation of this team was a response to the growing need for more data management and scholarly communication resources available to our academic community, mainly due to increased pressures for public access to data and publications stemming from federal regulations (Nelson, 2022). Neither Digital Scholarship nor Scholarly Communications are new topics at MSU, but both have had difficulty in gaining traction across their multiple iterations and in having a significant presence on campus beyond the Libraries' doors. Both groups work to provide scholarship services to MSU and are actively working together to establish boundaries and overlapping areas, so that faculty, staff, and students know who to contact to receive the appropriate assistance for their projects. Under a new library administration, both groups are encouraged to actively promote and market themselves across campus and work with peer institutions to help establish scope and workflows. This support has allowed both groups to actively identify areas of need, and plan how to address them, and how to scale and tailor our work to meet the current and future needs of MSU.

Our second main partnership is with the team of investigators of a National Science Foundation Campus Cyberinfrastructure (CC*) Area 7 Planning Grant, entitled Leading Advanced University Computing for Higher Education (LAUNCH). This is a collaboration between the High Performance Computing Collaboratory (HPC^2), Information Technology Services (ITS), and MSU Libraries. The main goal is to review the whole of MSU's cyberinfrastructure, including satellite campuses, Extension Services offices, and agriculture and forestry experimental stations, through the lens of research computing and data management (RCD). Geiger and Siniscalchi are two of the PIs on the grant, along with Micheal Navicky, Director of the HPC^2, Dawn Reynolds, Deputy Director of HPC^2, and Jeremy LaSalle, Systems Services Manager. To better understand the current RCD practices on campus, the PIs initially did outreach to every academic department and research center in MSU in the form of visits to departmental or college meetings, where the PIs gave a quick presentation about the project and gathered initial impressions and questions from the audience. Currently, the PIs are hosting focus groups and carrying out an online survey to gather in-depth data on current RCD practices and the needs and wants of the community. This expansive outreach effort has enabled Siniscalchi and Geiger to learn more about individual faculty and staff's research methods and curation practices and what they need and want to improve their workflows. This also had the additional

advantage of being seen on different parts of the campus. We have incorporated the information we gathered from this effort as we plan our outreach to undergraduate and graduate students, with a better understanding of the skills and knowledge that are seen as valuable in their formation and for their professional life, in or out of academia (Swygart–Hobaugh, 2018; Zhou et al., 2023).

Our third main partnership is with the Office of Research and Economic Development (ORED). ORED's overall goal is to support "faculty, staff, and students whose research leads to increasing knowledge to solve complex problems and engages through strategic economic development on a local, statewide, and global level." This mission aligns with our goals as we can supplement ORED's support by providing specific help with project management and curation. ORED houses several offices, and most of our collaborations involve the Office of Research Development (ORD). This collaboration was born out of the Scholarly Communication team's desire to be more involved with the grant proposal process and to ensure consistent communication between PIs and Libraries during collaborative efforts. This relationship provides connections to MSU's grant and contract specialists and allows new avenues for consultations with PIs as they are working on their proposals. The CC* PIs also are working with ORD to assist with connecting faculty and staff to RCD resources and services at MSU. These separate efforts have widened our options to work with faculty and staff, so that their research project and data management practices become more efficient and compliant with federal data sharing mandates.

The combination of expanding our network to understand the research lifecycle at MSU and de-jargoning the language we used is the foundation of our work to turn the research cycle into a people cycle. In the next section, we will discuss how we used and expanded on this foundation to target each major population at MSU (undergraduate students, graduate students, and faculty and staff) and incorporate digital curation pedagogy into their courses and workflows.

Output/Results

Undergraduate Students

As mentioned previously, individuals are changing both in how they receive information and how they interact with the world. Undergraduate students are no different. At MSU, New is the subject specialist librarian for the Department of English and works closely with this department to co-teach EN 3414: Critical Writing and Research in Literary Studies. In this class, New is responsible for teaching and working with the students to develop their research skills while also providing them with technical skills that are important for their field of study. This includes in-depth instruction in using "traditional" library resources, like databases, but it also includes archival research and developing a digital exhibit to teach archival analysis. It is in this digital exhibit project where we employ scaffolded learning with the students through project-based learning. Project-based learning is the teaching method that engages students through projects that use driving questions, collaboration amongst peers, and scaffolded activities to develop a real-world product (Brundiers & Wiek, 2013; Krajcik & Shin, 2014).

To help undergraduate students better understand the technical concepts involved in creating a digital exhibit, New and Geiger worked together to build on preexisting skills, both those learned formally and those learned informally. Through different hands-on activities and discussions, using the scaffolding method, the students were introduced to the technical skills needed for creating a digital exhibit. It is important to note that it is not just the students that are benefiting from this but also the instructors as they are challenged in their own thinking (Winstone & Millward, 2012).

Geiger developed an activity to help the students understand how digitizing an item for preservation differs from taking its picture. This activity employed several different objects, including a lacquered painting and a glass sphere, with the students instructed to take an "accurate picture" of the objects. The students' initial pictures were covered in glares or 'hotspots' from the overhead lights, which prompted a discussion on whether they were "accurate". Through trial and error, including moving the objects around and adjusting the lighting in the room, the students worked together to reduce the hotspots. Following the activity, Geiger explained that while what they took was a good picture of the item, it was not the same as digitizing the item for preservation, as the default file type on their phones was a lossy or compressed type. Uncompressed file types are required for digital preservation. They also discussed the color differences in each picture and talked about white balance and ISO sensitivity. For the final portion of the assignment, the student had to figure out how to adjust the settings in their phone to get to an uncompressed file type and take a picture of the item with colors that were as close as possible to the original. They then compared the pictures taken using lossy file formats with those captured as RAW images. This process allowed the students to get an idea of how taking a picture of an object can be easily confused with digitizing it if you do not know all the steps in the process. This also translates to them learning that preparing to gather data is just as important as gathering the data itself.

The next major component of the digital exhibit was to create metadata for the objects the students had digitized. Most had never heard of the term "metadata" before, and while Geiger did explain what metadata meant, the students did not immediately understand the concept. To better explain it, Geiger then employed real world examples from resources students interacted with. This included using the online library catalog to show the record for a book and explaining that this is the book's metadata. This helped, but students were still unsure about how to implement the technical or objective style for their own items, as was evident from most of the first metadata drafts, especially in the Description and Subject Headings fields, as they leaned more towards literary analysis. To help them understand how metadata creation differed from literary analysis, New and Geiger had the students recall the 5Ws (Who, What, Where, When, Why). While this is a common educational tool in K–12, it is often overlooked in later stages of education due to its simplistic nature. In concert with the 5Ws, New and Geiger incorporated accessibility principles into the students' education. At MSU, all descriptions are ADA (Americans with Disabilities Act)-compliant, meaning that even if someone cannot access the item itself, the information in the metadata is enough for them to know what the item is and is about. To help students fully understand ADA accessibility, New showed them an example of descriptive audio and captions. While most of the students had seen and often used captions, almost none of them had ever used or heard descriptive audio before. This was the best example, as they were able to understand how it provided the same service as captions, but for those with limited vision. The 5Ws and the ADA exercises led to excellent metadata records that were factual and descriptive. This refocused approach helped students understand that what they were trying to create was not a literary analysis like an essay, but rather a set of descriptions based on observations, similar to what they might have produced in science classes.

Graduate Students

As aptly put by Swygart–Hobaugh (2018): "[graduate students are] dropped into an unfamiliar academic wilderness with little to no survival skills." This is certainly true for the diverse population of graduate students at Mississippi State University. As of Fall 2024, of a little over 4,000 graduate students, 16% are international, 32% are out-of-state, and 52% are in-state (Office of Institutional Research and Effectiveness, 2025). The students come in with a wide range of previous experience in conducting their own research projects and will face different challenges, which will depend mostly on their advisor's

own experience and expectations and programmatic requirements. While undergraduates arriving at MSU go through orientation sessions to get them situated in the university, including library tours and instruction, graduate students are usually left to fend for themselves, and their actual onboarding is largely dependent on their advisors. It is a wilderness out there indeed, and librarians have a great potential to become a guiding light to these students.

To start filling these gaps in graduate student onboarding, MSU Libraries has created several initiatives to reach out to them. One of these initiatives is a student retreat offered by the Libraries for junior graduate students. The retreat offers sessions focused on improving their academic experience, filling some of the onboarding gaps (e.g., library instruction, how to use reference managers, copyright support for their future publications). The retreat involves faculty from different library units and is usually attended mostly by international students. While we do not have statistics about this, for many of the international population of students, graduate school is their first experience in a US-based higher learning institution, and they face the added challenge of cultural norms and expectations. The retreat thus serves the important function of unveiling this mysterious new world to them.

During the retreat, Siniscalchi teaches a session focused on data management, offering practical tips about institutional resources available to them. The backbone of the session focuses on explaining the different stages of the research lifecycle and contextualizing the graduate students' research within it, thus bridging the gap between the technical terms and their lived experience. The core of this session involves showing concrete actions that students can take throughout the research lifecycle to keep their research data organized, in concert with their writing, literature review, and such. Some of these actions can seem commonplace from the data librarian perspective (e.g., defining a file-naming system and a folder organization system), but to most students, talking about this from a data management perspective brings into focus actions that they are already taking in unsystematized and unorganized ways and makes them think through the material implications of the procedures (or lack thereof) they are currently undertaking. Sprinkling in some real-life anecdotes of catastrophic consequences of bad data management collected by Siniscalchi (some of them from her own graduate school experience) also helps materialize the importance of continuous digital curation practices. This session is also important in introducing students to the concepts of open scholarship and data sharing, which they will face at the end of their graduate term at MSU, as their thesis and dissertations will be eventually shared in our cloud-based institutional repository. Important here is also the role that our partnership with the Scholarly Communication team plays, as copyright instruction is essential for fostering a correct understanding among students of the different embargo and retention policies available for their work.

Independently from this student retreat, Siniscalchi has had success in communicating with graduate student associations (GSAs) from different departments at MSU and offering specific instruction about data management. This allows for the tailoring of that basic data management session, showing resources from their areas (e.g., DNA sequence repositories, USDA-specific resources). This is an indication that there is interest among students in learning about data curation and management, and that they perceive it as beneficial for their academic endeavors. In many of those sessions, students pose questions about how to talk to their advisors about data management, or about how they can improve their lab's management procedure, which indicates a disconnect between generational practices related to data and digital products. This is expected, due to the steep technological changes of the last decades and the differing levels of comfort and familiarity with technological tools of advisors and students. It is not uncommon to see cases of advisors who have been using the same methods for the last 30 years having to mentor students who are using cutting-edge equipment and analysis methods, and with whom they therefore cannot properly communicate. This indicates an unmet need that we, as library professionals, are well positioned to fill, as we are expected to keep up with

technological developments. The next frontier to be explored in this wilderness is to start offering RDM consultations directly to research groups, including advisors and students, so we can more effectively identify the disconnects between different stages of the people cycle.

Faculty & Staff

Working with faculty and staff presents its own unique challenges. We cannot teach digital curation skills through credited courses, but we can focus on being available through individualized consultations and group workshops. These one-on-one or group meetings are guided by the person who reached out to us, and we let them lead the conversation. We work with the faculty and staff on specific solutions but also ask broader questions to get an understanding of their total project workflow, which lets us know if there are other areas we need to touch on. The goal of teaching faculty and staff is to help them with their questions and talk about digital curation in a way that gets them interested in it.

Data consultation requests have increased as more researchers have to comply with U.S. federal regulations about data sharing and public access, as required by the 2022 OSTP Nelson Memorandum. One interesting aspect of these higher-level changes for us is translating the funder's language into explanations that make sense to the researchers and the many ways in which different disciplines think about their data and sharing. While some disciplines have a tradition of sharing data and are faced with almost no change in this last wave of federal regulations (for example, disciplines that work with DNA sequencing are used to sharing their sequences on GenBank), others have a harder time understanding why their data needs to be shared. This shows the important role that librarians have in closing the gap between the people and the research cycle: de-emphasizing jargon and explaining technical issues in a humanized way, taking the researchers' concerns about data ownership into account. In our experience, these are also moments that can make or break extended partnerships between librarians and researchers. When we can clearly explain the requirements that researchers need to fulfill, assuaging their worry about sharing their data, we create a positive experience that tends to extend beyond our team; the researcher starts to classify their experience with the "library" as positive, thus making it more likely that they or their departmental colleagues will come to us when needed.

Something that we frequently see in these consultations is that researchers may use aspects of digital curation even if not technically naming it. Research activities are becoming more and more collaborative, spanning teams across multiple institutions, and research outputs are increasingly becoming born-digital materials (e.g., online surveys, scientific instrument outputs, digital images and videos). This has led to a natural incorporation of cloud-based solutions (e.g., Dropbox, Google Drive) into research projects, sometimes resulting in haphazard workflows. We see two main challenges when working with researchers who have incorporated these cloud-based platforms in their work, and both stem from data permanence.

The first challenge usually involves early-career researchers who have jumped around multiple institutions and are finally settling at MSU. They are usually paying from their own pocket to have storage in one system of their preference and are hesitant to use the institution-provided application (OneDrive in our case), or on the opposite end, there are those that have depended on one institutionally provided system and are now having to switch to our system (e.g., Google Drive to OneDrive), which can pose curatorial difficulties depending on the level of organization of the researcher.

The second challenge we see is that researchers usually do not have a clear idea of what archiving their data entails. Some of these permanence and portability issues could be solved more easily if the researchers were prepared to deposit a well-documented copy of their data in an external archive. However, for many of them, storing the data on a closed cloud-based solution or publishing parts of data as supplemental material in an

article is archiving. It is on this terminology issue that we as librarians can work to close the gap between the research and the people cycle. By walking the researcher through the stages of the research lifecycle, sometimes in a simplified "before, during and after" version, mapping out what they are already doing and showing what is missing, we can instill better archiving practices. The fact that we can in most cases offer our institutional repository as a place for longer-term archiving (five to ten years) removes some of the barriers that researchers could face, such as having to find a repository or not trusting an external entity to hold their research products.

Our main goal when working with faculty is turning these initial contacts into relationships that extend beyond a single grant project. We want to continuously stress the benefits of digital curation, so faculty and staff use it to their advantage. By working with individual staff and faculty, we hope to see them incorporate these skills into all aspects of their work, including teaching, so that undergraduate and graduate students can also learn about digital curation from those in their own field.

Conclusion

By forming a multidisciplinary team focused on digital scholarship, we have been able to establish ongoing collaborations focused on digital curation within the Libraries and across the institution. Our work with different communities at the university, that is, with undergraduates, graduates, and faculty and staff, is grounded in real-world cases, meeting them where they are and deemphasizing technical terms and jargon. Techniques such as scaffolded learning and project-based learning are a way to transmit the technical knowledge of library professionals to a lay audience, offering them practical skills that can be extended throughout their academic life. By doing the constant work of teaching digital data curation skills, librarians are bringing the research lifecycle and the people lifecycle together.

Acknowledgements

We thank our associate deans Derek Marshall and David Nolen for their continued support of our initiatives, Chris Kolb for assistance with travel, the Mississippi State University Office of Research and Economic Development for travel funds awarded to Kathryn C. New, and the Alfred P. Sloan Foundation (G-2023-22331) for travel support to Lauren Geiger and Carolina Siniscalchi. We would also like to acknowledge our various music interests, family members, and emotional support pets for putting up with all of our neurosis.

References

Acker A., Donaldson D. R., Kriesberg A., Thomer A., & Weber, N. (2020). Integrating research and teaching for data curation in iSchools. *Proceedings of the Association for Information Technology* 57(1). doi:10.1002/pra2.285

Association of Public & Land-Grant Universities. (n.d.). *Land-Grant University FAQ.* https://www.aplu.org/about-us/history-of-aplu/what-is-a-land-grant-university/

Billings, E., & Walqui, A. (2021). *Topic brief 4: the zone of proximal development: an affirmative perspective in teaching ELLS and MLs.* New York State Education Department. https://www.nysed.gov/bilingual-ed/topic-brief-4-zone-proximal-development-affirmative-perspective-teaching-ells-and-mls

Brundiers, K., & Wiek, A. (2013). Do we teach what we preach? An international comparison of problem- and project-based learning courses in sustainability. *Sustainability* 5(4), 1725–1746. doi:10.3390/su5041725

Cofield, S. R., Childs, S. T., & Majewski, T. (2024). A survey of how archaeological repositories are managing digital associated records and data: A byte of the reality sandwich. *Advances in Archaeological Practice* 12(1), 20–33. doi:10.1017/aap.2023.29

Digital Curation Centre. (n.d.). *What is digital curation?* https://www.dcc.ac.uk/about/digital-curation

Faniel, I., & Connaway, L. (2018). Librarians' Perspectives on the Factors Influencing Research Data Management Programs. *College & Research Libraries* 79(1), 100–119. doi:10.5860/crl.79.1.100

Fisher, S., & Justwan, F. (2018). Scaffolding assignments and activities for undergraduate research methods, *Journal of Political Science Education* 14*(*1), 63–71. doi:10.1080/15512169.2017.1367301

Garstki, K. (2022). Teaching for data reuse and working toward digital literacy in archaeology. *Advances in Archaeological Practice* 10(2), 177–186. doi:10.1017/aap.2022.3

Harkins, M. J., Rodrigues, D. B., & Orlov, S. (2011). 'Where to start?': Considerations for faculty and librarians in delivering information literacy instruction for graduate students. *Practical academic librarianship: The international journal of the sla academic division* 1(1), 28–50. https://pal-ojs-tamu.tdl.org/pal/article/view/1463

Harvard Medical School. (n.d.). *What is research data management?* https://datamanagement.hms.harvard.edu/about/what-research-data-management

Harvey, R., & Bastian, J. A. (2012). Out of the classroom and into the laboratory: Teaching digital curation virtually and experientially. *IFLA Journal* 38(1), 25–34. doi:10.1177/0340035211435072

Hofelich Mohr, A., Johnston, L. R., & Lindsay, T. A. (2016). The data management village: Collaboration among research support providers in the large academic environment. In L. M. Kellan & K. Thompson (Eds.) *Databrarianship: The Academic Data Librarian in Theory and Practice* (pp. 51–66). Association of College and Research Libraries (ACRL). https://conservancy.umn.edu/items/ab42f5a4-71b3-473f-88de-468a42730c88

Johnston L. R., Curty, R., Braxton, S. M., Carlson, J., Hadley, H., Lafferty–Hess, S., Luong, H., Petters, J. L., & Kozlowski, W. A. (2024) Understanding the value of curation: A survey of US data repository curation practices and perceptions. *PLOS ONE* 19(6). doi:10.1371/journal.pone.0301171

Krajcik, J. S., & Shin, N. (2014). Project-based learning. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (2nd ed., pp. 275–297). doi:10.1017/CBO9781139519526.018

Levine, E., & Krtalic, M. (2016). Libraries in the digital age: The emerging discipline of digital curation. *Information Today* 33(7).

Matusiak, K. K., & Sposito, F. A. (2017). Types of research data management services: An international perspective. *Proceedings of the Association for Information Science and Technology* 54(1), 754–756. doi:10.1002/pra2.2017.14505401144

Mississippi State University. (2023). *Strategic Plan 2023–2028.* https://www.msstate.edu/transformation/strategic-plan

Mississippi State University. (2024). *Quality Enhancement Program*. https://www.qep.msstate.edu/

Montana State University. (n.d.). *Research Alliance*. https://www.montana.edu/research-alliance/

Nelson, A. (2022). *Ensuring Free, Immediate, and Equitable Access to Federally Funded Research.* Office of Science and Technology Policy. https://bidenwhitehouse.archives.gov/wp-content/uploads/2022/08/08-2022-OSTP-Public-Access-Memo.pdf

Office of Institutional Research and Effectiveness. (2025). *Fall 2024 enrollment by class, gender, race and residency.* https://ir.msstate.edu/inc/temp/enroll_class_gender_race_residency_fa24.pdf (Institutional access only).

Office of Research and Economic Development. (n.d.). *The ORED Mission.* https://www.ored.msstate.edu/about/mission

Poole, A. H. (2013). "Curate thyself" and the DigCCurr experts' meeting: Communication, collaboration, and strategy in digital curation education. *D-Lib Magazine* 19(5/6). https://www.dlib.org/dlib/may13/poole/05poole.html

Poole, A. H., & Todd–Diaz, A. (2022), Nailing Jelly to the Wall: Teaching Technology in North American Graduate Archival Education Programs. *Proceedings of the Association for Information Science and Technology* 59(1), 262–275. doi:10.1002/pra2.751

Rzepa, H. S. (2023). Teaching FAIR in computational chemistry: Managing and publishing data using the twin tools of compute portals and repositories. *Canadian Journal of Chemistry* 101(9), 725–733. doi:10.1139/cjc-2022-0255

Rod, A., Zhou, B., & Rousseau, M. (2023). There's no "I" in Research Data Management: Reshaping RDM Services Toward a Collaborative Multi-Stakeholder Model. *Journal of eScience Librarianship* 12(1). https://publishing.escholarship.umassmed.edu/jeslib/article/id/624/

Rosen, A. M. (2018). The best breakfast in town: A comprehensive research methods project. *PS: Political Science & Politics* 51(1), 173–177. doi:10.1017/S1049096517001895

Swygart–Hobaugh, M. (2018). Data and graduate students: Less naked and less afraid, or giving graduate students the clothes and confidence for data success. In C. Renfro & C. Stiles (Eds.), *Transforming Libraries to Serve Graduate Students* (pp. 281–300). Association of College and Research Libraries (ACRL). https://scholarworks.gsu.edu/items/011ec433-04fa-4ac9-8085-63f51190dd9c

Vacca, J. S. (2008). Using scaffolding techniques to teach a social studies lesson about Buddha to sixth graders. *Journal of Adolescent & Adult Literacy* 51(8), 652–658. doi:10.1598/JAAL.51.8.4

Winn, S. (1995). Learning by doing: Teaching research methods through student participation in a commissioned research project. *Studies in Higher Education* 20(2), 203–214. doi:10.1080/03075079512331381703

Winstone, N., & Millward, L. (2012). The value of peers and support from scaffolding: Applying constructivist principles to the teaching of psychology. *Psychology Teaching Review* 18(2), 59–67. https://eric.ed.gov/?id=EJ991410

Yang, S. (2016), Topical scopes of digital and data curation curricula. *Proceedings of the Association for Information Technology* 52(1), 1–4. doi:10.1002/pra2.2015.1450520100128

Yu, H. H. (2017), The role of academic libraries in research data service (RDS) provision: Opportunities and challenges. *The Electronic Library* 35(4), 783–797. doi:10.1108/EL-10-2016-0233

Zhou, X., Xu, Z., Kogut, A. (2023). Research data management needs assessment for social sciences graduate students: A mixed methods study. *PLOS ONE* 18*(*2). doi:10.1371/journal.pone.0282152