



# LAURA BUSH 21<sup>st</sup> CENTURY LIBRARIAN PROGRAM

Sample Application RE-259000-OLS-25  
Project Category: Community-Centered Implementation

University of Mississippi (University of Mississippi Libraries)

Amount awarded by IMLS: \$74,564

The University of Mississippi will provide professional development opportunities for rural academic librarians to learn coding and data science skills through Library Carpentry curricula. Academic librarians employed in rural institutions are often at a disadvantage in participating in professional development, such as coding and data science workshops, due to limited funds and challenges with attracting instructors to rural locations. This community-centered implementation project focuses on the needs of rural academic librarians in Mississippi, Louisiana, Arkansas, Alabama, and Tennessee by offering Library Carpentry workshops and building a network of Carpentries-certified instructors for the southeastern United States who can provide professional development opportunities for librarians regardless of institutional funding and geography.

Attached are the following components excerpted from the original application.

- Narrative
- Schedule of completion

When preparing an application for the next deadline, be sure to follow the instructions in the most recent Notice of Funding Opportunity for the grant program to which you are applying.

## Introduction

The University of Mississippi Libraries is seeking \$74,564 in funding from the Institute of Museum and Library Services' Laura Bush 21st Century Librarian Program for a community-centered implementation project that will provide professional development opportunities for rural academic librarians to learn coding and data science skills through Library Carpentry curricula. This project is intended to support the Laura Bush 21st Century Librarian Program's objective of developing training programs that enable the library and archival workforce to meet the needs of their communities (Goal 2, Objective 2.1). Academic librarians employed in rural higher education institutions are often at a disadvantage in participating in professional development, such as Carpentries workshops, due to limited funds which are needed to host events and due to difficulties with bringing instructors to rural locations. This community-centered implementation project focuses on the needs of rural academic librarians in Mississippi, Louisiana, Alabama, Arkansas, and Tennessee by offering Library Carpentry workshops at underresourced institutions and by building a network of Carpentries-certified instructors for the southeastern United States who can provide continuing professional development opportunities for librarians regardless of institutional funding and geography.

## Project Justification

Learning to code can enhance the skills and capacity of librarians in a variety of roles, including those at academic institutions. However, librarians often receive limited training on coding and data science and professional development opportunities can be scarce, especially for those working at rural, less-resourced institutions. As academic libraries continue to evolve and expand in their role, library workers face a constant need to adapt to an increasingly digital landscape. As libraries shift toward digital-first services, staff must navigate complex systems, manage vast digital collections, and adapt to emerging technologies. The rapid pace of technological change often outstrips traditional library training, leaving gaps in technical expertise.

### *Technology & Coding Skills for Librarians*

Coding proficiency can help library workers make better use of existing tools, create new tools, automate repetitive tasks, and develop more efficient workflows. However, without explicit instruction or specific examples it can be challenging for new coders to see how what they're learning can apply to their own library projects and workflows. The Code4Lib Journal (<https://journal.code4lib.org/>), whose earliest issue dates back to 2007, contains numerous and varied examples of code-based projects being used to enhance the work of libraries and library professionals. A few recent examples highlight the ways in which library workers make use of these tools. Collins and colleagues (2023) describe how the Acquisitions & Discovery staff at North Carolina State University uses OpenRefine, regular expressions, and lightweight Python scripts to integrate digital systems, automate tasks, clean up data, and batch process MARC records, with the majority of respondents using these skills as a daily or weekly part of their workflows. Moon-Chung (2023) describes another use of coding in library contexts, using Python scripts to standardize inconsistent or incomplete journal title information from interlibrary loan data in order to improve the data that their library uses to evaluate journal subscriptions.

Zhou (2023) outlines how Colorado State University Libraries used R and Python scripts to move content across platforms and automate labor-intensive and time-consuming processes like resizing images, matching transcripts to scans, building file structures, and renaming files. There are myriad examples of how relatively simple code-based solutions can automate or improve important but time-consuming and labor-intensive tasks, relieving some of the pressure on often-overworked library workers without adding additional cost.

At our own institution, our library workers regularly employ coding skills in our work. Our institutional repository team scrapes our university's webpages for preservation. Taking inspiration from an ongoing project at the University of Alabama (Clark, 2024), we've recently begun another webscraping project to identify open-access articles published by researchers at our institution and add them to our institutional repository. Our digital archives are also hosted on our institutional repository, and for the last five years we've been experimenting with automating parts of the necessary but time-consuming and labor-intensive process of audiovisual transcription using automatic speech recognition (ASR) packages in order to make our online collections more findable and accessible (see Norris-Davidson & Emanuel, 2023). Our data services team uses coding skills to evaluate our libraries' collections and circulation data, online chat service interactions, and instructional data from library workshops. We use application programming interfaces (APIs) to connect to government and vendor databases and collect publication and citation information about authors from our university. A public-facing example of this work is a digital humanities project led by two of our librarians which highlights an important collection of letters housed in our university's archives by digitally mapping the letters based on the senders' addresses. This information is displayed on an interactive map combined with data about the sentiment of the letters and historical demographic information, showcasing an important historical collection in a new light (Clemons & Norris-Davidson, 2023).

We also employ our coding skills on behalf of the researchers we work with, including developing a custom script and interface for our School of Pharmacy to help them keep up with their faculty publications (see Watson & Young, 2024). Throughout the year we conduct workshops, workshop series, and other training events on topics such as accessing and using US Census microdata, learning to code in R and Python, mapping data using geographic information software (GIS), and conducting text analysis. Many of our training events were inspired by or born out of our explorations into these technologies for our own research and workflows, and they have become some of our library's most popular events.

### *Librarians as Technology Trainers*

While knowing how to code is a useful skill for librarians to use themselves, academic libraries are also well-positioned to teach those skills to students and researchers at their institutions. Kang and Sinn (2024) conducted a review of 43 academic libraries from some of the largest colleges and universities in the United States, focusing on their library workshop offerings. 41 of those libraries offered technology education sessions. These sessions covered a wide range of topics, including instruction on specific software tools, digital humanities, data visualization, statistical analysis, GIS, and more. They found that "American academic libraries play an important role in educating their patrons a wide range of technology for their academic

success in technology-mediated learning and research environments” (Kang & Sinn, 2024, abstract). Python was the tool most frequently taught across all workshops, followed by R. These two open-source programming languages are used in many different contexts and therefore meet the needs of students and faculty across a wide range of disciplines.

While academic library workers are the target audience for this project, we see students and researchers at their institutions as long-term beneficiaries. As Kang and Sinn (2024, conclusion) note, “the academic library... plays an important role as an educator” in addition to providing space, resource, and services. As library workers develop their own skills in order to automate and streamline their workflows and improve the services offered through their libraries, opportunities for engagement and education through library workshops and other events becomes possible. In this way, our project functions as a type of train-the-trainer model, developing technology and coding skills in library workers who can then go on to train their peers and patrons. Train-the-trainer models have been used for decades as scalable, cost-effective methods of disseminating skills and knowledge. To this end, one of the goals of our project involves recruiting participating library workers who want to work towards becoming coding instructors for their community and helping them achieve instructor certification (see *Project Work Plan*).

### *Challenges for Professional Development in Rural Academic Libraries*

Despite evidence of the many benefits of library workers developing coding and data science skills, accessing opportunities to develop these skills can be a challenge, especially for librarians in rural academic institutions. Continuing professional development is a necessary component of the essential and continuously evolving work of librarianship, yet not all librarians have equitable access to professional development opportunities.

While there is abundant research about the challenges that rural public librarians face, little attention has been paid to rural academic librarians, particularly with regard to their need for continuing professional training and development. Kendrick and colleagues’ 2013 study on small and rural academic librarians is one of the few that focus on this population. This study suggests that academic librarians at small and rural institutions are often isolated from their professional peers; almost one in five were the only librarian at their institution, while one in three worked in a library with only two or three librarians. They listed a number of different priorities for professional development and training, but considered technology training to be their most important category of professional development.

While the vast majority (93%) of rural academic librarians reported attending online professional development, they still highlighted funding and travel distance as the top two barriers for accessing continuing professional development, suggesting a desire for – and major barriers to – accessing in-person professional development. Online trainings can be especially isolating for already-isolated professionals, such as solo librarians (see Kendrick et al., 2013, pp. 59-60), as peer interaction and opportunities for networking are an important part of successful professional development. Holding trainings in-person allows library workers to interact and network more easily, which is a major reason why we have chosen to host in-

person training events as part of this project. However, in-person events are not without their own challenges.

One organization that we volunteer for, The Carpentries, focuses on teaching fundamental coding and data science skills to librarians and other researchers. The Carpentries depends on a community of volunteer instructors to lead their workshops. However, traveling to a rural institution for these trainings can be a challenge. When our mid-sized flagship institution in rural Mississippi first sought to host a Carpentries workshop, we struggled to find instructors who could donate enough of their time to travel to the University when our closest airport is 75 miles away and in another state. Thanks to a grant through our Institute for Data Science, we were able to sponsor the cost of travel and lodging for our two volunteer instructors, but the multiple days of their time that they donated in order to travel and stay with us are not something that all instructors can manage. Working through our own difficulties made us start thinking about the many smaller and more rural institutions throughout the southeastern United States who are just as much in need of training but may lack the resources to bring instructors to their own campuses.

To resolve future challenges hosting Carpentries workshops at our institution, the University of Mississippi Libraries is now home to four Carpentries instructors, all of whom are library faculty working within computational, science, and/or data-heavy fields. Our implementation project will build upon the success of The Carpentries and their existing model while specifically targeting academic libraries in the rural southeastern United States.

### *Library Carpentry*

The Carpentries, a nonprofit organization that teaches coding and data science skills to researchers, has three lesson programs under its organizational umbrella. Software Carpentry, established in 1998, “was founded with the mission of teaching lab skills for research computing” (The Carpentries, n.d.). Data Carpentry and Library Carpentry were later established in 2014. Library Carpentry’s mission is “to empower people working in library- and information-related roles to use software and data in their own work and to become advocates for and train others in efficient, effective and reproducible data and software practices” (Library Carpentry, n.d. -a) and focuses on library and information science professionals with little to no coding experience.

Library Carpentry lessons are collected into a core curriculum and an extended curriculum. The lessons are developed, maintained, and refined by a volunteer community of instructors, lesson developers, and maintainers and are freely and openly available under a Creative Commons attribution license. The core curriculum consists of five lessons: Tidy Data, Introduction to Working with Data (Regular Expressions), The UNIX Shell, OpenRefine, and Introduction to Git (Library Carpentry, n.d. -b). A typical Carpentries-based training covers each of these core lessons and may also include additional lessons from the extended curriculum. The extended curriculum covers a number of additional topics including Python, R, SQL, MarcEdit, and more. While each of the core curriculum lessons is included in a Carpentries-

based training, the lessons in the extended curriculum are optional and supplementary, making each workshop customizable in order to suit learners' needs.

## **Project Work Plan**

We plan for this project to take two years to complete. Phase I activities for this project include identifying partners as well as organizing and running multi-day in-person training sessions for librarians at academic institutions in Mississippi, Alabama, Arkansas, Tennessee, and Louisiana. Phase II activities include the implementation of our train-the-trainer model and the establishment of a regional network of Carpentries instructors in the southeastern United States. Evaluation activities that assess the effectiveness and success of the project will be ongoing throughout both phases.

### *Phase I*

The bulk of the Phase I activities are made up of planning and implementing Carpentries trainings at institutions in the southeastern United States. These trainings will use the Library Carpentry core curriculum supplemented with lessons from the extended curriculum (see *Background on Library Carpentry*). The UM Libraries Carpentries team has already been in contact with possible partners, including the Carpentries central organization; LOUIS, The Louisiana Library Network (see supporting documents for letter of support); The Southeastern Library Association (see supporting documents for letter of support); and the Association of Southeastern Research Libraries. By sending recruitment surveys, partnering with these networks, disseminating information through our project website, and utilizing established listservs and social media pages, we aim to identify rural, underserved, or underresourced academic institutions across the southeast who do not already have certified Carpentries instructors as part of their faculty or staff and whose librarians could benefit most from participating. We aim to recruit one to three of these institutions per state to partner with as host institutions for a minimum of eight and a maximum of twelve sites. These sites will serve as the location for in-person instruction for participating library workers. We anticipate having commitments from at least half of these sites by the end of 2025, with the remaining sites secured in the early spring of 2026.

Once host institutions have been identified, the UM Libraries Carpentries team will work with the host institutions to schedule Library Carpentry workshops and travel to teach the two-day Library Carpentry curriculum. Hosting institutions will be responsible for the logistical aspects of the workshops (e.g. room reservations, catering) and internal advertising and recruitment while project personnel will be responsible for arranging their own travel, registering the event on the Carpentries website, building the workshop websites, and teaching the Library Carpentry curriculum. The project team will advertise and recruit library workers at nearby institutions for each event through partner networks, listservs, and professional and social media channels. These events will take place throughout the 2025-2026 and 2026-2027 academic years, as well as during the summer of 2026.

Carpentries trainings are usually two-day events with 7-8 hours of instruction each day. This typically includes two short breaks and one longer lunch break. The Carpentries uses participatory live coding (Wilson, 2016) as its primary method of instruction alongside a variety

of formative assessments to evaluate the progress of learners over the course of instruction. Participatory live coding involves the instructor working through the lesson by typing code in real-time, narrating as they go and involving learners by asking questions and providing opportunities for practice during each segment of the lesson.

Carpentries events are always co-taught by two instructors, at least one of whom has been certified through the Carpentries instructor training process. While one instructor teaches the group, the other instructor and a number of helpers recruited from the hosting institution circulate throughout the group to answer questions and help participants handle errors in their code. Carpentries-style instruction is predicated on the belief in learner autonomy, the idea that errors should be treated as learning experiences, and the idea that learners' motivation and management of their cognitive load always takes priority over the speed of instruction. Pre- and post-assessments provide feedback to both the instructors and the Carpentries organization with regard to the effectiveness of the event.

At each event, we aim to recruit one to two participants as volunteers who wish to become certified Carpentries instructors and who will go on to provide local and regional trainings themselves. Becoming a certified Carpentries instructor involves several steps, including online training, community engagement (including activities such as being a helper at a Carpentries event) and a live teaching demonstration. We will sponsor the costs of volunteers' instructor training (\$1,500 per person), provided that they agree to teach a Carpentries workshop for their community within six months of becoming a certified instructor. Monthly check-ins with volunteers will help us track their progress and provide a venue for volunteers to seek guidance on the process. We aim to have all volunteer instructors complete their training by spring 2027.

## *Phase II*

Starting in the second year of the project, we will work with our sponsored instructors as they organize their local events. We will provide logistical guidance, including our own checklists, workflows, and advice that we have developed in the course of hosting our own Carpentries events, as well as instructional guidance and mentorship for new instructors and help in finding another instructor to partner with. Instructors will be responsible for identifying the Carpentries curriculum that they wish to teach as well as organizing and teaching their event. Part of our project evaluation includes gathering feedback from the instructors about successes and challenges from their event, which we will use to adjust our own guidance as we continue working with instructors. Our goal is to have all new instructors teach at a community event at least once by fall 2027.

Carpentries lessons and curricula are developed by the Carpentries community. Volunteer lesson developers review and edit existing lessons, and as write new lessons as technology develops and needs change. In order to deepen our involvement in the Carpentries community and share our lessons learned from this project with a wider audience, two of our key personnel will complete the Carpentries' lesson development training in order to become part of the Carpentries lesson development community.

We will also establish a formal a Carpentries regional subcommunity for the southeastern United States starting in spring 2026. Carpentries regional subcommunities help support instructors through monthly calls, virtual training sessions, and by connecting instructors on digital channels such as Slack. These communities exist for a number of regions within the United States and across the globe. By establishing a regional subcommunity with both new and veteran instructors in the southeast, we aim to ensure that instructors in our region can access ongoing training, peer support, and find other instructors in their area to partner with for teaching. We will hold monthly video calls with the community group where members can discuss ongoing projects, challenges that they face and potential solutions, and share practical applications and code-based solutions. These video calls function as a form of peer-to-peer learning and are an especially important way to connect rural library workers who might otherwise be isolated from their professional peers. Once the group is established, we aim to identify and solicit future funding to allow the group to hold an annual in-person meeting and networking event. We will continue to collect evaluation data and feedback from workshops and sponsored instructors, and monitor the activity of the regional subcommunity to evaluate the success of the project as described in the performance measurement plan.

#### *Key Personnel*

Shelby Watson, Assistant Professor of Scholar Support and Data Services, will serve as the principal investigator. Dr. Watson's background is in educational research and professional development; she has previously designed and led professional development activities and research on these activities while at the University of Mississippi Center for Mathematics & Science Education, including projects funded by the Library of Congress. Her responsibilities will include managing and evaluating project activities and funds, and leading regular planning and evaluation meetings for the project. She will work with Dr. Savannah Kelly, Associate Head and Associate Professor of Scholar Support and Data Services, and Harley Rogers, Science Librarian and Assistant Professor, on grant administration activities, monitoring the regional subcommunity and leading monthly calls, and, as three of UM's certified Carpentries instructors, teaching the Library Carpentry lessons.

Elizabeth Batte, Outreach and Strategic Initiatives Librarian and Assistant Professor will coordinate with state and regional library networks and host institutions to organize and advertise the workshops. Ms. Batte is currently working towards her Carpentries instructor certification and will join the UM Libraries Carpentries team upon completion.

#### **Project Evaluation**

Evaluation of this project will be conducted through a combination of quantitative and qualitative measures to assess its impact on participating institutions, library workers, and the development of a sustainable regional Carpentries subcommunity. This includes key metrics such as the number of institutions and librarians participating in training sessions and related demographics, the number of volunteers who complete Carpentries instructor certification, and the number of locally organized workshops held by newly certified instructors. Pre- and post-workshop surveys will be administered to participants in order to gauge skill development, confidence with regards to applying Library Carpentry concepts, and usefulness of the training.

Additionally, we will collect feedback from host institutions to assess the logistical and institutional benefits and challenges of hosting these workshops.

In the second phase, evaluation efforts will focus on measuring the sustainability and impact of the regional Carpentries subcommunity. We will track participation in subcommunity activities, including attendance at monthly calls, engagement on digital platforms, and the number of workshops organized by newly certified instructors. Follow-up surveys with sponsored instructors and their institutions will help assess the extent to which trained librarians are implementing Carpentries lessons in their libraries and whether the initiative has led to increased collaboration among regional institutions. We will also conduct interviews with key stakeholders to identify challenges and opportunities for sustaining and expanding the program beyond the grant period. This approach will ensure that we not only measure the immediate impact of training workshops but also the long-term goal of building capacity for coding and data science instruction in libraries across the southeastern United States.

## **Project Results**

The two major goals of this project are to upskill library workers at institutions with limited access to professional development, and to build a network of academic librarians across the rural southeastern United States who can provide ongoing professional development to their peers and patrons at their institutions. Much in the same way that teacher shortages in rural areas are being combated through grow-your-own teacher preparation programs, we aim to combat the shortage of professional development opportunities for rural librarians and the difficulty of bringing in non-local instructors by growing a community of Carpentries-trained librarians in the areas that need them most. By evaluating and disseminating the outcomes of our project through our existing Carpentries, academic, and professional networks, we aim to provide an example that other instructors can use to build subcommunities in their areas. By sponsoring the cost of instructor training for interested librarians and supporting them as they host their own workshops for peers and patrons, we will work towards increasing library workers' ability to apply these skills to their own projects and workflows and share their knowledge with others.

The primary intended results of this project are to expand coding and data science training for librarians in underserved academic institutions across Mississippi, Alabama, Arkansas, Tennessee, and Louisiana and to establish a sustainable network of certified Carpentries instructors in the southeastern United States. By the end of the two-year project, we aim to have hosting training events at 8-12 institutions, sponsored up to 20 new Carpentries instructors, and facilitated the organization of locally hosted workshops by each of the newly certified instructors. Additionally, we seek to establish a regional Carpentries subcommunity that will provide ongoing peer support and continuing professional development opportunities for instructors and other librarians at their institutions. These outcomes will enhance the capacity of academic libraries in the region to support 21<sup>st</sup> century research and analysis skills, benefiting both librarians and the broader academic community.

To ensure that the impact of this project reaches beyond the participating institutions, we will share our findings and lessons learned through multiple channels. We will document our

process, challenges, and successes in publications and presentations aimed at other academic libraries that are interested in developing regional connections. Presentations at academic library conferences, such as the ACRL annual conference, will highlight best practices for developing a sustainable training network. After completing lesson development training and joining the existing community of Carpentries lesson developers, we will apply the lessons learned over the course of our repeated workshops towards refining and improving the existing Library Carpentry curriculum.

A key focus of this project is ensuring that the network of trained librarians and Carpentries instructors remains active and self-sustaining beyond the grant period. By requiring sponsored instructors to host workshops at their institutions, we aim to encourage a culture of ongoing training and mentorship within participating libraries. The formation of a regional Carpentries subcommunity will further support sustainability by providing a structured network for peer-to-peer learning, regular engagement, and the sharing of resources. Additionally, we will work with institutional partners to explore long-term funding strategies, such as securing support for continued trainings and leveraging regional library networks such as ASERL to facilitate future workshops. Through these efforts, we aim to create a lasting infrastructure that will continue to provide continuing professional development opportunities for rural academic librarians in the southeastern United States in the years to come.

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## Schedule of Completion

| Year 1<br>Project Activities                    | 2025 |      |     |     |     | 2026 |     |       |       |     |      |      |
|-------------------------------------------------|------|------|-----|-----|-----|------|-----|-------|-------|-----|------|------|
|                                                 | Aug  | Sept | Oct | Nov | Dec | Jan  | Feb | March | April | May | June | July |
| Identify host sites for workshops               |      |      |     |     |     |      |     |       |       |     |      |      |
| Build project website                           |      |      |     |     |     |      |     |       |       |     |      |      |
| Recruit participants for ongoing workshops      |      |      |     |     |     |      |     |       |       |     |      |      |
| Host LC workshops                               |      |      |     |     |     |      |     |       |       |     |      |      |
| Recruit volunteers for instructor training      |      |      |     |     |     |      |     |       |       |     |      |      |
| Monthly check-ins with new instructors          |      |      |     |     |     |      |     |       |       |     |      |      |
| Assist new instructors with workshop planning   |      |      |     |     |     |      |     |       |       |     |      |      |
| Key personnel activity & evaluation meetings    |      |      |     |     |     |      |     |       |       |     |      |      |
| Create infrastructure for regional subcommunity |      |      |     |     |     |      |     |       |       |     |      |      |
| Monthly regional subcommunity calls             |      |      |     |     |     |      |     |       |       |     |      |      |

Color Key:

|  |                                        |
|--|----------------------------------------|
|  | LC Workshop Logistics & Implementation |
|  | Participant & Volunteer Recruitment    |
|  | Key Personnel Tasks                    |
|  | Regional Subcommunity Development      |

| Year 2<br>Project Activities                  | 2026 |      |     | 2027 |     |     |       |       |     |      |      |
|-----------------------------------------------|------|------|-----|------|-----|-----|-------|-------|-----|------|------|
|                                               | Aug  | Sept | Nov | Dec  | Jan | Feb | March | April | May | June | July |
| Recruit participants for ongoing workshops    |      |      |     |      |     |     |       |       |     |      |      |
| Host LC workshops                             |      |      |     |      |     |     |       |       |     |      |      |
| Recruit volunteers for instructor training    |      |      |     |      |     |     |       |       |     |      |      |
| Monthly check-ins with new instructors        |      |      |     |      |     |     |       |       |     |      |      |
| Assist new instructors with workshop planning |      |      |     |      |     |     |       |       |     |      |      |
| Key personnel activity & evaluation meetings  |      |      |     |      |     |     |       |       |     |      |      |
| Lesson development training                   |      |      |     |      |     |     |       |       |     |      |      |
| Monthly regional subcommunity calls           |      |      |     |      |     |     |       |       |     |      |      |
| Dissemination of work                         |      |      |     |      |     |     |       |       |     |      |      |
| Final report                                  |      |      |     |      |     |     |       |       |     |      |      |

Color Key:

|  |                                        |
|--|----------------------------------------|
|  | LC Workshop Logistics & Implementation |
|  | Participant & Volunteer Recruitment    |
|  | Key Personnel Tasks                    |
|  | Regional Subcommunity Development      |