

Student Data Literacy Needs in Community Colleges: Perceptions of Librarians, Students, and Faculty

The University of North Texas (UNT) Department of Information Science seeks \$118,996 from the **IMLS Laura Bush 21st Century Librarian Program** for an 18-month **planning project** that aims to explore the need for data literacy in community colleges in United States. The project is intended to examine the current perspectives of community college librarians, faculty, and students regarding data literacy; identify the data literacy competencies needed for community college students; and develop data literacy action plans for community college libraries, which will assist community college librarians in assessing their capacity and creating a roadmap to incorporate data literacy into their existing literacy programs.

Key deliverables of this project include a Best Practices Resource Guide for data literacy teaching, learning, and assessment; a publicly accessible white paper that synthesizes findings of our focus groups/survey; and a project website that serves as a clearinghouse for project information and resources. This project supports the Laura Bush 21st Century Librarian Program goals and objectives, specifically Objective 3.4: Support training of the library and archival workforce to advance digital inclusion for the benefit of community members; and Objective 3.2: Create and/or refine training programs that build library and archival workforce skills and expertise in contributing to the well-being of communities. This project is aligned with these objectives because the findings of this project will identify the role and position of community college libraries in facilitating and enhancing the development of student data literacy competencies. The project will also set the foundation for a future project that aims to develop training modules for foundational data skills that can be used and adapted by community college libraries.

I. Project Justification

We live in a data-rich world, and one that continues to grow at exponential rates. There is so much data available to us, but how can we read, understand, and communicate that data? How can we make sense of data and use it? How can we structure and organize data for ease of use? Data literacy is regarded as a critical skill of the 21st century as the range of skills and knowledge needed to handle data is now critical in our personal and professional lives.

The current workforce is more competitive than ever and rapidly evolving. According to the World Economic Forum, we are on the brink of a “Reskilling Revolution.”¹ The new jobs emerging in the global economy will require different skills to work more intimately with intelligent machines, data, and algorithms. Existent jobs not traditionally associated with information technology increasingly require the ability to access, interpret, and produce data sets. The data literacy project survey carried out by data and analytics firm Qlik highlighted the fact that there are tremendous career opportunities for those who work with data: “The volume and variety of data is constantly growing, and the insight it can unlock to allow firms to be more successful is incredible, but you need people who are prepared to engage with data, and to gain an understanding of how to use and interpret it to support decision making no matter what their job role” (Qlik, 2019a). There is indeed a widening gap between the demand for a data-literate workforce and the supply of properly trained individuals with data skills.

This gap is increasingly recognized by universities, with some now prioritizing data skills for students to ensure that they are fully equipped for the future. To help students survive and thrive in this complex job market, data literacy has been recognized as an important learning outcome in higher education. A 2018 National Academies of Sciences, Engineering, and Medicine (NASEM) consensus study report identified ten components of data acumen, including mathematical foundations, computational foundations, data

¹ <https://www.reskillingrevolution2030.org>

management and curation, data description and visualization, etc. The report also asserted a need for all undergraduates to develop the appropriate depth of understanding in each component (NASEM, 2018). The Education Development Center's (EDC) Oceans of Data Institute (ODI)² is one initiative to address the data knowledge gap. Most recently, ODI established partnerships with four two-year colleges through a National Science Foundation (NSF) Advanced Technological Education project titled *Creating Pathways for Big Data Careers*³.

Responding to increased data literacy demands, data librarianship, which is connected to information science, e-science, and data science, has emerged. Many academic libraries have offered research data services to help researchers effectively execute the data stewardship workflow. Such services, however, primarily address the needs of faculty and graduate students and mainly involve data management support. While enhancing the data literacy competency of students can improve their academic performance and provide a sound basis for their professional development as it adapts to the big data age, a very small number of studies have investigated the current status of data literacy education for undergraduate students (e.g., Bracke & Fosmire, 2015; Burrell, Mann, & Neville, 2020; López-Meneses, et al., 2020).

In particular, there is a dearth of research into two-year programs at the community college (CC) level. CCs function as dynamic institutions serving the competing demands of student aspirations, local employer needs, and the changing economic and industrial conditions of local, state, and regional labor markets. There is considerable pressure on CCs to serve as employment-preparation institutions for diverse populations, including displaced workers, high school dropouts, baccalaureate and higher degree attainers who seek practical training for jobs, and students entering college directly from high school. Students attending CCs are either preparing to transfer to a four-year institution or pursuing vocational, occupational, or technical training to go directly into the workforce. In either case, these students will also need data literacy skills. For instance, entry-level data analyst, database specialist, software developer/trainer, quality assurance specialist, and technical writer positions involve working with data. Even in careers such as horticulture or automotive technology, increasingly large sets of relevant data are available, and employees are expected to know how to make use of it.

The recent growth of data science programs at the undergraduate and graduate level, along with the demand for data professionals in the workforce, has prompted many to think about the role of CCs in building the student's capacity for data literacy and data science. Stakeholders have convened several meetings and produced reports to solidify the foundation for data science education and establish program guidelines for two-year colleges. For instance, the *Two-Year College Data Science Summit*, held in 2018 to produce curriculum guidelines to assist two-year colleges in establishing and maintaining data science programs, concluded two-year colleges are uniquely positioned to help diversify the data science and STEM-related fields (Gould et al., 2018). The same argument was made at the *11th Roundtable on Data Science Postsecondary Education* (Kotz, 2020). Several programs and initiatives have responded to this call. For instance, EDC's new initiative, *Mentoring New Data Pathways in Community College*⁴, is helping faculty in six community colleges design programs to prepare students for data science and analytics careers. Although two-year colleges have challenges in supporting students in their data science programs with a comprehensive approach respectful of both student diversity and local needs, they have an opportunity to effectively instill principles of general data literacy in their broader undergraduate populations. This includes establishing and maintaining a data literacy curriculum for students in all programs, not just those focused on data science.

What roles should CC libraries and librarians play in helping prepare their students for this new data-driven era? It has been argued that CC libraries are recognized as an integral partner in student success through curriculum and student support. Several previous studies have demonstrated that librarian-provided

² <http://oceansofdata.org>

³ <http://oceansofdata.org/projects/creating-pathways-big-data-careers>

⁴ https://www.nsf.gov/awardsearch/showAward?AWD_ID=1902568&HistoricalAwards=false

information literacy intervention contributes to improved student retention and adds value to a student's long-term academic experience; use of library space and services has a positive impact on academic excellence (e.g., Bordignon et al., 2016; Krieb, 2018; Russo, 2016; White & Cheng, 2016). The IMLS-funded project *Community College Libraries & Librarians and Student Success* also confirmed that libraries and librarians contribute to student success by providing access to library resources and services (Lance, Schwarz, & Rodney, 2017). Another IMLS-funded project, *Community College Libraries & Academic Support for Student Success*, concluded that CC libraries, as partners and leaders in ensuring student success, should engage in reinvention beyond traditional roles and leverage their resources, and build new services that will be attractive and relevant to the students (Wolff-Eisenberg & Braddlee, 2018).

Despite such impact on student learning and success, CC libraries have long faced many challenges to adapt to the quickly changing technological landscape; this makes CC librarians' continuing training important, but funding for training is limited. They face challenges in incorporating data literacy into their existing literacy programs. Recent literature recognizes the need for data literacy instructions in undergraduate institutions and explores ways to establish campus-specific data literacy competencies across the curriculum (e.g., Beauchamp & Murray, 2016; Burress, Mann, & Neville, 2020). Although more CCs have addressed supporting and promoting campus-wide data literacy programs in their institutional strategic planning goals^{5 6}, few have examined how CC libraries and CC librarians can better help students improve their level of data literacy. How to address student data literacy needs, foster data literacy, and situate data literacy within a broader information literacy context in CCs remain challenging questions.

As such, this project is intended to examine the current data literacy perspectives of CC librarians, faculty, and students; identify the data literacy competencies needed for CC students; and develop data literacy action plans for CC libraries.

II. Project Work Plan

Project Design

The proposed project would accomplish the following project goals:

1. Examine perceptions of CC students, faculty, and librarians with respect to CC student data literacy needs;
2. Identify foundational data literacy skills and knowledge expected and assumed to be developed in CC students; and
3. Develop data literacy action plans for CC libraries that prioritize their community needs, engage key local partners, and empower CC librarians to foster and promote data literacy on their campus.

The major project activities include 1) conducting a comprehensive environmental scan on existing data literacy resources/services/programs and data literacy competency frameworks, which will produce a Best Practices Resource Guide for data literacy teaching, learning, and assessment that can be implemented in CC library practice; 2) surveying current CC students and recent CC graduates to obtain their opinion regarding the need and importance of student data literacy; 3) conducting focus groups with CC faculty to gauge faculty's conception of data literacy, their response to core data literacy competencies expected for CC students, and beliefs about how data literacy is to be incorporated into the curriculum; and 4) conducting focus groups with CC librarians to understand their views of data literacy needs in the CC context, attitudes toward the role of CC libraries in developing data literacy skills of students, and assess their expertise in relation to data literacy.

⁵ See the Flathead Valley Community College's Strategic Planning Goals and Objectives <https://www.fvcc.edu/about-fvcc/strategic-plan>

⁶ See the Lakeland College's Strategic Planning FY 2019-2022 <https://www.lakelandcollege.edu/wp-content/uploads/2021/05/Strategic-Plan-Bi-Annual-Report-May-2021.pdf>

The research team will use a collaborative research approach, mixed methods, and multi-institutional samples drawn from U.S. CC campuses.

This project builds on and extends the research team’s previous work on data literacy, examining the published literature, and identifying the key aspects of data literacy trends (Kim, Hong, & Evans, 2021; see Supporting doc 2: “Defining data literacy: An empirical study of data literacy dimension”). In addition to this work, the research team has conducted a comparative analysis of data literacy competency frameworks that inform data literacy education and assessment tools. This analysis was conducted to identify a set of common core competencies that apply to our target community (see Supporting doc 3: “A comparative analysis of data literacy competency frameworks”). Such identified competency areas and examples will be utilized as an inquiry framework for developing focus group interviews and survey questions.

The table below shows research methods aligned with the project goals and their expected outcomes.

Project Goals	Methods	Outcome
1. Examine CC students, faculty, and librarians’ perceptions of data literacy	Survey of current CC students and recent graduates; focus group with CC faculty; focus group with CC librarians	A comprehensive report outlining CC students, recent graduates, faculty, and librarians’ conceptions, attitudes, and perceptions of data literacy
2. Identify core data literacy competencies for CC students	Comprehensive environmental scan on data literacy competency framework; survey of CC students and recent graduates; and focus group with CC faculty	A report summarizing the skills and knowledge CC students expect to develop A survey questionnaire that assesses CC students’ self-rating of specific data literacy skills
3. Develop data literacy action plans for CC libraries	Comprehensive environmental scan on existing data literacy resources, services, and programs; focus group with CC librarians	A Best Practices Resource Guide for data literacy teaching, learning, and assessment A series of webinars that discuss key findings of survey/focus groups and presents how to utilize a Best Practices Resource Guide in the CC library

The project will include the following activities. See the attached Schedule of Completion for further explanation and a timeline of activities.

Activity 1: Project Initiation

As soon as funding of the project is announced, student assistants will be interviewed and hired to assist with data collection, analysis, and reporting. Under the PI’s guidance and supervision, student assistants will conduct a comprehensive environmental scan of data literacy. This environmental scan will focus on scholarly papers/presentations, case studies, and existing instructional programs and assessment tools. The information gathered for this environmental scan will be compiled and presented as a Best Practices Resource Guide for data literacy teaching, learning, and assessment. A project website, which will be used to share project activities and milestones, will be created by the student assistant during this time.

The PIs will convene the project advisory board, including scholars and practitioners in relevant fields. The project advisory board members, who are from diverse regions and communities, will offer insights and guidance on the research team’s work at significant milestones of the project. They will provide critical

feedback on data collection and analysis methods and the final action plan draft. In particular, CC library directors/librarians will serve as the points of contact with the student/faculty body studied in this project. The research team will choose CC sites from different regions (e.g., one in Texas, another in California, etc.) for our focus groups with faculty and survey of students. See the Research Team and Advisory Board section of this narrative.

Activity 2: Focus Group with CC Librarians

Focus groups are selected as a need assessment device as they have several potential strengths. One strength lies in the focus group's effective use of small group dynamics that allow the interdependent development of ideas with simultaneous critical evaluation of those ideas by group participants. Through the group process, participants can develop a critical level of intensity and sharing, leading the focus group members to build and expand on each other's ideas and comments. Another strength is that focus groups are valuable for gathering initial data, especially when little information on a specific topic of interest is known. As data literacy is an important yet not widely discussed topic in the CC libraries context, focus groups would potentially provide such an exploratory approach. Last, focus group research has been used in previous studies of information literacy instructional needs and expectations (e.g., Hartmann, 2001; Julien & Given, 2010; Latham & Gross, 2013; Latham, Julien, Gross, & Witte, 2016).

The research team will conduct focus groups with CC librarians at various large and small, urban and rural CC libraries around the country to gain a broad understanding of CC librarians' perspectives on data literacy demands. Focus groups are intended to elicit librarians' views on the current environment and its anticipated impact on CC libraries, the emerging role of CC libraries in CC education and data literacy education, and CC student data literacy needs; their readiness to integrate data literacy into their existing literacy program; and CC libraries and librarians' capacity and capability to address such needs.

After initial consultations with and input from the project advisory board, focus group questions will be developed. They will be framed around the following research questions:

- What are CC librarians' understandings of what data literacy is?
- What are CC librarians' views of the importance of data literacy in CC education?
- Will CC librarians and CC libraries play a significant role in data literacy? If so, in what areas will they concentrate?
- How can CC libraries foster and promote data literacy in the CC campus community?
- What competencies are needed for CC librarians to add data literacy into their existing literacy instruction portfolios?

Focus group participants will be recruited for two types of focus groups – one with library directors and the other with librarians working in literacy instruction. The research team will conduct four to five focus groups with six to eight participants in each group, as three to five focus groups is generally considered reasonable for the early exploration of a new area (Kitzinger, 1994). Participants will be recruited nationally through referral from our project advisory board using a snowball sampling and CC library-related listservs, including the Association of College & Research Libraries' (ACRL) Community and Junior College Libraries Section (CJCLS) listserv.

Given the current circumstances of COVID-19, focus groups will be conducted via a video conferencing service such as Zoom and audio-recorded. Before coming to a focus group meeting, participants will be asked to determine their data persona by taking a short data literacy assessment developed by the Data Literacy

Project (<https://thedataliteracyproject.org/assessment>)⁷. This assessment will help participants expose themselves to data literacy and be used as an opening question of focus group discussion to encourage everyone to participate. Participants in the groups will be encouraged to interact with each other by asking questions, exchanging anecdotes, and commenting on each other's points of view and experiences.

The focus groups will be recorded and transcribed. Then transcripts will be analyzed and coded using a grounded theory approach. Two of the researchers independently will code the transcripts using open coding, in which "concepts are identified, and their properties and dimensions are discovered in the data" (Strauss & Corbin, 1998, p. 101). The two researchers will compare their coding and discuss any differences to resolve them.

Activity 3: Focus Group with CC Faculty

Focus groups with faculty will be conducted to explore how they conceptualize data literacy and how they view student data literacy needs. Specifically, we are interested in examining faculty's conception of data literacy in the context of CC education; their expectations concerning student data literacy skills; attitudes toward the value and importance of data literacy in CC curriculum; and pedagogical practice in teaching data literacy. We will recruit CC faculty from various disciplines and departments to see whether there are disciplinary differences in faculty views and approaches to data literacy.

The following research questions will be explored:

- Are CC faculty familiar with data literacy? How do they define data literacy?
- What are CC faculty's beliefs and attitudes toward incorporating data literacy into the curriculum?
- Are they currently taking any actions to develop student data literacy skills?
- What are some obstacles the faculty faces in developing and implementing data literacy instruction?
- What are the best approaches to data literacy instruction perceived by the faculty?

The research team will conduct three to four focus groups with an anticipated attendance of seven to eight people in each group. Faculty participants will be solicited via emails sent by our project advisory board members, who will encourage the email invitation to be shared with interested faculty members at their institutions. See the Diversity Plan section of this narrative for our plan to recruit participants with diverse demographic and social backgrounds.

Activity 4: Survey of Current CC Students

In this project, the survey will serve as a needs assessment to reveal the conceptions and expectations of data literacy held by current CC students. We will also examine how such conceptions and expectations differ in terms of the student's socioeconomic and demographic characteristics, institutional type, and other factors.

Further, this survey will be developed to measure CC students' self-reported assessment of their current data literacy-related skill levels; the data literacy competency area we identified through our comparative analysis will be used as a baseline for measurement. See Supporting doc 3: "A comparative analysis of data literacy competency frameworks" for core competency areas for data literacy we identified through comparative analysis of data literacy competency frameworks. We anticipate CC libraries could adopt the survey questionnaire developed and administered in our project to assess their students' assessment of specific data literacy skills.

A survey questionnaire will be developed based on the following research questions, reviewed by the project advisory board, and tested for its clarity, consistency, and comprehensibility:

⁷ The responses to this assessment will describe student's comfort level in terms of four data personas reflecting different levels of data literacy: Data Aristocrats, Data Knights, Data Dreamers, and Data Doubters (Qlik, 2019).

- What does it mean to be data literate for CC students?
- Do CC students consider themselves to be data literate?
- What knowledge and skills do CC students see as necessary to become data literate?
- How do CC students think that the knowledge and skills necessary for data literacy are best mastered?
- How do CC students describe themselves in terms of their data literacy competency?
- How do CC students assess their own knowledge and skills regarding data literacy?

IRB approval will be obtained through UNT as the lead institution. An online Qualtrics survey will be administered to reach the largest CC student population possible. With the assistance of the project advisory board members who will contact students, survey participants will be solicited via email through campus listservs. Participation in the survey will be encouraged through incentives.

Once survey data collection is completed, descriptive statistical results will be provided by Qualtrics, which computes means for Likert-style questions and percentages for closed questions. Open-ended questions will be analyzed using the constant comparison method.

Activity 5: Survey of CC Graduates

A similar survey questionnaire will be designed and distributed to CC graduates – i.e., recent CC alumni who have entered the workforce or transferred to a four-year institution. The survey is intended to reveal CC graduates' conceptions and expectations of data literacy. It also aims to understand CC graduates' employer expectations, current workplace data practices, and how CC education could have better prepared them for their eventual workplace. We define recent CC alumni as those who have graduated with an associate degree in the past five years. We will obtain a random sample of recent alumni by working closely with CC's foundation office or alumni association at each institution in our sample.

A survey questionnaire will be developed based on the following research questions:

- What does it mean to be data literate for CC graduates?
- Do CC graduates consider themselves to be data literate?
- What knowledge and skills do CC graduates see as necessary to become data literate?
- What are the current data practices of CC graduates?
- How do recently graduated CC students suggest that their education could have better prepared them to be data literate?

Activity 6: Finalizing and Disseminating Project Deliverables

Activities and emergent findings will be shared on the project website and social media channels frequently used by librarians and educators throughout the project. After data analysis, the research team will create two products which will be disseminated in several ways. First, a Best Practices Resource Guide will provide background and resources on teaching, learning, and assessment of data literacy for CC students. The guide is intended to provide a pragmatic framework for those CC librarians who need or are interested in developing and implementing a data literacy program in their libraries. This guide will include background and resources on teaching, learning, and assessment of data literacy for CC students. This includes, but is not limited to, definitions and an annotated bibliography; assessment rubrics for student data literacy; exemplary data literacy programs and lesson plans; and professional development opportunities for CC librarians and faculty. Second, a white paper that compiles the findings of the focus group interviews and surveys, including implications for research, practice, and training, will be drafted by the research team and distributed to the project advisory board for their input and feedback. The report will also include recommendations and an action plan that addresses what resources and support are needed to guide CC libraries in fostering and promoting data literacy. Also, the survey questionnaire we developed and used in this project to assess CC students' self-rating of

specific data literacy skills will be included in this white paper to be adapted and used in CC libraries as a data literacy assessment tool.

Both the guide and the report will be publicly available and widely shared. The Best Practices Resource Guide will be the basis for an interactive webinar series hosted by the research team and provided free to the public. These will target CC librarians and interested faculty to share ideas and make actionable plans based on our research. We will also apply to present at the conferences these groups attend, focusing on events that provide highly interactive settings, such as the newly designed American Library Association conference, LibLearnX. The white paper report will be widely shared with CC librarians, faculty, and groups with intersecting interests. The report will be sent to college administrators and professionals in industries that typically hire community college graduates.

Project Team

The research team includes the following investigators:

- Dr. Jeonghyun (Annie) Kim, Associate Professor of Information Science at UNT, will serve as a PI of this project. Kim is currently working on the IMLS-funded project *Data Science for 21st Century Library and Information Professions* with Dr. Rorissa. She was a Co-PI on an IMLS-funded project from 2011 to 2015 that built a Graduate Academic Certificate program in Digital Curation and Data Management. Since then, she has directed and coordinated that program at UNT. She has published her research in leading academic journals, including the *Journal of the Association for Information Science and Technology*, *Library & Information Science Research*, and *Journal of Education for Library and Information Science*. She has served as Editor-in-Chief of *The Electronic Library* journal since 2020.
- Co-PI Dr. Lingzi Hong, Assistant Professor of Data Science at UNT, is currently serving as the Director of the Bachelor of Science in Data Science Program. Her research interests fall in the intersection of machine learning, community information studies, and data-driven decision making. She has three years of experience teaching data science introduction courses for undergraduate students and supervising the Data Science practicum. She has published her research in leading academic conferences and journals, including the *iConference*, *Annual Meeting of the Association for Information Science and Technology*, *EPJ Data Science*, and *Library & Information Science Research*. She has been a Co-PI for the UNT-funded project *Comparative Study of Data Literacy Education for College Freshmen in US and China*.
- Co-PI Dr. Sarah Evans, Assistant Professor of Library Science at UNT, is Coordinator for the Children's and Young Adult Librarianship Program and a Co-Director of UNT's Multiple Literacies Lab. In these roles, she uses her background in educational psychology and information science to examine learning across settings. Evans is currently PI on the National Science Foundation-funded project *Diversifying Human-Centered Data Science through the Research and Design of Ethical Games*. Previously, she was a Co-PI on the IMLS-funded project *Preparing Librarians for Data Literacy Leadership*, which focused on the role of librarians as data coaches in schools and public libraries.
- The graduate research assistants (students) with expertise or research focus on literacy, survey research, and qualitative and quantitative data analysis, will be recruited from the diverse pool of Ph.D. and/or Master's students of UNT.

The following practitioners have agreed to serve on our project's advisory board so far; they are currently directing CC libraries and/or engaging in literacy instruction at CC libraries. See Supporting doc 1: "Letters of Support" for these practitioners' relevant career and professional experience.

- Jesús Campos, Dean of Library & Learning Support Services, South Texas College
- Martha López Coleman, Director of Library Services, Thomas W. Cole Library, Wiley College

- Carolyn Norman, Associate Librarian, Mt. San Jacinto College Libraries, Mt. San Jacinto College
- Marissa Saenz, Outreach & Instruction Librarian, Del Mar College Library, Del Mar College
- Yumi Shin, Coordinator, Lamar State College Port Arthur Library, Lamar State College

Also, the following scholars have agreed to serve on our project's advisory board so far. Their research involves literacy education in higher education, student learning assessment, and data science education and workforce development. See Supporting doc 1: "Letters of Support" for these scholars' research experience and expertise.

- Heidi Julian, Professor of Information Science, University at Buffalo Graduate School of Education
- Abebe Rorissa, Professor & Director, School of Information Sciences at University of Tennessee
- Daniella Smith, Professor, Department of Information Science, UNT

III. Diversity Plan

CCs have served many minority, first-generation, low-income, and adult students. According to the American Association of Community Colleges (2021), 29 percent of the nation's CC students are the first in their families to attend college. Twenty percent have disabilities, 15 percent are single parents, 9 percent are non-U.S. citizens, and 5 percent are veterans. Most community college students receive financial aid, which usually requires them to carry a full course load and maintain a certain grade point average, stipulations that can add further pressure to their schoolwork. Nearly 22 percent of the nation's CCs are Minority Serving Institutions (MSIs), which are tasked with educating students-in-need, are critical actors in providing access to higher education for students of color, and provide important pathways to STEM-related education, training, and careers (NASEM, 2019). In this project, all CCs where our project advisory board members are serving are federally designated MSIs⁸. They have been selected for their diverse and broadly inclusive student profiles. They also represent geographic and economic diversity.

Further, the project will seek both focus group and survey participants of all ethnicities, genders, ages, and experiences. We will work with our target CC's Diversity Officers, diversity-focused student organizations and/or groups, who will help recruit faculty and student participants to ensure diversity and inclusion in our project. As staff from underrepresented groups often have higher service loads with no commensurate compensation (Senteio, 2021), we will provide financial support to cover focus group interview time.

IV. Project Results

Response to Current Needs

CC librarians serve CC students, which account for 41% of all undergraduates in the United States. In 2018-2019, 11.8 million students nationwide were enrolled in 1,044 two-year institutions. CCs are a pathway for individual prosperity and community stability. CCs are the choice for many low-income families and students who seek an affordable education. Data literacy is becoming a core information literacy component in the digital era. CCs are now in a critical stage to initiate and expand workforce development programs to address CC student data literacy needs and challenges. The specific skills and competencies needed have been generalized but will require local customization to meet partners' needs, i.e., four-year transfer institutions or workforce. By preparing CC students with basic data literacy skills, this project contributes to addressing the digital gaps individuals may face.

⁸ https://www.minorityhealth.hhs.gov/assets/PDF/2020_Minority_Serving_Institutions.pdf

CC libraries, which “are vital to the community college’s mission of formal education, information literacy, and lifelong learning”⁹, are well-positioned to support data literacy needs and challenges; they must think about adapting their spaces, resources, and services to continue evolving their support for the teaching and learning mission of the CC. In this context, this project reinforces the role CC librarians play in mitigating digital gaps and building community resilience. The project’s outcomes provide practical guidelines for CC librarians to arm students with the skills and knowledge necessary to satisfy the labor market requirements. This will help build community resilience by helping low-income groups thrive and accelerating the improvement of the workforce. It is anticipated that the white paper resulting from our focus groups and survey study will afford CC librarians a more complete and thorough understanding of CC student data literacy needs as well as the potential impact on students’ future development and ways to meet the needs of students and prepare CC students for future study or work. The Best Practices Resource Guide, which offers background and resources on teaching, learning, and assessment of data literacy for CC students, will assist CC librarians in creating a roadmap to address existing and emerging data literacy needs and incorporate data literacy into their literacy programs.

Foundation for Future Projects

Further, this project will help CC libraries/librarians assess their current capacity and develop a sustained approach to improving capacity. How are CC librarians prepared for these new literacy needs? Where are they learning the knowledge and skills necessary to meet such needs effectively? What are existing professional development opportunities and resources available for CC librarians? What new professional development model is needed for CC librarians? In answering these questions, this project will set the foundation for a future project that aims to develop training modules for foundational data skills for teaching and learning for CC librarians.

In addition to the multiple perspectives of impact, the project may also influence LIS research. It raises the research focus on studying the needs of CC students, which has received little attention. Our proposal has strong potential to motivate further LIS studies on data literacy needs, inclusiveness of data literacy education, and pedagogical methods conducted by LIS scholars and CC librarians. The project will enable us to understand the needs of students across socioeconomic and demographic spectrums, which may elicit pedagogical data literacy studies regarding diverse populations.

Distribution and Promotion of Project Deliverables

The project team will ensure the materials resulting from the project – the Best Practices Resource Guide and white paper – will be posted on the project website, social media, and shared with CC librarians, CC libraries, CC administrators and stakeholder organizations, and listservs. They will be licensed CC BY 4.0 to allow for broad reuse and dissemination and deposited to the UNT institutional repository, UNT Scholarly Works (<https://library.unt.edu/scholarly-works>), to ensure long-term access to the materials.

We plan to share our project deliverables to the listservs, including ACRL CJCLS, ACRL SCHOLCOMM (Scholarly Communication), ACRL ILI-L (Information Literacy Instruction), and ACRL DSS (Digital Scholarship). We will reach out to organizations such as ALA, ACRL, AACC, Council for the Study of Community Colleges (CSCC), and National Council for Workforce Education (NCWE) to inform them of the work we have completed for further sharing.

In this distribution, we will solicit feedback from these interest groups to improve the resource guide and make plans for future collaborations. We will also create a press release about these products to solicit podcast interviews that cover ideas and trends in librarianship, higher education, and data literacy.

⁹ <https://nclr-aacc.org>

Schedule of Completion

Activity	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	
Project initiation																			
• Establish a detailed work plan	█																		
• Hire research assistants	█																		
• Convene the project advisory board		█																	
• Develop a project website		█																	
• Conduct an environmental scan			█	█	█	█	█	█	█	█	█	█	█	█	█				
Survey of current students/recent graduates																			
• Develop survey questionnaire		█	█	█	█														
• Apply for IRB					█	█													
• Distribute the survey						█	█	█	█										
• Analyze survey data									█	█	█								
Focus groups with librarians																			
• Develop focus group questions				█	█														
• Apply for IRB						█	█												
• Recruit focus group participants								█	█										
• Conduct focus group sessions									█	█	█	█	█						
• Analyze focus groups													█	█					
Focus groups with faculty																			
• Develop focus group questions				█	█														
• Apply for IRB						█	█												
• Recruit focus group participants								█	█										
• Conduct focus group sessions									█	█	█	█	█						
• Analyze focus groups													█	█					
Project closure																			
• Finalize a Best Practices Resource Guide															█	█	█		
• Finalize a white paper															█	█	█		
• Conduct webinars																	█	█	

Digital Product Plans

The following digital products will be created through this project:

1. A Best Practice Resource Guide for data literacy teaching, learning, and assessment.
2. A white paper that synthesizes the findings of the focus groups and surveys that will be conducted as part of this project's activities.

These digital products will be made available in a printable PDF format and published under Creative Commons Attribution-ShareAlike 4.0 International (CC BY-SA 4.0) to allow sharing and attribution. Therefore, these digital products are free to be shared but must be given proper attribution in reuse.

Along with these digital products, recordings of webinars, which will be conducted to share lessons learned from the project and instructions on how to utilize the Best Practice Resource Guide, will be generated. These recordings will be converted into standard MP4 format.

Both digital products and recordings of webinars will be deposited to the UNT institutional repository, UNT Scholarly Works (<https://library.unt.edu/scholarly-works>), for long-term preservation and access. All content in the UNT Scholarly Works has a permanent URL for each item and will be visible on all major search engines. The URL for the items in the UNT institutional repository will be available on the project website.

Also, all focus group interview transcripts will be saved as a TXT file. Collected survey responses will be downloaded as CSV files. Due to privacy issues, transcript files and survey data will be anonymized and made available on the UNT data repository (<https://library.unt.edu/scholarly-works/data-repository>) and the project's Open Science Framework (OSF) site.

Organizational Profile

The University of North Texas (UNT) is a four-year public Doctoral University with a Carnegie Classification of Highest Research Activity (R1). The institution was founded in 1890 as a normal and teacher-training institute; its name changed from North Texas State University in 1988. UNT is in Denton, Texas, a town of over 151,219 in the Dallas/Fort Worth area of over 6.4 million. The University is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award baccalaureate, master's, and doctoral degrees. UNT is the 6th largest university in Texas, and among the 30 largest in the United States, with a combined enrollment of over 42,000.

The mission statement of UNT: “At the University of North Texas, our caring and creative community empowers our students to thrive in a rapidly changing world.” The responsible party for the mission statement is the Office of the President; it was revised and approved on February 2020.

The UNT College of Information (CI) is a member of the iSchools organization and is comprised of three departments: Department of Information Science, Department of Linguistics, and Department of Learning Technologies. Faculty and graduate students are highly productive in a wide variety of research efforts related to human information seeking, learning, and use behaviors; human-computer interactions; development, delivery, and evaluation of information and education systems and services; information and education policies and ethics in public and private sectors; computational linguistics; and the study of endangered languages. The CI has multiple research centers and labs and a record of success in obtaining research funding from sources such as the Institute of Museum and Library Services, the National Science Foundation, the National Aeronautics and Space Administration, the Texas Education Agency, and others.

The Department of Information Science (DIS) faculty is currently comprised of 26 full-time faculty, including 20 tenure-system faculty. As of the Fall 2021 semester, the Department of Information Science (DIS) had 1,923 students enrolled in its graduate and undergraduate programs. The DIS master's degree programs in Information Science and Library Science are accredited by the American Library Association and ranked 20th nationwide by *U.S. News & World Report*. A new master's degree program in Data Science was added in 2018. The DIS Interdisciplinary Ph.D. Program in Information Science offers seven concentrations created and implemented jointly with other academic units, in addition to a general program of study. The DIS faculty are diverse and, through residential and distance learning programs, proudly serves a diverse student population from across the state, nation, and world.