Public library virtual storytimes: Meeting school readiness and community needs through a socially distant approach

As public libraries have shifted programs for young children online, empirical research that substantiates the value of those programs, identifies promising strategies, and pinpoints safety concerns is vital. The University of Kentucky, in partnership with the Colorado Libraries for Early Literacy, proposes a three-year research project which will build upon findings from investigations of in-person storytime programs to investigate the school readiness supports within public library virtual storytime programs (VSTs). Complementary to that investigation, we will explore the needs and expectations of stakeholder groups in relation to VSTs. If funded, this **Research in Service to Practice** project, which addresses the **Lifelong Learning** category, will provide data to support the value of public library VSTs in relation to school readiness and community building, uncover evidence to help librarians tailor VSTs to meet the needs of various stakeholders, particularly those from traditionally underserved communities, and produce evidence-based guidelines to support public library VST efforts nationwide.

STATEMENT OF NATIONAL NEED

Public libraries have long served as essential community resources providing access to information; linking individuals with government resources and community services; and providing programming to expand learning, cultivate curiosity, and connect individuals.[1] In response to the COVID-19 crisis, nearly all public libraries in the United States closed buildings and discontinued in-person services; however, libraries' roles in providing for communities did not cease. Rather, most public libraries continued, expanded, or added services, with nearly two-thirds of public libraries offering virtual programming.[2]

Quality learning experiences and interactions are important for all young children, and libraries have a long and rich tradition of supporting community needs, learning, and school readiness through programs for young children and their caregivers.[3] Storytime programs are a cornerstone of public library programming, valued by library administrators for attracting and fostering long-term library users and for being the most highly attended programs libraries offer.[4] Caregivers, and the children under their care, choose to attend storytimes for both learning related as well as more socially based reasons including supporting school readiness, developing a love of reading, promoting a child-parent bond around books and reading, providing family entertainment and social interaction with other children and caregivers as well as offering a break from day-to-day routines and getting out of the house.[5]

Storytimes are especially beneficial for families struggling financially, who tend to have about half as many books in the home as their higher income counterparts.[6] Yet, traditional storytimes tend to be offered during working hours[7] when the caregivers of children, particularly those in financially volatile families, might be working. Notably, caregivers of immigrant children identify storytime as an opportunity for children to hear spoken English.[8]

Current, nationally significant challenge: Given the place of storytimes within public libraries' programming lineup as well as their focus on supporting school readiness,[9] continuation of storytime programming through virtual offerings has occurred in many public libraries, large and small and in communities of all sizes, since the onset of the pandemic.[10] While these VST programs are likely beneficial, researchers in the past have demonstrated a need to rely on research evidence drawn from "under our own umbrella," that is conducted specifically to investigate library programs within their actual contexts.[11]

Libraries' sudden shift to VST programming was in response to the pandemic. Yet, this change in delivery could also serve as an opportunity to better meet the needs of traditionally underserved populations (e.g., communities of color and children/families who experience economic hardships) and ensure that libraries are

equitable, diverse, and inclusive. Scholars propose that COVID-era innovation should enable more equitable systems that support children and families in lower-resourced circumstances.[12] VSTs might be a means for libraries to reach children of working parents, to bring literacy into the home environments of families who struggle to put food on the table let alone to purchase books and other resources, to bring rich language and sophisticated vocabulary into the homes of those at-risk children whose parents tend to use less complex and less lexically diverse sentences.[13] VSTs could be public libraries' opportunity to meet the needs of the most underserved populations of the community: those with financial insecurities, language differences, disabilities and/or developmental delays, who are often unable or chose not to attend in-person programs.[14] In short, VSTs have the potential to help level the playing field. Yet, to do so, VSTs need to employ materials and strategies that relate to children's lived experiences and diverse identities[15] and enable inclusion for those with insufficient access to or proficiency with technology, who tend to be further marginalized in fully remote learning situations.[16]

Building upon and complementing existing scholarship and practice: VST program offerings are likely to expand beyond the current pandemic and resurge again in the future should another emergency require social distancing, as predicted.[17] Therefore, it is vital to study VSTs programs to better understand the extent to which libraries are maximizing storytime outcomes while also being attuned to and taking added measures to safeguard against concerns related to children's screen time.[18] Identifying the extent to which librarians draw from the Science of Learning[19] to ensure children are active, minds-on, engaged, and socially interactive will better position libraries to demonstrate their contribution to children's learning and school readiness and to advocate for funding and other forms of support.

Colorado Libraries for Early Literacy, with assistance from the Association for Library Services to Children (ALSC), began developing a set of guides[20] to support librarians' VST programming efforts at the onset of the pandemic, and certainly that is a valuable resource; yet it too lacks validation that comes from empirical evidence drawn from contextualized research. Naturally, VST providers can and should draw from existing research conducted within traditional storytime programs; yet that research tell us that "seemingly inconsequential details such as how an artifact is presented can make important differences in the way storytime unfolds;"[21] thereby, giving even greater credence to the need for studies of VSTs where the presentation of artifacts is most certain to differ from traditional storytimes as are recruitment efforts[22] and both child and caregiver (note: this inclusive term is used to denote the adult who cares for the child e.g. parent, grandparent, legal guardian, etc.) outcomes.[23]

Further, there are gaps in the existing research of traditional storytime programs that are likely to be magnified in VSTs. For example, bilingual and non-English storytime programs are described in the professional literature,[24] but they have not been studied empirically, and the same is true of storytime programs designed specifically for children with disabilities. The field has also recently called for additional research seeking insights from caregivers across a range of libraries serving different cultural and socioeconomically positioned populations.[25]

Given the prominence of storytime programming in public libraries, the perception of these programs as gateways into other library services,[26] and the transition to virtual delivery, empirical investigations focused on the reach and effectiveness of VST programming offered by public libraries are essential and support IMLS' recent call for more research focused on early learning in libraires. [27]

Integrating promising practices conveyed at the national forum on media literacy (LG-98-18-0052-18), building upon the *Supercharged Storytimes* (RE-95-17-0085-17) curriculum and the methods employed throughout the *Storytimes for School Readiness* (LG-96-17-0199-17) and Project Views (LG-06-11-0254-11) studies, the current project proposes to examine and inform existing and continued practice in the development and delivery of public library VST programs.

PROJECT DESIGN

Project approach

As a **Research in Service to Practice** project, the aim of this endeavor is to work collaboratively with practitioners as we engage in exploratory research. Beginning with the project design and continuing throughout the duration of the project, the research team has and intends to continue to build off the findings of the IMLS-funded *Storytimes for School Readiness and Community project* and to leverage strategic collaborations with key stakeholders and partners.

- At the conceptualization stage, we solicited input and support from key practitioners, and upon invitation to submit a full proposal, the PIs reached out to ALSC and CLEL to solicit input about the project direction and to formulate research questions designed to uncover evidence best suited to compliment and extend the existing *Virtual Storytime Services Guide*.
- Throughout the data preparation stage, we will work closely with practitioner and researcher advisors to design survey and interview instruments that will address important factors related to VSTs.
- Working with state library agencies and association advisors, we will solicit participation from public libraries in all nine US regions (New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, and Pacific).
- As we draw findings from the collected data, we will first share them with advisory board members for feedback and review.
- Finally, we will work closely with practitioner partners to create additions that will complement the existing guides and serve to transform them into evidence-based guidelines.

In accordance with Institutional Review Board policies, all data collection and analysis will be conducted by the core research team and in compliance with University of Kentucky COVID-19 Research safety guidelines.

Strategic Collaborations and Demonstrated Expertise

Research Team— **Dr. Maria Cahill** will serve as the project director and Primary Investigator (PI). Cahill is a literacy scholar and is currently serving as PI for the IMLS-funded *Storytimes for School Readiness and Community Needs* which found that storytime programs are meeting caregivers' needs and supporting school readiness but also identified a number of shortcomings in serving traditionally marginalized groups and in supporting children's higher order thinking, analytic reasoning, and advanced language development. Cahill has experience spearheading multi-state projects, conducting research in library settings and with young children, and collecting and analyzing multiple forms of qualitative data. **Dr. Soohyung Joo**, co-PI, is an information scholar. He has a keen interest in children's information sources and language analysis of children's learning materials. Joo has expertise in natural language processing, text mining, and statistical analysis and has used these methods in investigations of library services to children. **Dr. Luke LeFebvre**, co-Investigator (co-I), is a communications scholar. LeFebvre has expertise on the use of communication technology to improve instructional practices for learners. **Dr. Antonio Garcia**, co-I, is a scholar in the field of Social Work. He is committed to effectively engaging community stakeholders to address contextual and organizational system-level barriers to ameliorate the gap between need for and use of interventions for African American and Latino children. The research team draws from distinct but complementary fields of study and has extensive experience investigating storytime programs, technology-infused learning environments, and family and community factors related to children's ability to access library resources. Members of the team have previously employed (in IMLS-funded studies of traditional storytime programs) most of the methods and data analysis tools proposed including systematic observational techniques associated with informal learning and natural language processing of adults' child-directed speech.

Researcher and Practitioner Consultants and Advisors— The strategic advisory board will guide the research team in preparing instruments and protocols and translating results for evidence-based practice. **Beth Crist** serves on the Steering Committee for CLEL (the organization that spearheaded the creation of the existing *Virtual Storytime Service Guide* and partnered with ALSC to launch them) and is the Youth Services Consultant

for the Colorado State Library. **Stephanie Smallwood** is an early literacy specialist with Springfield-Greene County (MO) Library District and co-Chair of ALSC Early Childhood Programs and Services Committee. **Amy Olson** is Youth Services Consultant for the Kentucky Department of Libraries and Archives and author of "Celebrating Cuentos: Latino Children's Literature & Literacy in Classrooms & Libraries." **Janet Ingraham Dwyer** is Youth Services Consultant for the State Library of Ohio and partners with the Ohio Library Council on Ohio Ready to Read, a statewide resource network to facilitate early literacy activities in libraries. **Dr. Lynne McKechnie** is researcher of library services and programs and has studied storytime programs in Canada. **Dr. Kun Lu** is an information researcher with expertise in natural language processing. In addition to these practitioners and scholars, we will invite state library agency youth services consultants from each of the nine states represented in the study sample to serve in an advisory capacity.

Theoretical frames

Reflecting its cross-disciplinary approach, this project draws on theoretical and conceptual frameworks from multiple social science fields. Bioecological Systems Theory[28] proposes that child development is best conceptualized through the lens of four nested and interacting contextual systems that affect progress and learning. Proximal processes influence and are influenced by a child's own attributes, collective surrounding systems, and time, all of which impact development and affect both the child's microsystem as well as the other surrounding systems. The Science of Learning framework[29] proposes that children learn best when they are cognitively active and physically engaged in meaningful experiences that are socially interactive. The Teaching through Interactions framework[30] posits that three interactional processes, emotional support, organization of the environment, and instructional support, are the primary drivers that lead to learning. Finally, the Diffusion of Innovation theory[31] helps to explain how the diffusion of innovations is related to dissemination, implementation, sustainability, improvement and scale-up of change processes such as VSTs.

Project Design Overview

This four-phase project aims to investigate multiple layers of VST components and to assess the needs of stakeholders and communities through two complimentary studies. Study 1 is designed to investigate multiple aspects of VST programs, and Study 2 is designed to investigate stakeholders' perceptions in relation to VST programs. Working together, the two studies should produce findings that provide a full picture of the value of VSTs as well as signal of changes libraries can make to ensure these programs produce the intended outcomes and better address the needs of young children and families. Table 1 outlines the time frame and purpose of each phase, and the narrative before and after the table provides details about the participants, data collection, data analysis, and interpretation and dissemination of findings.

Research questions

The overarching question driving this project is: **How do public library virtual storytime programs meet the needs of ALL young children and their caregivers?**

In collaboration with our library practitioner partners we formulated two research questions which drive our data collection and approach to analysis:

> RQ1: How are VST programs designed to support ALL children and their caregivers?
>
> RQ 2: What is the value of VST programs, and what resources and supports are necessary for those values to be realized?

Study 1 will address Research Question 1 and its sub questions (conveyed in Table 1) and is designed to investigate multiple layers of VST components. ***Study 2*** will address Research Question 2 and its sub questions (conveyed in Table 1) and is designed to comprehensively assess the needs of multiple stakeholder groups.

Participants— Working with state library agencies and association advisors, we will solicit participation from public libraries in all nine US regions (New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, and Pacific). From those volunteers, we will

draw a stratified random sample of 27 libraries, three in each region, based on population of the legal service area and rural/urban designation to ensure representation of communities in each of the population density categories: urban, suburban, and rural, as well as the continuum of small libraries to large library systems. Additionally, we will utilize data from the IMLS Economic Status and Broadband Availability and Adoption Indicator Workbook to identify and include libraries in both urban and rural areas where a significant proportion of children are living below the poverty line and/or have limited broadband access. As described in the sections to follow, other participants include library directors, children's librarians, VST librarians, caregivers, and young children (i.e., child-caregiver dyads).

Table 1. Project Design Overview.

Phase (time frame)	Objective/Research Sub-question	Methods	Outcome
Phase 1: Study preparation (September 2021-December 2021)	Identify participants, secure human subjects research approvals from library systems and university IRB(s)	Work in collaboration with state library agencies in each of the regions to identify participating libraries.	A stratified random sample of 27 libraries, three in each US region, balanced across rural, suburban, and urban communities and including communities in both urban and rural areas where a significant proportion of children are under the poverty line and/or have limited broadband access
Study 1 Phase 2: Data collection (January 2022 – May 2022) and Phase 3: Data analysis (January 2022 – August 2023)	RQ1.1 What technologies are integrated in and/or used to deploy VSTs, and how accessible are VSTs in general and for traditionally underserved populations?	Observations	Understanding of multiple dimensions and components of VST that position them to support ALL young children
	RQ1.2 What is the nature of the interactions between VST providers and participants, and what strategies are employed to support those interactions?	Observations, CLASS instrument	
	RQ1.3 What learning domains are addressed in VSTs and through use of what materials, and how is diversity reflected in those?	Observations, content analysis	
	RQ1.4 What is the complexity of the language used in VST programs?	Natural language processing, text mining	
	RQ1.5 How do VSTs reflect ethical principles of library and information services?	Observations, content analysis	
	RQ1.6 How do contextual factors influence VST practices?	Statistical analyses	

Study 2 Phase 2: Data collection (January 2022 – May 2022) and Phase 3: Data analysis (January 2022 – August 2023)	RQ2.1 What do children perceive as the value of VSTs and how do they perceive their needs are met and/or could be better met through them?	Interviews with caregiver and child dyads	Understanding of the value of VST programs, and resources and supports necessary for those values to be realized
	RQ2.2 What do caregivers perceive as the value of VSTs and how do they perceive their own needs as well as those of their child(ren) are met and/or could be better met through them?	Surveys of caregivers	
	RQ2.3 How are VST programs failing to address the needs of young children from traditionally underserved groups, and what policies, procedures, and systemic solutions would facilitate libraries' services to these groups?	Collaboration with community organizations; interviews with non-attendee families	
	RQ2.4 What are VST librarians' goals and objectives for the programs and what resources, technologies, supports, and challenges advance and/or impede the goals and objectives?	Interviews with VST providers	
	RQ2.5 What are library administrators' VST goals and objectives, and what resources, technologies, supports, and challenges advance and/or impede the goals and objectives?	Nation-wide survey of library directors	
	RQ2.6 What are the motivating factors influencing librarians' decisions to adopt or not to adopt VST programs?	Nation-wide survey of children and youth librarians	
Phase 4: Transition from evidence to practices (September 2023 – August 2024)	Build practical guidelines to support librarians in planning for and offering quality VST programs. Disseminate the guidelines and project outcomes.	conceptualization of evidence; case analysis; advisory board roundtables	Evidence-based guidelines; Reports and research articles

Data Collection

Data collection for storytime analysis— We will capture and store video recordings of four VST sessions from each public library participant, totaling 108 VST programs (four sessions from 27 libraries). We will intentionally seek to include a minimum of 12 programs offered in Spanish and/or offered as Spanish-English bilingual programs. A $100 payment will be offered to each library as a token of appreciation for participation.

Data collection for community assessment— We will collect data for community needs assessment via surveys and virtual interviews. All interviews will be recorded and then transcribed. We intend to

- Survey library directors and children's librarians nationwide to identify VST goals, supports, barriers, and challenges and to examine the diffusion of innovation within the context of VSTs,
- Conduct semi-structured virtual interviews with at least one VST librarian at each participating library site.

- Request that participating libraries share a link to an online survey for caregivers of young children aimed at identifying their needs and perceptions, in relation to VST. The survey will also contain two optional questions: one requesting contact information if the caregiver is interested in entering a drawing for a $25 gift card to an online book seller, and a second one requesting contact information if the caregiver would be willing to participate in an individual virtual interview with their child. From those who agree to participate, we will randomly select a total of 25 caregiver-child dyads to virtually interview and offer each a $50 gift card to an online book seller.
- Recruit and collaborate with library administrators at three sites, including: 1) one each in rural, suburban, and urban areas, 2) at least one of which will have a significant proportion of children living below the poverty line, and 3) most sites will include racially diverse communities. These administrators will collaborate with the research team to solicit virtual interviews with a total of 10 caregiver-child dyads who do not participate in VST programs because they either are not able to do so, chose not to do so, or are not aware that the programs exist. We will work with the library administrators to facilitate use of equipment and internet access for those who could not participate otherwise. We will offer a $50 gift card to an online book seller to each dyad.

Data Analysis

Study 1: Investigation of storytime elements

For *Study 1*, full transcription of all observations will commence as the data are uploaded to a UK-controlled secure site, and transcripts of bi-lingual and/or Spanish-language observations will be translated to English. We will use NVivo software and systematic observational techniques to content analyze VST recordings and transcripts to determine materials, elements, and strategies currently practiced in VST. Consistent with an exploratory approach, we will employ open coding that is iterative, comparative, and primarily inductive to make meaning from the data and generate findings.

Accessibility for traditionally underserved groups—We will investigate both drivers to and challenges in accessibility of VSTs with an eye toward accessibility to children from underserved families. This investigation will explore when and how VSTs are offered (live vs. recorded) and via what platform(s), use of and accuracy of captioning and auxiliary aids, inclusion of language supports for English learners, offerings in languages other than English, and any other supports to make VSTs more accessible to diverse groups of children. Surveys of library directors and VST librarians will complement the investigation of accessibility issues in VST programming (see *Study 2*).

Interactions and instructional strategies— Interactions (or facilitated interactivity) between storytime librarians and children will be analyzed through observation and content analysis of the video recordings. We will use the Classroom Assessment Scoring System (CLASS) instrument,[32] a standardized observational measure of adult-child interactions to measure three domains of interactions known to affect the quality of learning: emotional support, learning environment organization, and instructional support. The quality of interactions in VSTs will be compared with those previously measured in traditional storytimes[33] to identify advantages and weaknesses of VSTs in terms of interactivity (or facilitated interactivity) between librarians and children. In addition, we will explore instructional and interactive strategies employed in VSTs, such as props and songs, used in VSTs and conduct comparisons with those previously identified[34] in traditional storytimes.

Domains of learning and reflections of diversity—Employing a deductive approach, researchers will conduct a content analysis utilizing the Head Start Learning Outcomes Framework to identify domains of learning observed in VST programs, with a distinct eye towards elements in VSTs addressing COVID-19 issues, for example, social distancing, hygiene practices, health and safety, and emotional well-being. Additionally, using a framework previously employed in studies of traditional storytime programs,[35] we will engage in content analysis to examine reflections of diversity (e.g., culture, ethnicity/race, disabilities, LQBTQ+, etc.) in the materials used in the VST observations.

Language, educational content, and diversity—Employing natural language processing methods, we will assess the language learning environment in VSTs. Adopting methods previously used to investigate traditional storytime programs,[36] we will measure the complexity of language and vocabulary sophistication to evaluate the benefits of VSTs on children's language development. Various language components will be investigated, such as tokens/words exposure, proportion of sophisticated words, sentence length, and grammatical complexity. The analysis will include relationships between language and VST strategies such as interaction tactics, singing and movement, use of props, and technology integration. Content analysis will be utilized to explore ways that VST language supports school readiness and learning (i.e., language and literacy, scientific reasoning, basic math, social and emotional development, and perceptual, motor, and physical development). Additionally, we will examine the extent to which the language of VSTs reflects aspects of diversity.

Ethical issues—We intended to investigate multiple ethical issues related to VSTs including ethical and fair use of information, privacy and safety issues related to participation, and barriers affecting traditionally underserved populations (e.g., registration requirements, marketing efforts, etc.). Surveys of library directors and caregivers as well as interviews with VST librarians and caregiver/child dyads will complement the investigation of ethical issues in VST programming (see *Study 2*).

Factors associated with VST practices—We will examine various contextual factors surrounding VST practices, ranging from session length, librarian qualifications and experience, library location, library size, and other community factors for each of the measures above.

Study 2: Community Needs Assessment

For *Study 2,* all collected survey data will be analyzed both quantitatively and qualitatively to identify frequencies and major themes. All interviews will be conducted via a web conferencing tool, recorded, and transcribed for qualitative analysis. Full transcription of all interviews and programs will commence as the data are uploaded to a UK-controlled secure site. Consistent with an exploratory approach, the research team will employ open coding that is iterative, comparative, and primarily inductive to make meaning from the data and generate findings.

Perceptions of Program Participants—From the surveys of caregivers, we will assess perceived value of and barriers to VST during the pandemic as well as perceived likelihood of ongoing VST use. The survey will also investigate how the needs and expectations of caregivers in VST would be different from those in traditional onsite storytimes. Collected responses will be analyzed both quantitatively and qualitatively. Additionally, in-depth interviews with child-caregiver dyads will complement survey findings by directly asking children about their experience with VSTs. Our particular interest lies in understanding ways children engage in and react to storytimes in the virtual setting.

Perceptions of Children and Caregivers Who Do Not Participate—We will explore needs of non-attendee families. As previously described, we intend to conduct in-depth interviews with child-caregiver dyads who do not currently participate in VSTs to explore reasons underlying why they do not or cannot attend VST, and what kinds of support or resources would be needed to assist and facilitate participation in VSTs. Moreover, interviews will explore the types of stories traditionally underserved or disengaged populations would prefer to explore during VSTs. Finally, we will also gather feedback on other programs and services that would address their needs both during periods that require social distancing as well as times when in-person interactions are permissible and safe.

Perceptions and motivations of VST librarians—Interviews with librarians will generate detailed field stories regarding how librarians prepare and implement storytimes in the virtual setting. The interviews will seek to uncover effective strategies as well as challenges/barriers.

Diffusion of innovation— Surveys of children's librarians nationwide will be used to measure the diffusion of innovation within the context of VSTs. Adoption of technological innovations or restructuring how public

storytime is delivered includes not only a hardware and software change but how software is used to deliver and receive storytime messages. Understanding how librarians (1) diffused VST as an innovation, (2) communicated that innovation through certain channels in a (3) limited timeframe (4) to individuals interacting with the public library will provide data for evidence-based decision-making and better position libraries to adapt to change in the future.

***Perceptions and motivations of library administrators*—**Using a researcher-owned data set of public library director contact information, we will survey directors nationwide. The survey will complement those already administered by the American Library Association and its divisions and will focus on administrative supports and challenges at the library level in offering VSTs. The survey will also investigate administrative attempts and continued plans to reach children from traditionally underserved populations and support them via online programming. Collected data will be analyzed both quantitatively and qualitatively. We will examine potential differences of library-level support by community level factors using statistical analysis.

Translating Studies 1 & 2 for evidence-based practice

Once *Study 1* and *Study 2* are complete, we will examine all empirical findings to identify components to be included in the evidence-based guidelines. The researchers will work closely with the advisory board at this stage, particularly those members who had a hand in creating and supporting the existing *Virtual Storytime Services Guide*. The initial draft of the guidelines will be reviewed by the advisory board and shared with voluntary partner librarians for proof of concept. The project team will prioritize and refine the guideline components based on the feedback.

Project evaluation— There will be multiple forms of evaluation to ensure the success of the project. First, the advisory board will analyze the validity and reliability of the project design. Second, the project team will share preliminary findings and a draft of outcomes in multiple ways, especially through professional conferences and via the project website, and will solicit feedback and opinions about the impact of the project from different audiences of stakeholders including library practitioners, researchers, and library school educators. Third, we will pilot the guidelines with partner libraries for proof-of-concept purposes. Finally, key performance indicators will be devised to monitor the project's success; for example, the view and download statistics of the guidelines from the repository and the number of libraries with whom the project outcomes are shared will be two such indicators. Research impact will be monitored based on the number of downloads, views and citations.

DIVERSITY PLAN

As indicated in the data collection and analysis plans, this investigation is designed to include traditionally marginalized, underserved families. First, for Study 1, we intend to study VST programs offered by libraries in areas that have significant portions of the child population living in poverty and significant portions of the population with limited broadband accessibility. Further, we intentionally seek to include a minimum of 12 programs offered in Spanish and/or as Spanish-English bilingual programs. For Study 2, we intend to solicit the perspectives of both the children and caregivers living in those areas that have significant portions of the child population living in poverty and significant portions of the population with limited broadband accessibility as well as those who participate in the Spanish and/or as Spanish-English bilingual programs to capture both how VSTs are beneficial as well as how they could be better for these groups. Finally, and perhaps most importantly, the project intends to seek the perspectives of young children and caregivers from traditionally underserved groups who are **not** using VSTs and/or other library services to explore how VST programs are failing to address their needs, and what resources, structures or solutions would facilitate libraries' services to better meet their needs. Finally, in addition to addressing the needs and perceptions of traditionally underserved groups, this project is also designed to incorporate small and rural library systems and the populations they serve. As recently acknowledged, "...in the library and information science professional and academic discourse, rural libraries receive far less attention than seems appropriate given how numerous they are and how central they are to their communities."[37]

NATIONAL IMPACT

Evidence-base for libraries nationwide—Quality learning experiences and interactions are important for all young children. Libraries have a long tradition of providing storytime programs to support school readiness and address community needs, and recent studies support the value of storytimes. Yet it is not clear if these programs are effective when delivered virtually and how differences in delivery methods, strategies and materials utilized, language and nonverbal messages communicated, and engagement tactics affect child and caregiver outcomes. Findings from this project will serve as an initial evidence-base for libraries nationwide and inform them of both promising practices and unanticipated concerns that can subsequently be used to tailor programs to best meet the needs of children and families.

Guidelines to support library practice—The primary, tangible deliverable from the project will be the guidelines for practitioners that are evidence-based to complement the existing practice-based *Virtual Storytime Services Guide*. In tandem with the existing guide, the guidelines will provide detailed information about how to initiate and plan a VST program; acquire associated resources and technologies; collaborate with other personnel or units; facilitate interactions with children; and evaluate the success of programs. The guidelines will be beneficial, adaptable, and scalable to all different sizes of libraries. In addition, the guidelines will serve as a useful resource for libraries to train and upskill librarians using latest technologies.

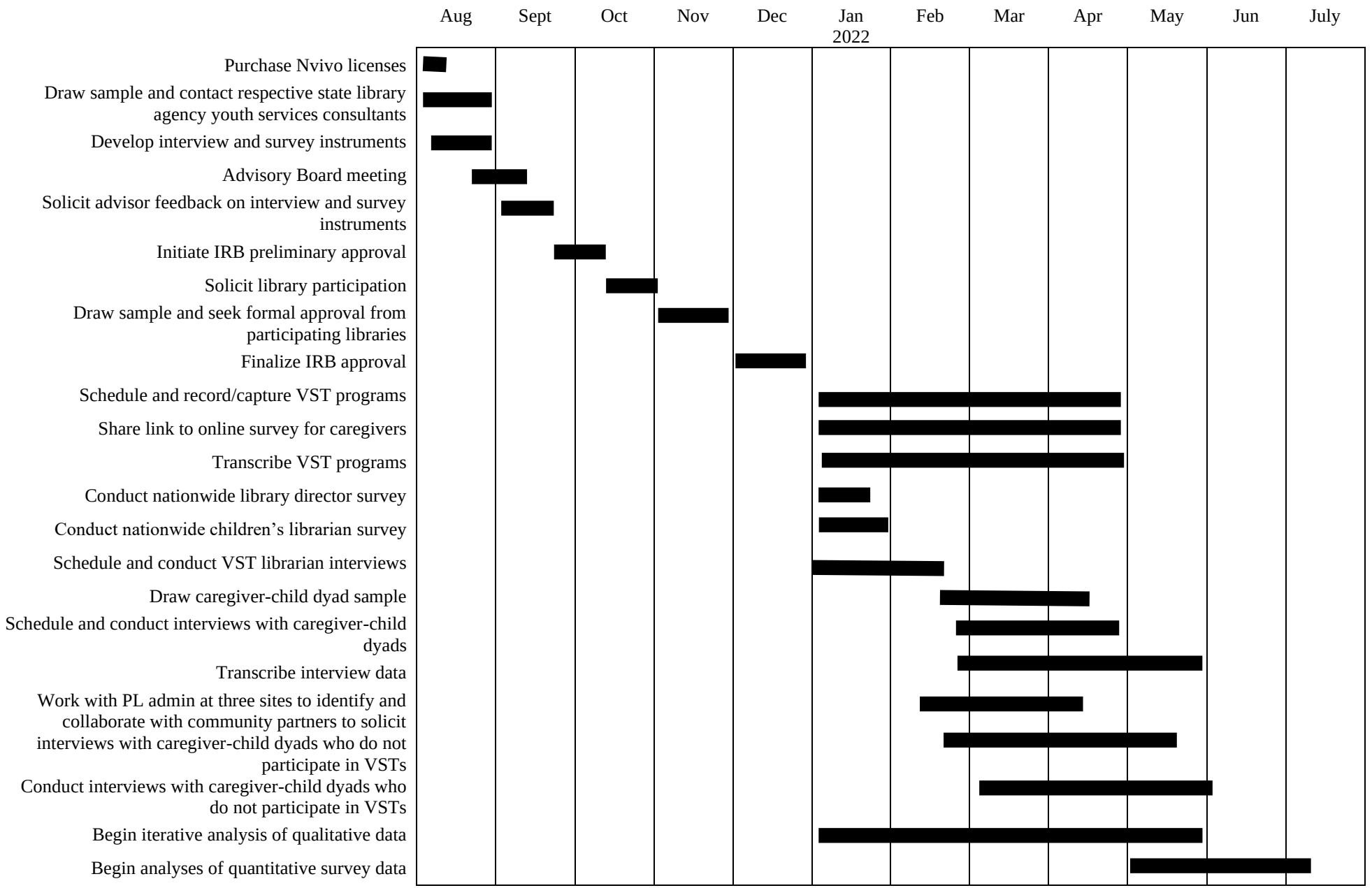
Application for museums and other informal learning providers— Moreover, the guidelines should also inform other communities that plan virtual programming for children even after the pandemic is over, specifically museums or other educational organizations. The guidelines from this project can be readily adaptable to school libraries or children's museums that plan to develop VST programs. The guidelines should be particularly useful for those institutions that plan to reach children from underserved populations via online programs.

Early childhood communities— VSTs can serve as a compelling tool for educational and social purposes in pre-schools or other early child education institutions. Findings from this study will produce numerous theoretical and practical implications for effective instructional interactions in online environments, which will be beneficial to other organizations and agencies that serve children.

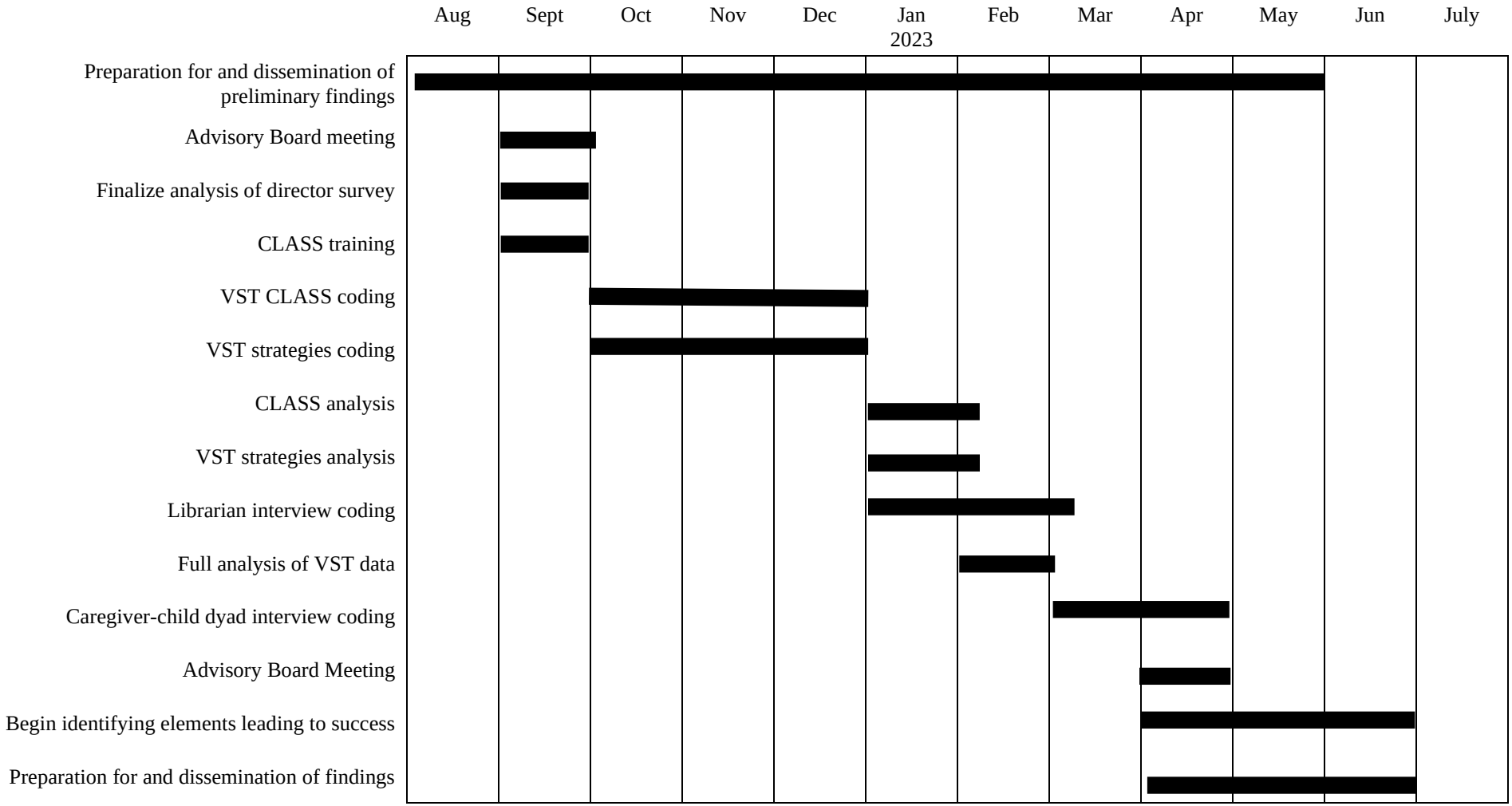
Multiple channels will be used to communicate with the public library community and LIS researchers. First, a project website will serve as a platform to disseminate early preliminary findings and to communicate with both library practitioners and LIS researchers. We will actively present findings from the project at various professional conferences, such as ALA Annual Conference, PLA Conference, Association of Rural & Small Libraries Conferences, and regional state library conferences and meetings including the CLEL Conference which attracts participants from beyond library communities. Third, the guidelines and all outcomes will be shared via the institutional repository maintained at UK. Fourth, research findings from the project will be shared to multiple academic disciplines, including Library and Information Science, Social Work, Instructional Communication, and Early Childhood Education in the formats of journal articles and conference proceedings.

For sustainability, the guidelines and other products will be uploaded and shared via a digital repository housed by UK Libraries. The project team will monitor the adoption of these shared resources and will answer any questions from library practitioners or library science researchers. We will continue conducting related research in the area of VST after the project period, and the guidelines will be updated based on our future research.

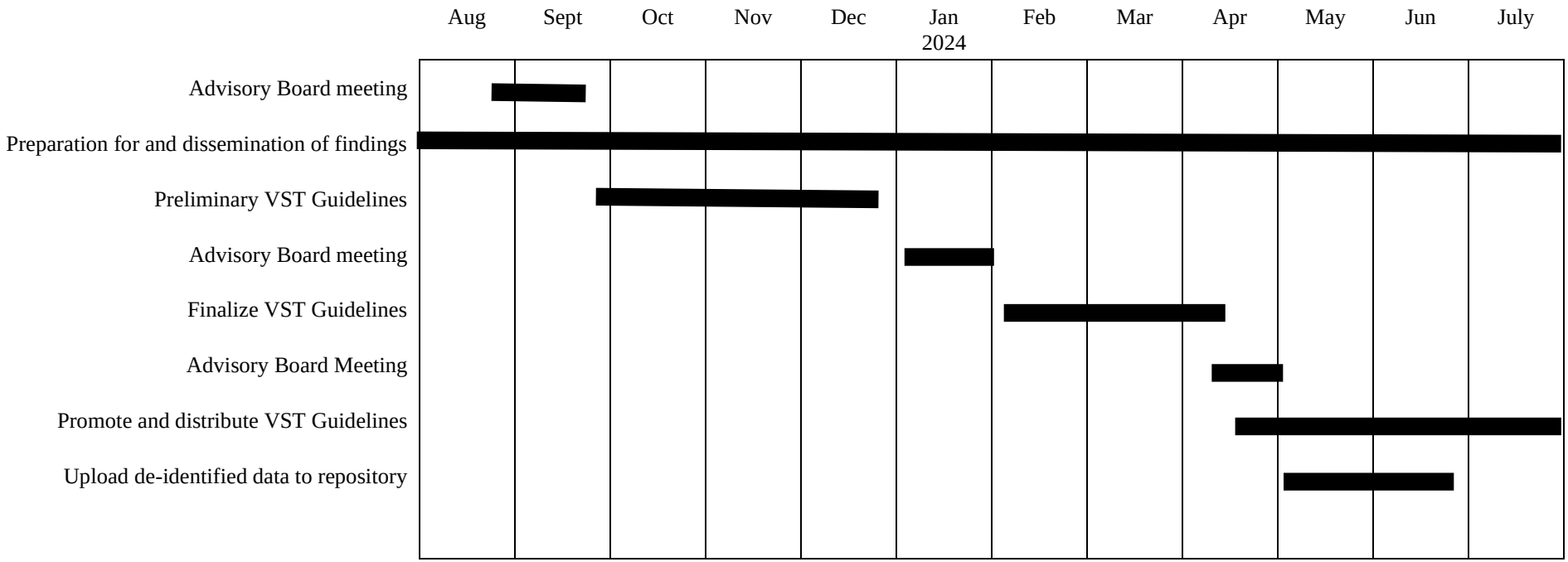
SCHEDULE OF COMPLETION: Year 1 (2021 – 2022)



SCHEDULE OF COMPLETION: Year 2 (2022 – 2023)



SCHEDULE OF COMPLETION: Year 3 (2023 – 2024)



DIGITAL PRODUCT FORM

INTRODUCTION

The Institute of Museum and Library Services (IMLS) is committed to expanding public access to digital products that are created using federal funds. This includes (1) digitized and born-digital content, resources, or assets; (2) software; and (3) research data (see below for more specific examples). Excluded are preliminary analyses, drafts of papers, plans for future research, peer-review assessments, and communications with colleagues.

The digital products you create with IMLS funding require effective stewardship to protect and enhance their value, and they should be freely and readily available for use and reuse by libraries, archives, museums, and the public. Because technology is dynamic and because we do not want to inhibit innovation, we do not want to prescribe set standards and practices that could become quickly outdated. Instead, we ask that you answer questions that address specific aspects of creating and managing digital products. Like all components of your IMLS application, your answers will be used by IMLS staff and by expert peer reviewers to evaluate your application, and they will be important in determining whether your project will be funded.

INSTRUCTIONS

If you propose to create digital products in the course of your IMLS-funded project, you must first provide answers to the questions in **SECTION I: INTELLECTUAL PROPERTY RIGHTS AND PERMISSIONS.** Then consider which of the following types of digital products you will create in your project, and complete each section of the form that is applicable.

SECTION II: DIGITAL CONTENT, RESOURCES, OR ASSETS

Complete this section if your project will create digital content, resources, or assets. These include both digitized and born-digital products created by individuals, project teams, or through community gatherings during your project. Examples include, but are not limited to, still images, audio files, moving images, microfilm, object inventories, object catalogs, artworks, books, posters, curricula, field books, maps, notebooks, scientific labels, metadata schema, charts, tables, drawings, workflows, and teacher toolkits. Your project may involve making these materials available through public or access-controlled websites, kiosks, or live or recorded programs.

SECTION III: SOFTWARE

Complete this section if your project will create software, including any source code, algorithms, applications, and digital tools plus the accompanying documentation created by you during your project.

SECTION IV: RESEARCH DATA

Complete this section if your project will create research data, including recorded factual information and supporting documentation, commonly accepted as relevant to validating research findings and to supporting scholarly publications.

SECTION I: INTELLECTUAL PROPERTY RIGHTS AND PERMISSIONS

A.1 We expect applicants seeking federal funds for developing or creating digital products to release these files under open-source licenses to maximize access and promote reuse. What will be the intellectual property status of the digital products (i.e., digital content, resources, or assets; software; research data) you intend to create? What ownership rights will your organization assert over the files you intend to create, and what conditions will you impose on their access and use? Who will hold the copyright(s)? Explain and justify your licensing selections. Identify and explain the license under which you will release the files (e.g., a non-restrictive license such as BSD, GNU, MIT, Creative Commons licenses; RightsStatements.org statements). Explain and justify any prohibitive terms or conditions of use or access, and detail how you will notify potential users about relevant terms and conditions.

The digital products expected from this project include:

- Guidelines for virtual storytime practices
- Research reports including findings of the project
- Research instruments including interview protocols, coding books, and survey questionnaires
- Research data including storytime transcripts, interview transcripts, and survey responses after removing any identifiable information according to the IRB protocol.

The PIs and co-investigators will hold the copyright of all digital products. Part of the digital products will be shared and available for reuse through a Creative Commons license (e.g., CC-BY-NC). These products will not be used for commercial purpose. Peer-reviewed articles or other publication produced from this project will be exceptions on the use of a Creative Commons license.

A.2 What ownership rights will your organization assert over the new digital products and what conditions will you impose on access and use? Explain and justify any terms of access and conditions of use and detail how you will notify potential users about relevant terms or conditions.

The PIs and co-I's will hold ownership to the resulting digital products, including guidelines, research reports, research instruments and research data. Digital products will be uploaded to the University of Kentucky Libraries' digital repository (https://uknowledge.uky.edu). The PIs and co-I's will share selective data for non-commercial purposes under the approval of the University of Kentucky IRB. The PIs will notify any terms of access and use including the Creative Commons license information with the product files as part of metadata fields.

A.3 If you will create any products that may involve privacy concerns, require obtaining permissions or rights, or raise any cultural sensitivities, describe the issues and how you plan to address them.

This project will involve data collection from human participants, including observations, interviews and surveys of stakeholders. All human-involved data collection plans will be reviewed and approved by the Institutional Review Board (IRB) of the University of Kentucky. We will strictly follow the regulations of the IRB to protect participants' right and privacy. Any personally identifiable information will be removed from the datasets, such as survey responses and interview transcripts. In addition, all empirical data such as interview transcripts and survey results will be stored at a secure digital space and will be used only for research purposes.

SECTION II: DIGITAL CONTENT, RESOURCES, OR ASSETS

A.1 Describe the digital content, resources, or assets you will create or collect, the quantities of each type, and the format(s) you will use.

Digital content	Quantities	Format
Guidelines	5 to 7 sections	MS-Word document, PDF
Survey responses	Depends on response rate	MS-Excel spreadsheet, .csv, SPSS files
Interview records (VST librarians)	Approximately 27	.mp3 or alternative format
Interview transcripts (VST librarians)	Approximately 27	MS-Word document, PDF, TXT file
Interview records (child-caregiver dyads)	Approximately 25	.mp3 or alternative format
Interview records (non attendee groups)	Approximately 10	.mp3 or alternative format
Interview transcripts	Approximately 27	MS-Word document, PDF, TXT file
Interview protocols	3	MS-Word document, PDF
Survey questionnaires	3	MS-Word document, PDF
Storytime videos	Approximately 108 sessions	.mp4 or alternative format
Storytime transcripts	Approximately 108	MS-Word document, MS-Excel spreadsheet, PDF, TXT
Research reports	~ 10	MS-Word document, MS-PowerPoint, PDF

A.2 List the equipment, software, and supplies that you will use to create the digital content, resources, or assets, or the name of the service provider that will perform the work.

Software, equipment, and supplies	Related digital products or purposes
MS-Office Word, PowerPoint, and Excel	Research data, research reports, data analysis, others.
Adobe Acrobat	Research data, research reports
Zoom virtual conference tool (or alternative virtual communication platform)	Interviews, advisory board meetings, research team meetings, recordings
Qualtrics survey tool	Survey research data
Media player, Adobe Captivate (or equivalent)	Data observation and analysis, video editing
NVivo	Qualitative data
SPSS	Quantitative data
Python Natural Language Toolkit	Text data analysis
R and RStudio	Quantitative data

A.3 List all the digital file formats (e.g., XML, TIFF, MPEG, OBJ, DOC, PDF) you plan to use. If digitizing content, describe the quality standards (e.g., resolution, sampling rate, pixel dimensions) you will use for the files you will create.

File format	Equipment/application – Quality standards
.pdf	Adobe Acrobat – default
.docx or .doc	MS-Word – default
.pptx	MS-Powerpoint – default
.sav	SPSS Statistics – default data document
.xslx	MS-Excel spreadsheet
.nvp	NVivo file - default
.csv	SPSS, R, Python – not applicable
.txt	Python, R – not applicable
.mp3	Default setting of a device
.mp4	Default setting of a device

Workflow and Asset Maintenance/Preservation

B.1 Describe your quality control plan. How will you monitor and evaluate your workflow and products?

The PIs will oversee the quality control of all digital products. We will create checklists to

assess our workflow progress and production. We will also check if all digital files are compatible with the equipment or software that we plan to use. We will ask our advisory board to check the quality of products, especially the format of the guidelines. For some of the products, we will pilot them with members of the profession for proof-of-concept purposes.

B.2 Describe your plan for preserving and maintaining digital assets during and after the award period. Your plan should address storage systems, shared repositories, technical documentation, migration planning, and commitment of organizational funding for these purposes. Please note: You may charge the federal award before closeout for the costs of publication or sharing of research results if the costs are not incurred during the period of performance of the federal award (see 2 C.F.R. § 200.461).

All original files will be stored in the University of Kentucky controlled secure site managed by the PIs. Back-up files will be made in an external storage for long-term preservation if necessary. The guidelines and other digital artifacts produced from this project will be uploaded to the digital repository (UK Knowledge, https://uknowledge.uky.edu) maintained by the University of Kentucky Libraries. For sharing research data, we will follow the guidelines of the IRB of the University of Kentucky.

Metadata

C.1 Describe how you will produce any and all technical, descriptive, administrative, or preservation metadata or linked data. Specify which standards or data models you will use for the metadata structure (e.g., RDF, BIBFRAME, Dublin Core, Encoded Archival Description, PBCore, PREMIS) and metadata content (e.g., thesauri).

The research team plans to upload and share the guidelines, research reports, and part of research data under the approval of the IRB of the University of Kentucky. The UK Knowledge system (https://uknowledge.uky.edu) will be used to preserve and share the items. As to metadata, the research team will use the standard metadata schema provided by the UK Knowledge interface, which includes a range of metadata fields such as title, keywords, creators, date, description, and others. The research team will closely work with a digital scholarship librarian at the University of Kentucky Libraries to create relevant metadata.

C.2 Explain your strategy for preserving and maintaining metadata created or collected during and after the award period of performance.

Created metadata will be preserved along with individual items in the UK Knowledge repository (https://uknowledge.uky.edu). The research team will consult a digital scholarship librarian for preservation of metadata for digital artifacts.

C.3 Explain what metadata sharing and/or other strategies you will use to facilitate

widespread discovery and use of the digital content, resources, or assets created during your project (e.g., an API [Application Programming Interface], contributions to a digital platform, or other ways you might enable batch queries and retrieval of metadata).

Not applicable.

Access and Use

D.1 Describe how you will make the digital content, resources, or assets available to the public. Include details such as the delivery strategy (e.g., openly available online, available to specified audiences) and underlying hardware/software platforms and infrastructure (e.g., specific digital repository software or leased services, accessibility via standard web browsers, requirements for special software tools in order to use the content, delivery enabled by IIIF specifications).

The following digital content will be shared to the public: (a) the guidelines, (b) research reports, and (c) part of research data. The UK Knowledge system (https://uknowledge.uky.edu) will be used to share the digital items. The items uploaded to the UK Knowledge system will be accessible via standard web browsers such as Google Chrome and Safari. Any terms of access and use will be notified with the product files as part of metadata fields.

D.2. Provide the name(s) and URL(s) (Universal Resource Locator), DOI (Digital Object Identifier), or other persistent identifier for any examples of previous digital content, resources, or assets your organization has created.

The UK Knowledge system (https://uknowledge.uky.edu) will provide URIs and assign unique DOIs to individual items. The research team will work with the digital scholarship librarian at the UK Libraries.

SECTION III: SOFTWARE

General Information

A.1 Describe the software you intend to create, including a summary of the major functions it will perform and the intended primary audience(s) it will serve.

Not applicable

A.2 List other existing software that wholly or partially performs the same or similar functions, and explain how the software you intend to create is different, and justify why those differences are significant and necessary.

Not applicable

Technical Information

B.1 List the programming languages, platforms, frameworks, software, or other applications you will use to create your software and explain why you chose them.

Not applicable

B.2 Describe how the software you intend to create will extend or interoperate with relevant existing software.

Not applicable

B.3 Describe any underlying additional software or system dependencies necessary to run the software you intend to create.

Not applicable

B.4 Describe the processes you will use for development, documentation, and for maintaining and updating documentation for users of the software.

Not applicable

B.5 Provide the name(s), URL(s), and/or code repository locations for examples of any previous software your organization has created.

Not applicable

Access and Use

C.1 Describe how you will make the software and source code available to the public and/or its intended users.

Not applicable

C.2 Identify where you will deposit the source code for the software you intend to develop:

Name of publicly accessible source code repository: Not applicable
URL: Not applicable

SECTION IV: RESEARCH DATA

As part of the federal government's commitment to increase access to federally funded research data, Section IV represents the Data Management Plan (DMP) for research proposals and should reflect data management, dissemination, and preservation best practices in the applicant's area of research appropriate to the data that the project will generate.

A.1 Identify the type(s) of data you plan to collect or generate, and the purpose or intended use(s) to which you expect them to be put. Describe the method(s) you will use, the proposed scope and scale, and the approximate dates or intervals at which you will collect or generate data.

Types of data	Intended use	Methods/tools	Approximate dates and intervals
Survey responses from librarians, directors, and caregivers	Descriptive analysis, statistical analysis, qualitative analysis (open coding, content analysis, etc.)	Online survey via the Qualtrics tool	Jan. 2022 – Apr. 2022
Storytime recordings and transcription	Qualitative analysis (open coding, content analysis, etc.), natural language analysis and text mining	Transcription	Jan. 2022 – Apr. 2022
Interview recordings from librarians and caregiver/children dyads	Qualitative analysis (open coding, content analysis, etc.), descriptive statistics	Virtual interviews via the Zoom conferencing tool	Feb. 2022 – Jun. 2022

A.2 Does the proposed data collection or research activity require approval by any internal review panel or institutional review board (IRB)? If so, has the proposed research activity been approved? If not, what is your plan for securing approval?

The research team will acquire approval from the Institutional Review Board (IRB) of the University of Kentucky for any human involved data collection, including interviews and surveys with stakeholders. The research team plans to submit a new IRB application for approval in October 2021. The PIs already have experience in securing IRB approval for a similar scope study and will utilize this experience to design ethical data collection practices.

A.3 Will you collect any sensitive information? This may include personally identifiable information (PII), confidential information (e.g., trade secrets), or proprietary information. If so, detail the specific steps you will take to protect the information while you prepare it for public

release (e.g., anonymizing individual identifiers, data aggregation). If the data will not be released publicly, explain why the data cannot be shared due to the protection of privacy, confidentiality, security, intellectual property, and other rights or requirements.

The planned surveys and interviews will collect demographic information from each participant. The research team will take multiple measures to protect personally identifiable information (PII). The research team will assign an identification number for each participant to ensure the anonymity of responses. In any transcript of interview, we will not disclose any PII by deleting any personal information. For survey data, all responses will be aggregated for data analysis to ensure the data anonymization. The PIs will make sure any PII is removed from data sets or results before sharing or publication. All data collection will strictly follow the IRB regulations. The research team will not divulge any confidential or proprietary information in this study.

A.4 What technical (hardware and/or software) requirements or dependencies would be necessary for understanding retrieving, displaying, processing, or otherwise reusing the data?

Technical tools	Purpose
Zoom virtual conference tool (or alternative tool)	The tool will be used to conduct and record virtual interviews.
Qualtrics	The tool will be used to administer online surveys.
MS-Office (MS-Word, MS-Excel, and MS-Powerpoint)	The tool will be used to collect transcription data, descriptive analysis, and visualization of the findings.
NVivo	The tool will be used to analyze qualitative data.
SPSS	The tool will be used to analyze quantitative data.
R	The tool will be used for statistical analysis, data visualization, and text mining.
Python	The tool will be used for natural language processing and text mining.

A.5 What documentation (e.g., consent agreements, data documentation, codebooks, metadata, and analytical and procedural information) will you capture or create along with the data? Where will the documentation be stored and in what format(s)? How will you permanently associate and manage the documentation with the data it describes to enable future reuse?

This project will produce survey questionnaires, interview protocols, and codebooks for qualitative analysis as part of data documentation. These data documentation files will be stored and managed together with the associated datasets.

A.6 What is your plan for managing, disseminating, and preserving data after the completion of

the award-funded project?

Collected research data will be stored in the PI's personal digital space for a certain period of time according to the IRB regulations after the project. In addition, the research team plans to archive and share part of the datasets via the UK Knowledge repository. Before sharing to the public, any personally identifiable information will be removed from the datasets based on the IRB regulations.

A.7 Identify where you will deposit the data:

Name of repository: University of Kentucky Institutional Repository - UK Knowledge
URL: http://uknowledge.uky.edu

A.8 When and how frequently will you review this data management plan? How will the implementation be monitored?

We will revisit and review this data management plan every time we need to store data. The PIs will monitor the implementation of this plan annually when writing an annual report and final report to IMLS.