The University of Kentucky, in collaboration with the Kentucky Department of Libraries and Archives, the State Library of Indiana, and the State Library of Ohio, will conduct a three-year research project to investigate the extent to which public library storytime programs support school readiness of young children and meet the needs of stakeholder groups. Based on results from the investigation coupled with findings from a comprehensive needs assessment, we will develop guidelines for effective storytimes and develop digital learning modules to train librarians and other community program providers, such as museum programmers. The *Storytimes for School Readiness and Community Needs* project will provide data to support the value of public library storytimes for school readiness and community building, as well as information to help librarians tailor storytimes to meet the needs of various stakeholders.

STORYTIMES FOR SCHOOL READINESS AND COMMUNITY NEEDS

Little empirical research exists to validate the contributions public library storytimes make toward the school readiness of young children nor how they address the needs of the children and their caregivers who attend. Therefore, the University of Kentucky (UK), in partnership with three state library agencies, proposes a three-year research project which will build on findings from the field of early childhood education to investigate the school readiness supports within public library storytimes. Complementary to that investigation, we will explore the needs and expectations of stakeholder groups in relation to storytime. If funded, our Research Grant project, which addresses the Community Anchors project category, will provide data to support the value of public library storytimes for school readiness and community building, as well as information to help librarians tailor storytimes to meet the needs of various stakeholders.

1. STATEMENT OF NATIONAL NEED

Experiences and interactions in early childhood have profound effects on physical and cognitive development and serve as building blocks for future success (Zero to Three, 2000). Language and literacy skills of young children impact overall academic success in both the elementary years as well as schooling years later (NICHD, 2005; Scarborough, 2001). Social skills, such as paying attention, getting along with others, and persistence, have also been noted as important indicators of school readiness (Arnold, Kupersmidt, Voger-Lee, & Marshall, 2012). Yet, there is great variation in the development of school readiness skills of children. For example, only about one-third of children in the US enter school able to recognize letters (Child Trends, 2015). This discrepancy in abilities and school readiness is particularly concerning given that once established, differences tend to persist across the school years (Burgess, Hecht, & Lonigan, 2002; Dickinson & Porche, 2011), even impacting the likelihood of high school graduation or dropout (Alexander, Entwisle, & Horsey, 1997).

Variation in school readiness has been attributed to differential environments. Much attention has been given to differences in the quantity of language exposure (Hart & Risley, 1995); yet, the quality of the language children hear is equally important (Dickinson & Porche, 2011; Hoff, 2003) as is the quality of the interactions in which they hear them (Cartmill, 2016): children need knowledge of thousands of complex words (Biemiller 2006), and contextual factors support successful language learning. However, conversations in homes (Cunningham & Stanovich, 1998) and preschool classrooms (Dickinson & Porsche, 2011) tend to be modest in terms of language complexity and vary greatly in terms of interactional quality (Hirsh-Pasek et al., 2015). This is especially troubling for children in the lowest socioeconomic conditions who suffer a "double dose of disadvantage" in both home and school environments (Neuman, Kaefer, & Pinkham, 2017).

Public libraries are positioned to provide rich learning opportunities that support school readiness through programs for young children and their caregivers (IMLS, 2013, 2014; Urban Libraries Council, 2007), and an overwhelming majority of Americans believe that libraries should be providing literacy and school readiness support programs (Horrigan, 2015). Our own recent research reveals that libraries nationwide are putting human resources towards children's programming efforts (Joo & Cahill, in press), and in return, half of all children and youth who visit a public library do so to attend a program (Miller, Zickuhr, Raine, & Purcell, 2013).

Storytimes for young children are a cornerstone of public library programming (Albright, Deleck, & Hinkle, 2009), sometimes considered the "raison d'être" of children's librarians (Hedemark & Lindberg, 2017). Yet, very little empirical research exists to validate the contributions public library storytimes make toward the school readiness of young children nor how they address the needs of the children and their caregivers who attend. In fact, children's librarians have been lamenting this dearth of research for decades. Smardo (1984) wrote in the early 1980s: "…in spite of the widespread availability of preschool storyhours sponsored by public libraries, valid and reliable experimental evaluative research evidence is practically nonexistent..." (p. 52), and twenty years later, Walter (2003) stated, "We have almost no good data about library services to very young children and their families and caregivers in spite of the fact that this is a growing element in public library services, with more and more public libraries entering the early childhood arena" (p. 581). Nearly 15 years later, circumstances have changed little.

While IMLS has funded a number of early learning projects in recent years, only three of those were research focused, and only one was related to programming in public libraries: Project VIEWS investigated children's early literacy behaviors during storytime and found them to be correlated with the early literacy content of the storytime (Campana et al., 2016). A handful of other studies in the US (Becker, 2012; de Vries, 2008; Smardo, 1984; Williams, 1998) also point to the value of public library storytimes; however, all of these studies, including Project VIEWS, are focused on a single state, and all but two, Project VIEWS and a study sponsored by the Idaho Commission for Libraries (Stewart et al., 2014), involved very small samples of participants and only a single library system, often only a single library branch.

Children's librarians have focused much attention on and learned from the Every Child Ready to Read (PLA & ALSC, n.d.) initiative. While ECRR is a valuable endeavor focused on school readiness, it serves a different purpose than regular storytime programming. That said, ECRR principles and methods have been appropriated and remixed by librarians such that an intentionality of educating parents on early literacy concepts is now ingrained in public library early childhood practices, notably storytimes.

Still, given the paucity of empirical investigations focused on storytime, it is difficult for librarians to understand just how well they are addressing the needs of families, communities, early childhood educators, and other members of the "early learning ecosystem" (Hill, Proffitt, & OCLC, 2015, p. 7). Additionally, this lack of research "under our own umbrella" (Stooke & McKenzie, 2011) makes it difficult for instructors in LIS programs, public library directors, state library youth coordinators, and library association leaders to use evidence-based practices in preparing and training children's librarians to deliver high quality storytimes. During the IMLS-sponsored forum on learning in libraries, one key theme that emerged is the need to "conduct relevant research on learning in libraries that both informs, and is informed by, practice" (Hill, Proffitt, & OCLC, 2015, p. 13). The overarching goal of this project is to conduct research on storytimes that is both informed by practitioners and informative for their practice.

Naturally, librarians draw on research from other fields, such as child development and early childhood education, when creating and justifying storytime programs. However, scholars in any area of study recognize the importance of context. Thus, if the library community is to truly understand the value of storytime and identify means for improving storytime to better prepare children for school success and to meet the needs of community stakeholders, it is imperative that comprehensive investigations of storytime serve as the research base.

Just as investigations in preschool classroom contexts point to disparities in child outcomes based on contextual factors such as differences in teaching strategies (Zucker, et al, 2010), teaching materials (Price, Bradley, Smith, 2012), language exposure (Dickinson & Porche, 2011), teacher-child interactions (Piasta et al, 2012), child-teacher ratios (Morrow, 1989), and teacher training (Neuman & Cunningham, 2009), so too do multiple variables likely affect the quality of storytime learning environments, and in turn, child outcomes. McKenzie and Stooke (2007), for example, pointed out that "Seemingly inconsequential details such as how an artifact is presented can make important differences in the way storytime unfolds" (p. 11). Of equal importance, however, is the necessity to conduct investigations across different types of public libraries since previous research reveals disparities between libraries serving larger populations and those in more sparsely populated regions (Schneider, 2014).

Using data collection techniques fine-tuned in Project VIEWS, we plan to investigate storytimes across a variety of public library contexts. Building on findings from the field of early childhood education and using some of the same data analysis methods, we plan to investigate the quantity and quality of the language environment as well as the quality of adult-child interactions within public library storytimes. In contrast to any existing research on library programming for young children, in this multi-state investigation we will stratify the sample to include libraries serving urban, mostly rural, and rural populations and include library systems and branches with small, medium and large public service areas.

Complementary to the investigation of storytimes, we also intend to explore the needs and expectations of parents, child care providers, librarians, and library administrators in relation to storytime and other programs and services aimed at young children. Thus, our project will produce findings that will be useful and applicable to librarians across a wide spectrum of public libraries in the US: it will provide data to support the value of public library storytimes for school readiness and community building, as well as information to help librarians tailor storytimes and other programs and services to meet the needs of various stakeholders. Finally, findings from our project can be used for training and professional development purposes.

2. PROJECT DESIGN

Goals and Outcomes*:* To address the overarching research question, **how do public library storytimes support the school readiness of young children and address the needs of public library stakeholder groups**, we intend to investigate storytime practice in public libraries in regards to (1) interaction between librarians and children, (2) strategies employed in storytimes, and (3) the complexity of the language used in storytimes. In addition, we will explore the needs of parents, childcare providers, librarians, and library administrators. Based on the findings, we plan to suggest guidelines for effective storytimes as well as to develop digital learning modules to train librarians and other community program providers, such as museum programmers. The project will produce the following final outcomes:

a. An understanding of three dimensions of storytimes in public libraries, including
   - Interaction between children and librarians
   - Strategies employed in storytimes
   - Complexity of language used in storytimes
b. Needs assessment of four groups of stakeholders, including
   - Parents
   - Childcare providers
   - Children's librarians
   - Library administrators
c. Guidelines for effective storytimes in terms of interaction styles, strategies, language use, and material selection
d. Digital learning modules to train librarians for effective storytimes

Research Models and Research Questions: According to a social-interactionist theory of language acquisition (Bruner, 1961, 1964, 1965; Vygotsky, 1978), the full potential of children's language learning can only be realized socially through interaction and cooperation with others who have more highly developed language skills. Through supportive language experiences such as shared book reading, the adult or more experienced peer works within the zone of proximal development, moving children from their current level of language understanding and expression to a deeper awareness of vocabulary and syntactical patterns needed for independent language comprehension and production (Wasik & Hindman, 2013). For example, during shared reading, adults can provide synonyms or contextual definitions for complex vocabulary encountered.

Figure 1 shows a conceptual framework of the project, which consists of two subordinate studies, and Table 1 presents research questions, research methods, and associated outcomes. First, we will explore three dimensions of public library storytimes, including interactions, strategies, and language use in storytimes (Study 1). Second, we will conduct needs assessments of four groups of stakeholders: parents, childcare providers, librarians, and library administrators (Study 2). Third, based on the findings from Studies 1 and 2, we will develop guidelines for effective storytimes in public library environments. Fourth, we will produce practical learning modules intended for children’s librarians and child care providers (Translating Research for Evidence-based Practice). To achieve the proposed research objectives, multiple methods will be employed, such as structured observation, textual analysis, surveys, focus groups, and interviews. We will use R software for statistical analyses and NLTK open source tool for textual analyses.

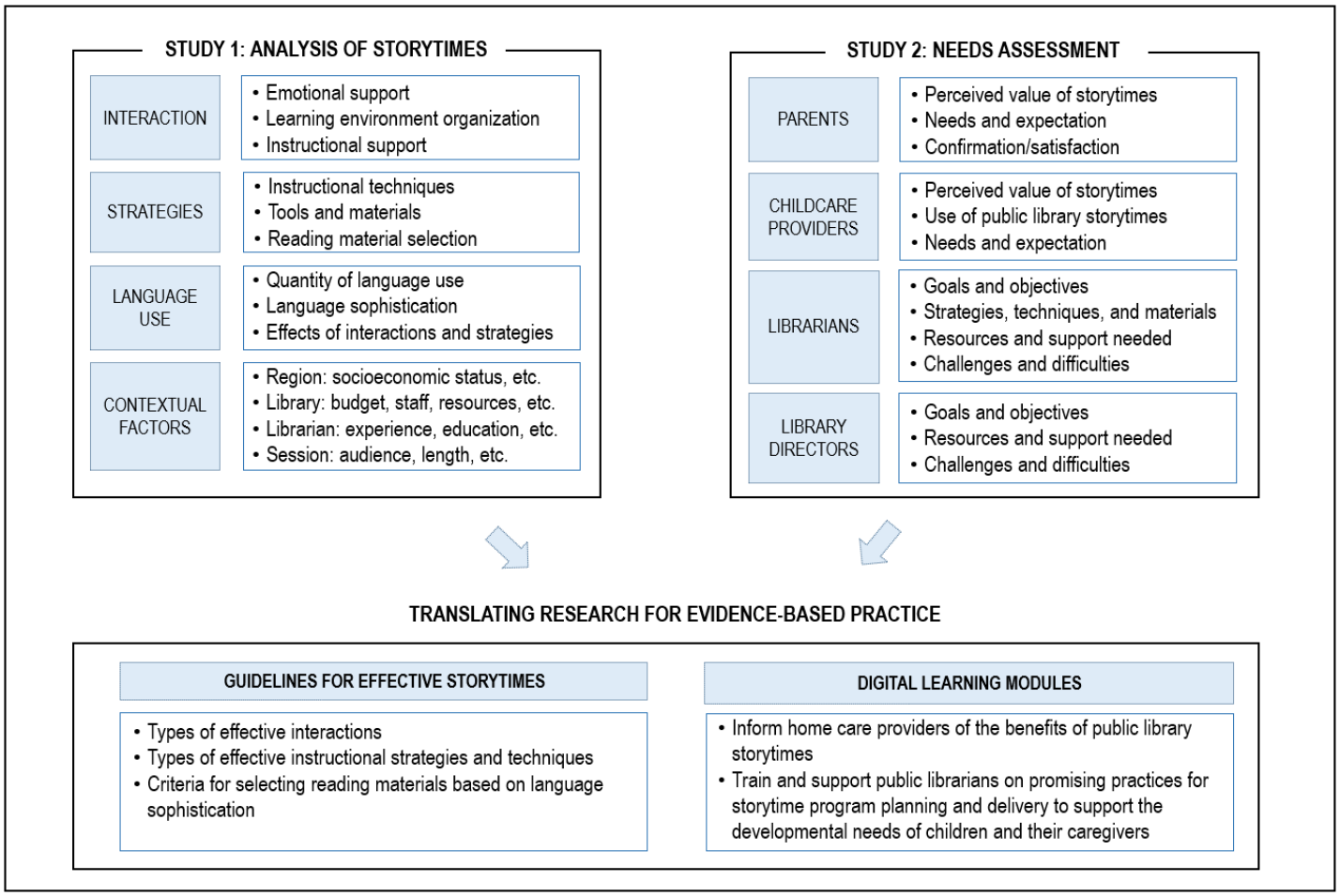


Figure 1. Research Framework

Table 1. Research questions, corresponding methods and associated outcomes

Phase	Research Questions	Methods	Outcome
Study 1	What is the nature of interactions between children and librarians in public library storytimes?	observations; content analysis	Understanding dimensions of storytimes
	What types of strategies are adopted and employed in storytimes? What are the behaviors of children in relation to those strategies?	observations; content analysis	
	What is the nature and complexity of language use in storytimes?	natural language processing; text mining	
	What are contextual factors affecting interactions, strategies, and language use in storytimes?	correlation analysis; hierarchical linear modeling	
Study 2	What do parents perceive as the value of storytimes? What are their expectations and needs for storytimes?	survey of parents	Needs assessment of four groups of stakeholders
	What do childcare providers perceive as the value of storytimes? For what purposes and in what ways do childcare providers utilize public library storytimes?	focus group interviews of childcare providers	
	What are librarians' goals and objectives when developing storytimes for preschool children?	interviews with librarians	

	What kinds of resources and support are needed for effective storytimes for preschool children? What challenges and barriers exist in providing storytimes in public libraries?	interviews with librarians; surveys of library directors	
Evidence -based Practice	What are effective interactions, strategies, and language use in storytimes for preschool children?	advisory board meetings; consolidating findings from Studies 1 and 2	Guidelines for effective storytimes; Digital learning modules to train librarians

Advisory Board
Throughout the project, we will convene advisory board meetings on a regular basis (see Schedule of Completion) to ensure the validity and reliability of all data collection and data analysis techniques and to provide guidance on the development of the storytime guidelines and the online learning modules. The advisory board will include all members of the research team, representatives from the three partner state library agencies, and three project advisors with expertise respectively in child development, public library programming for children, and educational psychology and statistical analysis.

Data Collection - Recordings of storytime, librarian demographic information, parent/caregiver needs
For storytime data, we plan to collect video recordings of 72 storytime sessions from 36 public libraries across three states. To solicit participation from public libraries, we have partnered with state library agencies in three states (see Supporting documents) where more than 50% of preschool children are unable or choose not to attend any type of preschool program, a factor well recognized as adversely affecting school readiness (Rathburn et al., 2016). In Spring 2018 our state library agency partners will send invitations to all public libraries in the 135 counties that fall within the 11 library regions identified as the sampling frame for this study, which targets multiple underserved groups including, but not limited to, racially and ethnically diverse populations, second language learners, inner-city and rural populations, and Appalachian communities. From the library systems that volunteer to participate, we will select 36 libraries as follows. For each state, we will draw a stratified random sample of twelve libraries based upon population of the legal service area and rural/urban designation. In Fall 2018, replicating data collection methods tested in Project VIEWS, the research team will visit all 36 library sites to collect data from 72 storytime sessions using a two-camera system to record both attendees who choose to participate and the storytime librarian. In this way, we can observe all details of every interaction between the librarian and the children and adult participants during the sessions. All utterances in videos will be transcribed. Additionally, we will administer two brief surveys: one to parents/caregivers (see Study 2 below) and one to the storytime librarian to collect demographic information, such as years of experience and educational background. As a token of compensation for their participation, we will offer a $200 gift certificate to a library supply vendor to all library systems that participate.

<u>Study 1 – Analysis of Storytimes</u>
(1) Data Analysis 1: Interactions between librarians and children: Beginning in Spring 2019 and continuing through Summer 2019 we will analyze interactions between storytime librarians and children through observation techniques and content analysis of the video recordings. The purpose of this analysis is to identify the nature of interactions occurring between librarians and children and to assess the quality of those interactions. We will use the Classroom Assessment Scoring System (CLASS) PreK instrument, a standardized observational measure of adult-child interactions designed for use in programs that serve preschool children (Hamre, Goffin, Kraft-Sayre, M., 2009). CLASS PreK is widely used in Head Start and other early childhood classrooms as a measure of the quality of teacher-child interactions and is included as a quality measure in many states' quality rating and improvement systems (Perlman, Falenchuk, Fletcher, McMullen, Beyene, & Shah, 2016). CLASS protocols can be modified for use in both formal and informal settings such as family

child care homes and afterschool programs, and they have been validated for use with diverse populations, including dual language learners and children with special needs. Over ten years of research using CLASS demonstrates a connection between high quality adult-child interactions and children's social skills, language, early literacy, and math outcomes (Hamre et al). CLASS provides a reliable and valid assessment based on three broad domains that help to measure the effectiveness of adult-child interactions:

- Emotional Support: the degree to which storytime librarians establish and promote a positive climate in storytime through their interactions; responsiveness to children, acknowledgement of children's emotions, and assistance in helping them resolve problems. The assessment of this domain emphasizes children's interests, motivations, and points of view.
- Learning Environment Organization: the degree to which storytime routines and procedures facilitate the organization and management of children's behavior, time and attention in storytime. The assessment emphasizes the extent of clear and consistent expectations.
- Instructional Support: the degree to which storytime librarians support and extend children's thinking, problem solving and conversational skills, and vocabulary. The assessment emphasizes the extent to which concepts are made relevant to children's everyday lives, asks questions that encourage children to analyze and reason, and offers help and feedback.

Three members of the research team will earn official CLASS certification prior to the collection of storytime recordings.

(2) Data Analysis 2: Strategies and materials employed in storytimes: From Summer 2019 through Fall 2019 we will employ structured observational techniques to investigate types of strategies employed in storytimes. First, we will randomly select 10% of the sample and use an inductive open coding process (Strauss and Corbin, 1990) to identify categories of librarian strategies, material use, and participant behaviors in storytime. We will then create an initial coding scheme to include an operational definition and relevant examples for each type of strategy, material, and behavior; and we will work with the advisory board to ensure the validity of the categories. The research team will use the coding scheme to code the full sample of storytimes. Intercoder reliability will be checked by coding about 20% of storytimes independently by multiple coders. Once all coding is complete, the research team will examine descriptive statistics, such as frequency and duration of strategies and behaviors. Finally, a network analysis (Kolaczyk & Csárdi, 2014) based on co-occurrence will be used to examine the relationships between different types of strategies and behaviors.

(3) Data Analysis 3: Language Use: Beginning in Summer 2019 and continuing through Fall 2019, using the transcripts of the storytime recordings, we will employ natural language processing techniques to examine the complexity of language use in storytimes. Using protocols similar to those used in investigations of preschool classrooms (Dickinson & Porche, 2011) we will analyze the following aspects of the language use:

- Token count and unique word count
- Number of sentences and sentence length
- Proportion of sophisticated words
- Proportions of grammatical properties (e.g., number of nouns, verbs, adjectives, adverbs, etc.)
- Sentiment scores
- The relationships between the language use and interaction and strategy types.

We will measure language quantitatively by analyzing token and unique word counts, and qualitatively by calculating proportions of sophisticated words using Biemiller's (2010) dictionary, a corpus of approximately 11,000 words which are categorized as high or low priority for young children. Results will reveal the extent to which storytimes support the learning of sophisticated vocabularies for preschool children. We will measure syntactical complexity through analysis of sentence and part-of-speech taggers (Jurafsky & Martin, 2014) in which all grammatical components of the observed sentences will be decomposed to investigate the proportions of nouns, verbs, adjectives, and other elements. Sentiment analysis will be also conducted by comparing observed terms with a sentiment term score dictionary, LabMT Dictionary (Dodds et al., 2011). More

importantly, we plan to examine the effects of interactions and strategies on the complexity of language in storytimes by calculating proportions of sophisticated words by interaction type and strategy type. Collectively, these analyses will inform a comprehensive understanding of the complexity of language use in storytimes.

(4) Data Analysis 4: Effects of contextual factors on storytimes: Finally, beginning in Fall 2019, we will examine the impacts of contextual variables on storytimes. To be more specific, four hierarchical levels of variables are to be investigated: regional level, library level, librarian level, and storytime session level. First, at the regional level, we are interested in the effects of two variables on interactions, strategies, and language use: (1) socioeconomic status (SES), measured by a composite variable of educational attainment and family income in the region, and (2) urbanization rate. Both variables are obtainable from the US Census. Second, at the library level, our foci are on the influences of libraries' service area size, budget, staff, and other resources on storytime practice. Library-level variables will be obtained from the datasets of IMLS Public Library Statistics. Third, at the librarian level, we plan to investigate the association between storytime librarians' qualifications and storytime practice. Finally, at the session level, the research team will consider the effects of variables such as the number of child participants, number of adult participants, session length, etc. Basically, we will examine all relationships between these contextual variables and storytime practice represented by frequencies of interactions and strategies and proportions of sophisticated words, using t-tests or ANOVAs for categorical variables and correlation analysis for numerical variables. Also, cross-tabulation will be applied to investigate specific patterns of interaction and strategy types employed by different contextual variables. Then, we will conduct hierarchal linear modeling to selective contextual variables to verify any significant causal relationships.

Study 2 – Needs Assessment

STUDY 2 is a comprehensive investigation of needs and perceptions of four stakeholder groups: parents, child care providers, librarians, and library administrators. We will be cognizant of Measures that Matter efforts and plans in collecting data for Study 2.

(1) Surveys with Parents/caregivers: As described above, in Fall 2018, we will survey adults who participate in storytime with their children to identify the needs and perceptions of parents and caregivers of young children. The print survey questionnaires (see supplementary materials) will be distributed to parents of attendees at the storytime site as they enter the storytime area. Completed questionnaires will be coded aggregately into a spreadsheet file, and we will analyze the collected survey data both quantitatively and qualitatively. In addition, the similarities and differences of parent/caregiver needs will be examined at the regional and library levels.

(2) Focus Group Interviews of Early Child Care Providers: In Spring 2018 we will conduct focus group interviews with licensed child care providers to identify their needs and perceptions in relation to both storytime and other public library programs and services. The project team will work in collaboration with the Child Care Resource and Referral organization in each of the three states to identify child care providers across different types of care settings (e.g., child care centers, preschool programs, family child care, Head Start, etc.) to participate in virtual focus group interviews (see supplementary materials). We will conduct a minimum of three focus group interviews, one in each state, using a semi-structured format via a synchronous web conferencing tool. As a token of compensation for their participation, a $25 Amazon online gift card will be given. All interview sessions will be audio recorded and transcribed. Using an inductive open coding process, the research team will identify the perceived value of storytimes to child care providers, the ways storytimes are used in child care environments, and the unique expectations, needs, supports, and barriers related to storytime attendance for childcare providers and the children they serve.

(3) Interviews with Storytime Librarians: In Fall 2018 we will conduct in-depth semi-structured interviews (see supplementary materials) with the storytime librarians to identify their storytime goals and the perceived supports and barriers related to designing and providing high quality storytimes for young children and their families, as well as children in formal child care settings. Interviews will take place separately from the

storytime recordings and will be conducted via a synchronous web conferencing tool and recorded and transcribed for analysis. We will analyze the interviews qualitatively using an inductive open coding process.

(4) Surveys of Public Library Directors: In Spring 2018, we will administer a survey (see supplemental materials) to directors of public libraries in the three states to investigate library-level support for storytimes. The specific objectives of this survey are focused around understanding storytime goals, supports, and barriers at the organizational level. In collaboration with state library agency partners, the research team will distribute a link to the online survey via email. We expect the online survey invitation will be distributed to approximately 500 library directors or administrators. We will analyze the collected data both quantitatively and qualitatively. The analysis will provide a comprehensive understanding of how storytimes are planned, provided, and assessed on the managerial side, which will supply useful evidence for development of guidelines in the translation stage of the study.

Translating Research For Evidence-Based Practice – Development Of Guidelines And Learning Modules

Once Study 1 and Study 2 are complete, the research team will consolidate the findings to identify evidence-based guidelines for effective storytimes. In addition, we will develop digital learning modules to train those who offer storytimes for preschool children including public librarians, school librarians, museum program providers, and child care providers.

(1) Storytime Guidelines: To review and consolidate the findings from Studies 1 and 2 and package and disseminate them in a manner consumable to library and early childhood education practitioners, the research team will work closely with the Advisory Board. Prior to the meetings, we will share the preliminary findings from Studies 1 and 2 and ask the Board to prioritize them in terms of importance and feasibility for inclusion in the guidelines. The first-round meeting will focus on the materials and strategies related to language exposure and complexity. The second-round meeting will focus on the comprehensive findings in the areas of effective interactions, strategies, and language use from Study 1. The Advisory Board will then prioritize types of interactions and strategies based on utility and effect on children's behavior in storytime environments. The focus of the third-round meeting will be to identify specific strategies to better meet the needs of the stakeholders based on the findings from Study 2 and to discuss solutions for challenges that librarians and library directors address. The final guidelines will consist of: (1) effective interaction methods; (2) effective strategies and materials; (3) parent and childcare provider priorities and needs in relation to storytime; (4) support and strategies for designing storytimes as recommended by librarians; and (5) strategies to efficiently deploy and promote storytimes to diverse groups of children.

(2) Learning Module Development: Using the guidelines developed above we will produce a minimum of two online learning modules to support librarians in creating and providing effective storytimes. The first module will focus on adult-child interactions that support child learning. The second module will focus on strategies and materials related to enhanced language environments in storytime. Learning modules will be 1-2 hours in length, self-paced and interactive in nature, and include reflection activities prompting librarians to consider incorporation of the learning into their storytime activities. Modules will be piloted with librarians who participate in Study 1 and will be modified based on their feedback as well as input from the Advisory Board. The learning modules will follow the model employed in the IMLS-funded *School Ready Libraries* and will include an evaluation component to measure participants' learning.

Dissemination of Results

In collaboration with our partner state library agencies, we intend to share the guidelines and learning modules widely with both the library and early childhood education communities, primarily through existing professional library association and early childhood education agencies. For example, we will distribute the guidelines and learning module access information through national- and state-level email distribution lists. We will also present the results at national- and state-level conferences for librarians as well as those for early childhood educators, and we plan to publish results in professional journals in both fields such as *Children and Libraries* and *Young Children*. Our state library partners will also share the guidelines and learning modules

with a national network of state agency youth services consultants affiliated with the Chief Officers of State Libraries Association. Additionally, because museums and school libraries also serve young children and their families (Cahill, 2004, 2012), we intend to distribute the guidelines and learning module access information through school librarian and museum programmer professional networks and venues as well.

In addition to translating the results for evidence-based practice through the development of the guidelines and learning modules, throughout the project, we also plan to share preliminary findings and final results with both early childhood and library and information scholars through presentations at national research conferences and through articles published in academic journals.

Potential Risks, Data Management and Data Sharing

In this study we will video-record storytime sessions and will capture the images and audio of participants and storytime librarians. Cameras will be positioned to allow storytime attendees who do not consent to participate in the research to do so without being recorded. This data collection technique was previously approved in the IMLS-funded Project VIEWS. The researchers will work closely with the UK Office of Research Integrity to avoid any potential violations of participants' rights. According to IRB regulations, all collected data will be securely managed and be used only for research purposes. Given the sensitive nature of and personally identifiable information contained within this data, we will restrict access to it. However, we intend to anonymize all identifiable information in transcripts and make those more accessible to other researchers.

Project Personnel

UK Faculty: Dr. Maria Cahill will serve as the project director and PI. Cahill's research focuses on the literacy development of children and adolescents within the context of library services and programming. She has published widely and presented locally, nationally, and internationally to librarians and educators on early childhood literacy development, library programming, and professional development of librarians. Cahill, who previously served as co-PI for the IMLS-funded *Literacy Matters* project, will coordinate all activities with the project personnel, partners, and advisory members. **Dr. Soohyung Joo**, co-Investigator, has expertise in research methods, textual analysis, and needs assessment. Joo has actively engaged in several projects analyzing library-generated data including library statistics and user surveys. This project is a natural extension of his research to investigate language use and needs assessment in library settings. **Mary Howard**, co-Investigator, is a Research and Development Associate focused on quality early care and education at the Human Development Institute, UK. Howard's focus is on research to inform policy to practice and creating cross-agency partnerships to ensure all young children have access to quality environments. She is currently PI on the IMLS-funded *School Ready Libraries* project partnering with the Kentucky Department for Libraries and Archives. UK faculty team members have years of experience in all planned methods in this study, including surveys, interviews, textual analysis, and learning module development. In particular, the researchers previously conducted a textual analysis and have built all programming tools required for text analysis in this study.

UK Graduate Students: We seek support for two graduate research assistants who will support the investigators in the data collection and analysis phases of the project. Their involvement in this project, coupled with their concentrated coursework, will position them to become leaders in children's programming and evidence-based librarianship.

Partner Organizations: We will partner with state library agencies in three states and work closely with **Krista King-Oaks, Janet Ingraham-Dwyer, Suzanne Walker, and Beth Yates,** the children's services consultants and programming personnel in those agencies with expertise in children's library programming and service. All four consultants will serve on the strategic advisory board.

Expert Consultants: Four research consultants will also serve on the strategic advisory board and guide the research team in data analysis and translating results for evidence-based practice. **Dr. Renee Casbergue**, Professor of Literacy at Louisiana State University, has more than 25 years of experience as a researcher of early literacy. She served as the PI of a $3.6 million Early Reading First project. **Dr. Lynne McKechnie**,

Professor of Information and Media Studies at the University of Western Ontario, has expertise in public library programming for children and qualitative research techniques. **Dr. Kun Lu**, Assistant Professor of Library and Information Science at the University of Oklahoma, has expertise in natural language processing, statistical analysis, and quantitative research techniques. One member of the *Measures that Matter* leadership team has also agreed to serve as a project advisor.

3. NATIONAL IMPACT

Public libraries are positioned to provide rich learning opportunities that support school readiness through programs with high quality language environments for young children and their caregivers (IMLS, 2013, 2014; Urban Libraries Council, 2007); however, there is little empirical evidence to demonstrate the extent to which storytime programs, a cornerstone of public library programming efforts, provide supportive environments to prepare children for academic success nor to understand the extent to which they meet the needs of parents and early childhood educators. This project will not only provide that much-needed evidence to position public libraries as essential community anchors, it will also serve as a research model for other scholars interested in investigating children's library programming as well as programming in other informal learning contexts.

Young children and their families: While public children's librarians and early care and education professionals are the direct recipients of the storytime guidelines and online learning modules, the 20 million young children, more than 25% of the population below age 18 in the US (AEC Foundation, 2016), and their families are the primary focus of this project and will benefit from improved public library storytime programs in which quality interactions, strategies, and materials coalesce, resulting in a supportive language environment which serves as a building block for school readiness, lifelong learning, and community engagement.

Public library programs and services: This project has the potential to transform the practice of children's librarians in public libraries where storytime and other children's programming comprise a majority of public library efforts and resources in this realm (Joo & Cahill, in press). Improving storytime programming to better prepare young children for the demands of formal schooling is significant on its own, but this project also aims to uncover the program and service needs of the parents of young children as well as early childhood educators; thus, positioning public libraries to better serve the needs of their communities.

Other library and informal learning environments: We intend to share guidelines, learning modules, and results with school librarians and museum programmers who also serve young children and caregivers; thus potentially transforming the practice of other professional communities.

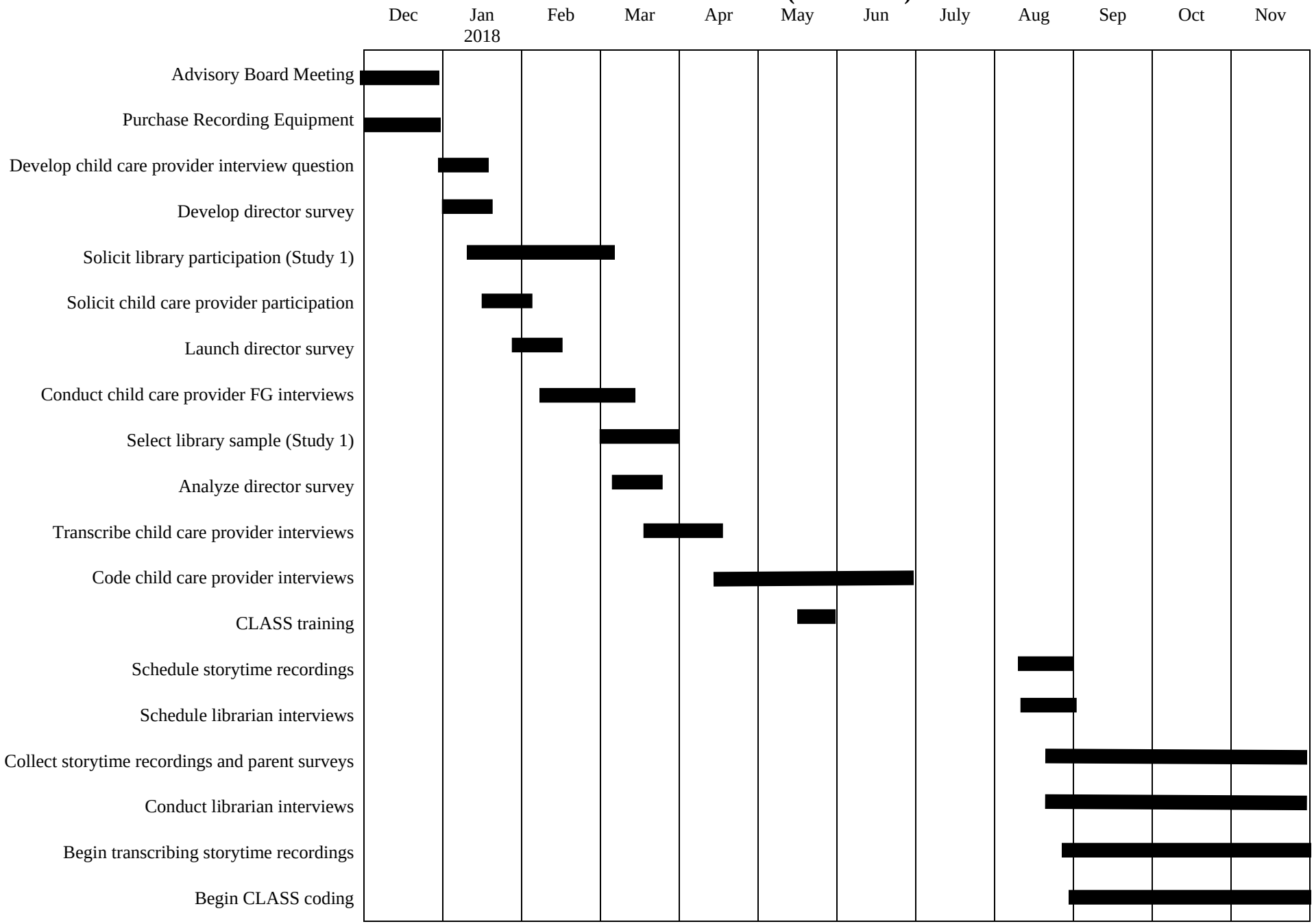
LIS educators and professional development leaders: Findings from this study, the only one which investigates public library storytime across multiple states, will serve LIS educators, public library directors, state library youth coordinators, and library association leaders as they prepare children's librarians to employ evidence-based practices in the delivery of high quality children's programming.

Scientific impact: Very few studies of adult-child interactions or the language environment of young children have taken place in informal learning contexts beyond the classrooms and homes of young children, and very little empirical evidence exists to measure or support the development of high quality public library storytime programming. Our contributions to the professional knowledge base in these areas should be valuable for other researchers and scholars interested in exploring similar issues in storytime and other informal learning contexts.

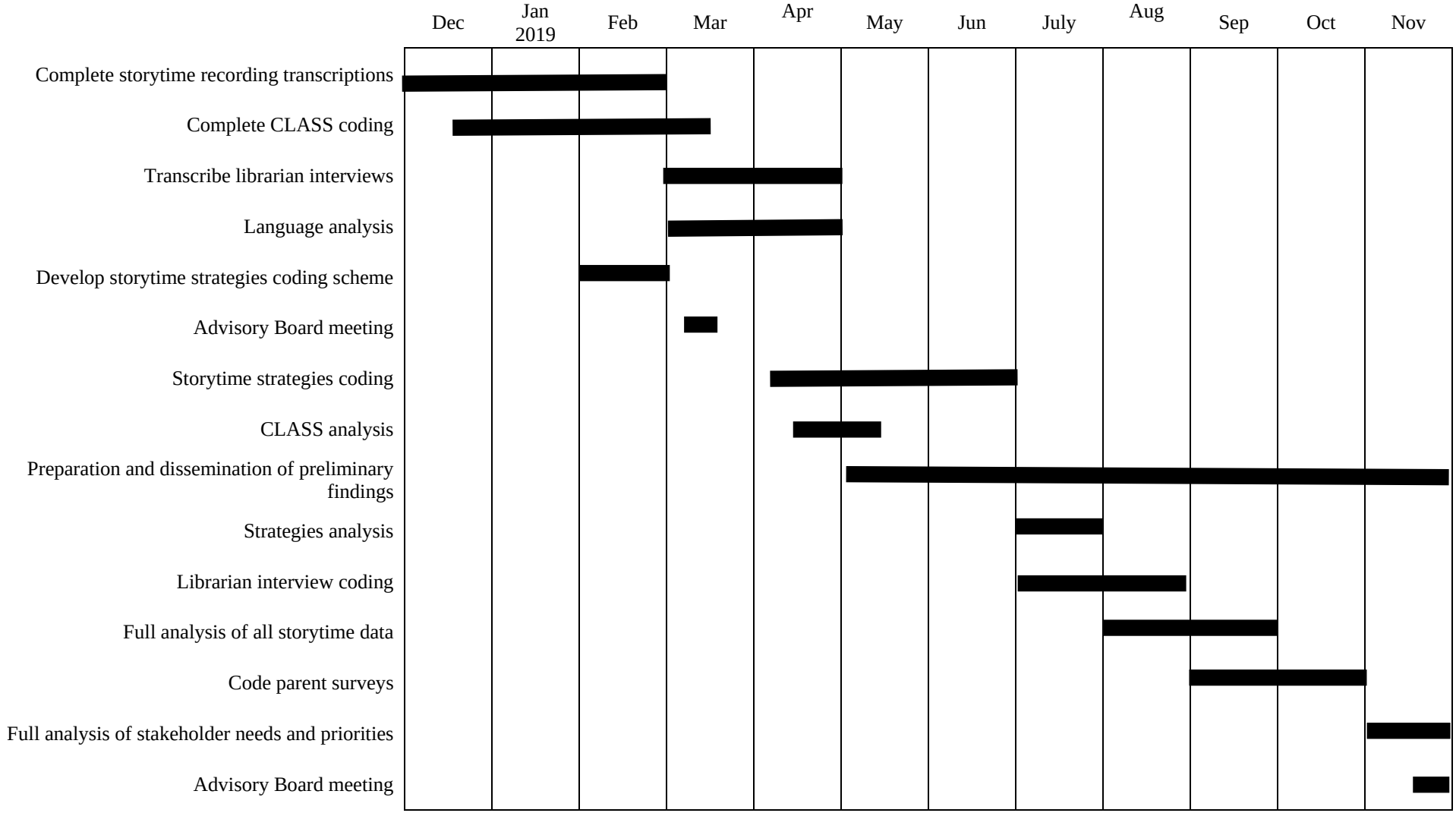
Evidence of Project Success

Performance Goal and Performance Measure Statement: As a Community Anchors project, we intend to strengthen libraries [and museums] as essential partners in addressing the needs of their communities. To measure the extent to which we do so, we will embed an evaluation survey that asks librarians and childcare providers to identify the extent to which they believe the guidelines and learning modules prepare them to engage in high quality adult-child interactions and provide rich language environments with parents. Our goal is for a minimum of 80% of respondents to indicate agreement or strong agreement to statements of impact.

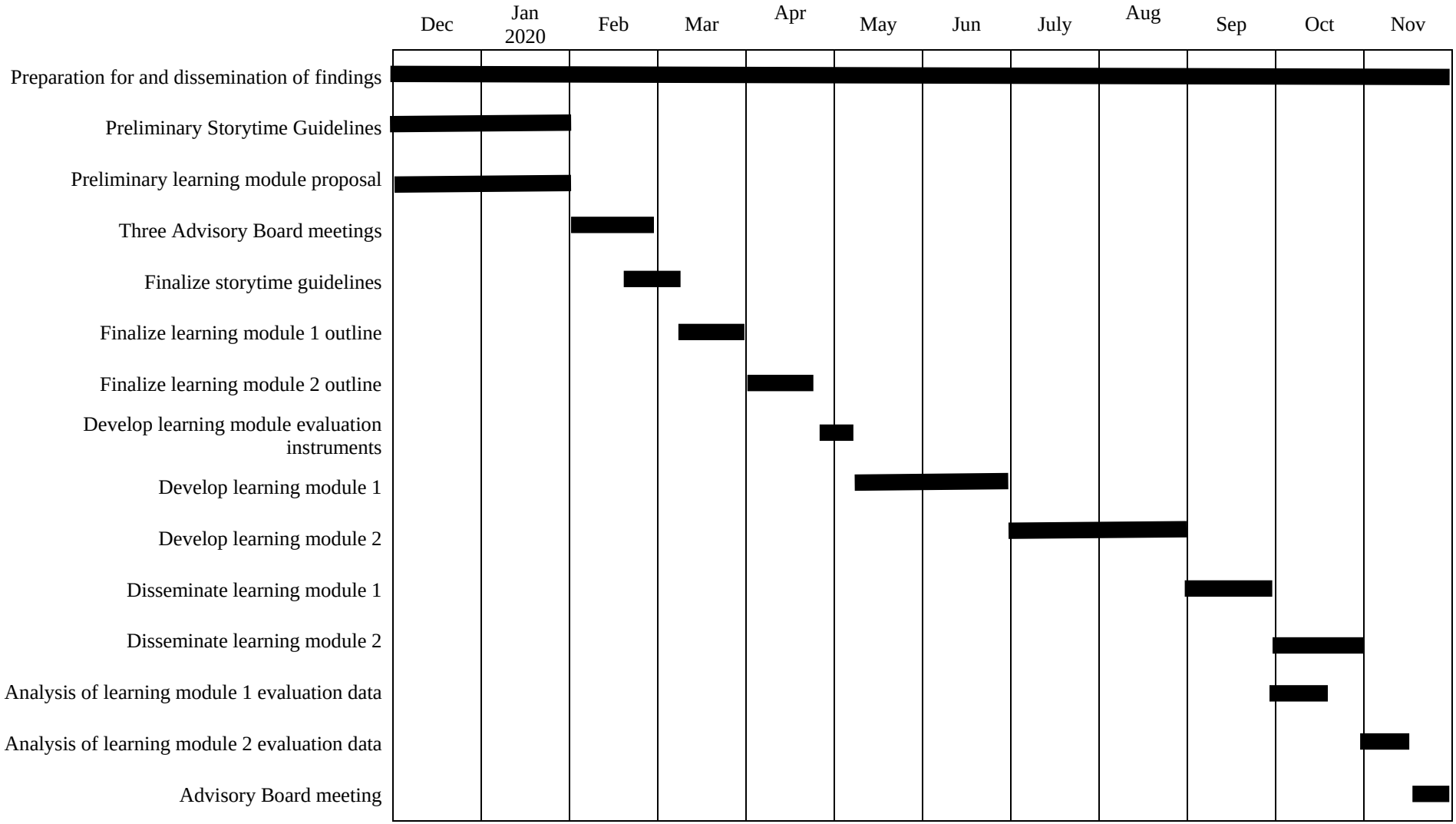
SCHEDULE OF COMPLETION: Year 1 (2017 – 2018)



SCHEDULE OF COMPLETION: Year 2 (2018 – 2019)



SCHEDULE OF COMPLETION: Year 3 (2019 – 2020)



DIGITAL STEWARDSHIP SUPPLEMENTARY INFORMATION FORM

Introduction
The Institute of Museum and Library Services (IMLS) is committed to expanding public access to federally funded research, data, software, and other digital products. The assets you create with IMLS funding require careful stewardship to protect and enhance their value, and they should be freely and readily available for use and re-use by libraries, archives, museums, and the public. However, applying these principles to the development and management of digital products is not always straightforward. Because technology is dynamic and because we do not want to inhibit innovation, we do not want to prescribe set standards and best practices that could become quickly outdated. Instead, we ask that you answer a series of questions that address specific aspects of creating and managing digital assets. 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 any type of digital product as part of your project, complete this form. We define digital products very broadly. If you are developing anything through the use of information technology (e.g., digital collections, web resources, metadata, software, or data), you should complete this form.

Please indicate which of the following digital products you will create or collect during your project
(Check all that apply):

	Every proposal creating a digital product should complete …	Part I
	If your project will create or collect …	**Then you should complete …**
☑	Digital content	Part II
☐	Software (systems, tools, apps, etc.)	Part III
☑	Dataset	Part IV

PART I.

A. Intellectual Property Rights and Permissions

We expect applicants to make federally funded work products widely available and usable through strategies such as publishing in open-access journals, depositing works in institutional or discipline-based repositories, and using non-restrictive licenses such as a Creative Commons license.

A.1 What will be the intellectual property status of the content, software, or datasets you intend to create? Who will hold the copyright? Will you assign a Creative Commons license (http://us.creativecommons.org) to the content? If so, which license will it be? If it is software, what open source license will you use (e.g., BSD, GNU, MIT)? Explain and justify your licensing selections.

This project will produce research data sets collected from video recording of storytimes, surveys, and interviews. The datasets will be in format of video files (storytime videos), spread sheets (survey data), audio files (interview recordings) and text files (transcripts of storytimes and interviews). The PI and co-investigators will hold the copyright of all datasets. Part of the datasets will be allowed for reuse for non-commercial research purposes, including survey data and transcripts without identifiable personal information. In addition, we will develop a minimum of two online learning modules to support librarians in providing effective storytimes. For those potentially sharable data, the Creative Commons license of CC, BY, and NC will be assigned.

A.2 What ownership rights will your organization assert over the new digital content, software, or datasets and what conditions will you impose on access and use? Explain any terms of access and conditions of use, why they are justifiable, and how you will notify potential users about relevant terms or conditions.

The copyright of the datasets will be held by the PIs. The PIs will allow the sharing of selective dataset for non-commercial research purposes. Under the approval of the UK Institutional Repository Board. The copyright of the digital learning modules will be held by the PIs, and the Creative Commons license of CC, BY, and NC will be assigned to them.

A.3 Will you create any content or products which may involve privacy concerns, require obtaining permissions or rights, or raise any cultural sensitivities? If so, please describe the issues and how you plan to address them.

We plan to collect video recordings of storytimes and will capture the images and video of participants as well as storytime librarians. We will work closely with the UK Office of Research Integrity for research design to avoid any potential violation of participants' rights. We will collected consent form according the IRB requirements. All collected data including vide recordings will be securely managed and only be used for research purposes.

Part II: Projects Creating or Collecting Digital Content

A. Creating New Digital Content

A.1 Describe the digital content you will create and/or collect, the quantities of each type, and format you will use.

We plan to build online learning modules to support librarians to plan, design, and provide effective storytimes for preschool children. At least two modules will be created, and each module is expected to be 1-2 hours in length. The modules will include reflection activities prompting librarians to consider incorporation of the learning into their storytime practice. The first module will focus on adult-children interactions based on the results of the project (Study1), which will support child learning while the second module will cover strategies and material selection related to children's language development. The format will be self-paced downloadable or streaming online video files, consisting of interaction types and examples, strategies and examples, case studies and best practices, material selection guidelines, and others.

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

We will use presentation software (such as PowerPoint) to create digital modules. For video editing, we will use Camtasia software for Windows (https://www.techsmith.com/camtasia.html), which supports creating video tutorials and presentations with various functions for video editing. The modules will be delivered through a learning management system such as Moodle or Canvas.

A.3 List all the digital file formats (e.g., XML, TIFF, MPEG) you plan to create, along with the relevant information on the appropriate quality standards (e.g., resolution, sampling rate, or pixel dimensions).

Possible digital file formats to be created include MS Word, MS PowerPoint, PDF, MP3 audio files, and MP4 video files. Appropriate quality standards will be maintained to ensure accessibility of all files via standard web browsers.

B. Digital Workflow and Asset Maintenance/Preservation

B.1 Describe your quality control plan (i.e., how you will monitor and evaluate your workflow and products).

The video modules will undergo multiple forms of evaluation for quality control. First, the producers will rehearse a couple of times before creating a module and collect feedback from all research team members to improve the quality. Based on the feedback, the scenario and content of modules will be modified and enhanced. Second, we will ask the advisory board to review the modules and to provide comments to enhance the quality of the modules. Third, modules will be piloted with selected librarians who participated in Study 1 and will be modified based on their feedback. In addition, the recording quality will be checked by the research team to meet the criteria of quality standards (see A.3)

B.2 Describe your plan for preserving and maintaining digital assets during and after the award period of performance (e.g., storage systems, shared repositories, technical documentation, migration planning, 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 CFR 200.461).

Original master files will be stored in both the PI's personal storage and the research team's cloud storage. Backup files will be made in an external storage and will be kept by the PI for long term preservation. The modules will be uploaded and shared via a learning management system.

C. Metadata

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

Learning Object Metadata (LOM) will be adopted as metadata standard, which is specialized for educational objects.

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

The research team will generate an LOM-based metadata document for each module in XML format. Separate XML documents with document type definition will be separately preserved and maintained by the research team.

C.3 Explain what metadata sharing and/or other strategies you will use to facilitate widespread discovery and use of digital content created during your project (e.g., an API (Application Programming Interface), contributions to the Digital Public Library of America (DPLA) or other digital platform, or other support to allow batch queries and retrieval of metadata).

It is expected that this project will produce a small number of digital objects (less than five). Therefore, metadata sharing on this scale is not necessary for this project. We will only share XML documents on request.

D. Access and Use

D.1 Describe how you will make the digital content 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).

The modules will be available to the public through an online learning management system such as Moodle or Canvas, and will be accessible via standard web browsers. We will have no restrictions on access.

D.2 Provide the name and URL(s) (Uniform Resource Locator) for any examples of previous digital collections or content your organization has created.

The research team has not created any online module in the past.

Part III. Projects Creating Software (systems, tools, apps, etc.)

A. 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) this software will serve.

N/A

A.2 List other existing software that wholly or partially perform the same functions, and explain how the tool or system you will create is different.

N/A

B. Technical Information

B.1 List the programming languages, platforms, software, or other applications you will use to create your software (systems, tools, apps, etc.) and explain why you chose them.

N/A

B.2 Describe how the intended software will extend or interoperate with other existing software.

N/A

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

N/A

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

N/A

B.5 Provide the name and URL(s) for examples of any previous software tools or systems your organization has created.

N/A

C. Access and Use

C.1 We expect applicants seeking federal funds for software to develop and release these products under an open-source license to maximize access and promote reuse. What ownership rights will your organization assert over the software created, and what conditions will you impose on the access and use of this product? Identify and explain the license under which you will release source code for the software you develop (e.g., BSD, GNU, or MIT software licenses). Explain any prohibitive terms or conditions of use or access, explain why these terms or conditions are justifiable, and explain how you will notify potential users of the software or system.

N/A

C.2 Describe how you will make the software and source code available to the public and/or its intended users.

N/A

C.3 Identify where you will be publicly depositing source code for the software developed:

N/A

Name of publicly accessible source code repository:
URL:

Part IV. Projects Creating a Dataset

1. Summarize the intended purpose of this data, the type of data to be collected or generated, the method for collection or generation, the approximate dates or frequency when the data will be generated or collected, and the intended use of the data collected.

This project will collect research data in multiple ways to achieve the research objectives, including video recording of storytimes, surveys, interviews, and focus groups. For the analysis of storytimes, we will collect video recordings of 72 storytime sessions from 36 public libraries located in Indiana, Kentucky, and Ohio (Aug 2018 - Feb 2019). The research team will visit each selected library and two video cameras will be used to capture both participants and librarians. For needs assessment, we will collect data from four different stakeholders, including parents/caregivers, childcare providers, librarians, and library directors. First, for parents/caregivers, print survey questionnaires will be distributed at the storytime site, and we expect to collect approximately 200 valid responses (Aug 2018 - Dec 2018). Second, for childcare providers, focus group interviews will be administered with about 20 participants (Feb 2018 - May 2018). All interview sessions will be audio recorded and transcribed. Third, for storytime librarians, interviews are planned with approximately 36 librarians (Aug 2018 - Apr 2019). Interviews will be conducted via a synchronous web conference tool. Interviews will be recorded and transcribed. Fourth, we will administer an online survey to directors of public libraries in the three states. We will distribute the online survey invitation to about 500 library directors, and expect to receive at least 100 complete responses. The collected data will be analyzed both quantitatively and qualitatively to accomplish the research questions of the project.

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 data collection will require approval from the Institutional Review Board (IRB) of the University of Kentucky for video recordings, surveys, interviews, and focus groups. We plan to submit a new IRB application for the project in the fall 2017.

3. Will you collect any personally identifiable information (PII), confidential information (e.g., trade secrets), or proprietary information? If so, detail the specific steps you will take to protect such information while you prepare the data files for public release (e.g., data anonymization, data suppression PII, or synthetic data).

The planned surveys, interviews, and focus groups will collect demographic information of each participant. We will use identification numbers to ensure the anonymity of responses, and all responses will be aggregated for analysis. In interview transcripts, we will not disclose any personally identifiable information such as organization names or subject names. Instead, subject numbers or organization numbers will be used in all transcripts. Storytime recordings will capture images and audio of participants. Only the research team members will be able to access those videos. Transcripts of storytime videos will not include any personally identifiable information. We will use subject numbers or organization numbers if necessary. All these processes will be approved from the IRB of the University of Kentucky.

4. If you will collect additional documentation such as consent agreements along with the data, describe plans for preserving the documentation and ensuring that its relationship to the collected data is maintained.

We will collect consent forms for video recordings, interviews, and focus groups. The consent forms will provide detailed descriptions of the project objectives, participation process, confidentiality, compensation (if any), and other information to be disclosed before participating the study. Only those who agree to the consent form will participate in the study.

5. What will you use to collect or generate the data? Provide details about any technical requirements or dependencies that would be necessary for understanding, retrieving, displaying, or processing the dataset(s).

First, for recording of storytimes, we will use two video cameras, one records storytime librarians and the other records attendees. The recorded videos will be transformed MPEG-4 format and securely saved in a cloud storage. All utterances in videos, then, will be recorded for analysis. Second, for surveys of parents/caregivers, print questionnaires will be used and will be coded using a spreadsheet, CSV file format. Third, for focus group interviews with childcare providers, we will use a web conferencing tool, Zoom (https://zoom.us). All interview sessions will be audio recorded and saved as MP3 format. Forth, for interviews with storytime librarians, the same tool, Zoom, will be used, and also be recorded as MP3 files. Finally, for online surveys with library directors, we will use the UK Qualtrics system (http://www.uky.edu/ukat/atg/qualtrics). The collected survey responses will be downloaded as CSV files. All video files, audio files, trascriptions and survey data will be uploaded and managed securely in a cloud storage. Only the research team will be able to access the data. Backup files will be made and securely stored in the PI's personal storage.

6. What documentation (e.g., data documentation, codebooks, etc.) will you capture or create along with the dataset(s)? Where will the documentation be stored, and in what format(s)? How will you permanently associate and manage the documentation with the dataset(s) it describes?

The following additional documents are expected to be created in the project: a coding book for storytime interaction analysis; a coding book for storytime strategy analysis; a survey questionnaire and coding book for parent/caregiver surveys; interview protocols for semi-structured focus groups interviews with childcare providers; protocols and a list of questions for semi-structured interviews with librarians; a survey questionnaire and coding book for library director surveys. All these additional documentation will be stored and managed together with the associated datasets in the cloud storage. Backup files will be made and securely stored in the PI's personal storage.

7. What is the plan for archiving, managing, and disseminating data after the completion of the award-funded project?

After the completion of the project, collected data except for storytime videos will be archived in the University of Kentucky institutional repository (uknowledge.uky.edu). The research team will upload those files with the assistance of the Department of Digital Scholarship at the University of Kentucky Libraries. We will create metadata to make them easily searchable on the web as well as Creative Commons license information.

8. Identify where you will be publicly depositing dataset(s): University of Kentucky Institutional Repository - UKnolwedge

Name of repository: UKnowledge
URL: http://uknowledge.uky.edu

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

We will visit and review this data management plan every time we create and store data. In addition, we will review this plan regularly at least twice a project year during the research team meetings to check whether all data are well managed as planned.