

ABSTRACT

Today, there is increasing demand for children’s librarians to have technological skills, particularly when it comes to creating and instituting libraries as digital learning spaces for children. However, most librarians and MLIS students, due to a lack of core curriculum on instructional design and design thinking/methods in MLIS programs, may have little to no exposure on instructional design and user-centered design (i.e., a set of practices that support explicit understanding of users, tasks, environments, and evaluation). To address this need, our project brings together a team of researchers from The Information School at University of Washington (UW iSchool) and the School of Education at California State University, San Marcos (CSUSM) to deepen understanding of libraries as community anchors through design thinking practices. This three-year project focuses on the development of **intergenerational participatory design (PD, co-design) groups for libraries and children** (ages 7 - 11). The goal of these co-design groups is to help librarians design and implement digital learning activities for local youth and family patrons. The project will occur from June 1, 2018, until May 31, 2021. The direct audiences for this research grant are public librarians serving youth, youth patrons participating in the project, and MLIS students. Indirectly, children and family patrons will benefit from librarians’ transformed practices. Our overarching research question is: ***How can intergenerational participatory design groups support libraries as community anchors through the co-design of digital learning activities FOR and WITH librarians and children?*** The primary research questions are: ***(RQ1)*** What are the affordances and challenges of creating and supporting intergenerational participatory design groups in libraries for digital learning?; ***(RQ2)*** How can we improve and build community anchor supports for intergenerational participatory design groups across different libraries, both local and national? ***(RQ3)*** What impact do intergenerational participatory design groups have on libraries, children, families, design processes and products, and other factors?; and ***(RQ4)*** How can MLIS students improve their professional practice with libraries and patrons through engagement with intergenerational participatory design groups?

The public library partners are The Seattle Public Library (WA, urban), Whitman County Library (WA, rural), Stevens County Library (WA, rural), and San Diego Public Library (CA, rural/urban). Each of these library systems serves a variety of marginalized youth populations, including rural, immigrant, and lower-SES youth. In addition, we will be integrating a service-learning MLIS course at UW iSchool for pre-service librarians to engage in co-design by supporting the development of intergenerational PD groups in libraries. Our framework of implementation focuses on a communities of practice model in which different forms of mentorship will occur to help train, recruit, and implement intergenerational co-design groups in libraries. The proposed project fills a significant gap in professional development by supporting both pre-service and experienced librarians to engage in design thinking practices with youth to create digital learning activities that matter for local contexts and neighborhoods.

Year 1 will setup the initial framework and **local** relationships for co-design. Our team will continue to setup, expand, and investigate how MLIS students, SPL, and children (ages 7-11) will engage in intergenerational co-design groups designing digital learning activities in three SPL branches. We will be also be working with two rural WA libraries and coordinating with CSUSM and setting up intergenerational co-design groups with three CA libraries in the San Diego area. **Year 2** will focus on **local and statewide** implementations of intergenerational co-design groups. We will be continuing co-design groups in the three SPL branches. These three SPL branches will help two rural WA libraries begin their co-design groups. We will be developing the first-round digital learning activities with all three WA libraries. Finally, we will be starting the CA intergenerational co-design team planning, recruitment, and training. **Year 3** will emphasize **local, state, and nationwide** implementations of intergenerational co-design groups. We will continue our co-design groups in SPL and WA rural libraries. During Year 3 we will begin three intergenerational co-design teams in CA. The SPL urban libraries will mentor two urban CA libraries, while the WA rural libraries will mentor a single rural CA library. Finally, we will use our primary data sources – interviews, videos, photos, field notes, and design artifacts – to develop a guide of best practices for other libraries across the U.S. to setup their own intergenerational co-design groups for digital learning development.

Abstract and overall summary of project

Libraries play a central role in connected learning spaces for youth (Ito et al., 2013) and are important community anchors for youth and family patrons to engage in digital learning opportunities (Lee et al., 2017). Today, there is increasing demand for children’s librarians to have technological skills (Adkins & Esser, 2004), particularly when it comes to creating and instituting libraries as digital learning spaces for children (Ito et al., 2013; Subramaniam, Ahn, Fleischmann, & Druin, 2012). Such library digital learning spaces include makerspaces, digital media design, robotics, games for learning, e-textiles, and computer programming (Barron, Gomez, Martin, & Pinkard, 2014; Ito et al., 2013; Lee et al., 2017; Subramaniam et al., 2012). However, most librarians and MLIS students, due to a lack of core curriculum on instructional design and design thinking/methods in MLIS programs (Clarke, Meyer, & Lee, 2017), may have little to no exposure on instructional design and user-centered design (i.e., a set of practices that support explicit understanding of users, tasks, environments, and evaluation). Thus, while librarians are tasked to create more opportunities for digital learning, both MLIS students and librarians are ill-prepared to be technology and instructional designers.

To address this need, our project brings together a team of researchers from The Information School at University of Washington (UW iSchool) and the School of Education at California State University, San Marcos (CSUSM) to deepen understanding of libraries as community anchors through design thinking practices. This three-year project focuses on the development of **intergenerational participatory design (PD, co-design) groups for libraries and children** (ages 7 - 11). The goal of these co-design groups are to help librarians design and implement digital learning activities for local youth and family patrons. The project will occur from June 1, 2018, until May 31, 2021. The direct audiences for this research grant are public librarians serving youth, youth patrons participating in the project, and MLIS students. Indirectly, children and family patrons will benefit from librarians’ transformed practices. The goal of this project is to develop a framework of implementation to help libraries set up their own independent intergenerational co-design groups, which can be expanded to include a larger number of libraries over time in a sustainable manner. Our overarching research question is: ***How can intergenerational participatory design groups support libraries as community anchors through the co-design of digital learning activities FOR and WITH librarians and children?***

The public library partners are The Seattle Public Library (WA, urban), Whitman County Library (WA, rural), Stevens County Library (WA, rural), and San Diego Public Library (CA, rural/urban). Each of these library systems serves a variety of marginalized youth populations, including rural, immigrant, and lower-SES youth. In addition, we will be integrating a service-learning MLIS course at UW iSchool for pre-service librarians to engage in co-design by supporting the development of intergenerational PD groups in libraries. While libraries have engaged in past PD projects with university partners (Dalsgaard & Eriksson, 2013; Somerville & Collins, 2008), less is known about 1) training and supporting public librarians to engage in co-design of digital learning activities for their own local contexts towards digital learning and 2) implementing co-design groups for libraries as community anchors that are independent and self-sustaining for public libraries and their resources. Our framework of implementation focuses on a communities of practice model in which different forms of mentorship will occur to help train, recruit, and implement intergenerational co-design groups in libraries. We will disseminate our framework to libraries, design researchers, and MLIS programs serving diverse youth around the country. The proposed project fills a significant gap in professional development by supporting both pre-service and experienced librarians to engage in design thinking practices with youth to create digital learning activities that matter for local contexts and neighborhoods.

Statement of Need

Design Thinking and Digital Learning: Design thinking is a creative approach and mindset in which people examine problems and attempt to develop new design solutions. Design thinking for libraries is both a very familiar aspect and an innovation in librarianship. In Clarke's (2018) study of contemporary American librarianship, she noted that libraries and librarians have a strong history and epistemology of designing tools and services to support patrons’ access to information resources. She noted Poole’s Index to Periodical Literature (est. 1848), The Washington County (MD) Free Library book-wagon (est. 1909), and The eXtensible Catalog (XC) project (est. 2006) as three case examples showing how librarianship aligns with fundamental

epistemological approaches towards designs (e.g., wicked problems, problem finding and framing, design iterations, critique, rationale, reflections-on-action, etc.). An area of librarianship that fits into design thinking is the development of children and youth services in libraries. In the past, children's librarians needed interpersonal skills, a love of children, the ability to manage resources, and a good knowledge of children's literature (Adkins & Esser, 2004). Today, there is demand and need that youth librarians know how to design, support, and implement digital learning programs for youth and families (e.g., Lee et al., 2017).

One way that design thinking has been helping youth librarians is IDEO's (2014) impactful report, *Design Thinking for Libraries*, that provides both a strong rationale for libraries and librarians for design thinking, and a toolkit to help librarians engage in these tasks. While IDEO (2014) has provided helpful activities, exercises, reflections, worksheets, and techniques for librarians to engage in design thinking, what is missing is a dedicated support system that helps librarians begin to engage in these design thinking practices with youth. The IDEO toolkit is designed to help librarians gain knowledge of a general audience. However, years of human-centered design research indicates that dedicated techniques and strategies are needed to engage in design thinking when it comes to working with youth (Druin, 2002; Walsh, Foss, Yip, & Druin, 2013; Yip et al., 2017)

Participatory Design and Libraries: Engaging in intergenerational participatory design (PD, or co-design) groups through a communities of practice model can be the key for BOTH librarians and MLIS students to engage in user-centered design and design thinking processes to design for youth. PD is a design method in which users (patrons) engage in the design process with expert designers (Kensing & Blomberg, 1998). The method focuses on supporting democratic, collaborative relationships between users and designers during the design process. By providing agency and opportunities for users to contribute, PD attempts to ensure that users have equal standing with designers while they work together. Collaborative design (co-design) is the subset of PD in which expert designers work closely with target stakeholder audiences to solve a design problem. While PD is broader and include any activity with end-users, co-design implies that the end-user is a part of the design process. It was not until the late 1990s that child-computer interaction researchers adapted PD and co-design more widely to include children in the design processes (Bekker, Beusmans, Keyson, & Lloyd, 2003; Druin, 1999). Libraries serve as important pillars for democracies, and we believe that creating opportunities for patrons to engage in a democratic process of design supports the ultimate mission of libraries. Prior work in PD has occurred in libraries (Dalsgaard & Eriksson, 2013; Somerville & Collins, 2008), but they have often focused on either short-term projects or university libraries.

To date, we have very little understanding how the development of PD groups of children and libraries could function and support libraries as community anchors. Therefore, our research on PD in libraries will provide first-hand data for developing an innovative support system and community of practice to work with local and national libraries interested in implementing intergenerational PD groups for digital learning and design thinking. This project builds on prior work from IMLS (LG-81-16-0151-16) by Lewis, Nelson, Simmons, Koh (advisory board member) and Ge on participatory action research study by creating ways for libraries in multiple contexts themselves to develop their own localized participatory design teams to create digital learning opportunities for family and children patrons.

Project and Significance

The ultimate aim of our research is to understand *how intergenerational PD groups can support libraries as community anchors through the process of co-designing digital learning activities WITH and FOR children and librarians*. To study this research overarching question, we will create, train, and disseminate a framework for libraries to develop their own intergenerational PD groups. Research results will be used to:

(1) Create a process in which libraries can engage in PD independently to create digital learning activities. Our model of implementation will support librarians to help them create their own intergenerational co-design groups of adults, teens, and children to help develop learning activities for local family and child patrons. By helping to support the creation of these co-design groups, we are helping local libraries develop different ways to integrate PD methods to support local neighborhood needs.

(2) Provide a means to create a central hub at UW iSchool and SPL to help train and support pre-service and veteran librarians engaging in PD across the country. To ensure that there is a support system in place for librarians running local intergenerational co-design groups, we are developing a support system to create a community of practice (Lave & Wenger, 1991) between the different libraries and the University of Washington. Using an MLIS course (“Participatory Design in Libraries”) that teaches about PD in libraries, we will have pre-service library students work closely with SPL as part of service learning to create intergenerational co-design groups around libraries in Seattle. From this, we will work together with SPL to outreach our PD model to other urban and rural libraries in Washington and California, thus expanding our scope from the local community to state-wide, and then to the national level. We will generate a framework of implementation that look at how libraries can be supported and then independently run co-design teams.

(3) Create materials, workshops, seminars, and presentations to help other librarians engage in PD. To support our community of practice model, we will develop a diverse means of introducing PD methods to librarians to help them co-design new digital learning activities. We will invite librarians to take part in co-design groups at SPL. To outreach to librarians who cannot be in-person, we will not only have them attend online seminars, but also use telepresence robots to engage in local co-design teams around SPL. The resulting professional development resources will help develop pre-service and veteran librarians engage together and promote widespread adoption and sustainability.

Research Questions

Our research will use a qualitative approach to answer the following sub-questions: **(RQ1)** What are the affordances and challenges of creating and supporting intergenerational participatory design groups in libraries for digital learning?; **(RQ2)** How can we improve and build community anchor supports for intergenerational participatory design groups across different libraries, both local and national? **(RQ3)** What impact do intergenerational participatory design groups have on libraries, children, families, design processes and products, and other factors?; **(RQ4)** How can MLIS students improve their professional practice with libraries and patrons through engagement with intergenerational participatory design groups?

Project Design

Prior Work and Collaborations: KidsTeam UW. Our research into PD has been built on a strong foundation of prior successful research. First, for three years, PI Jason Yip has developed a robust on-campus intergenerational co-design group between SPL and children co-designers (ages 7-11), called *KidsTeam UW*. Here, we have engaged in 13 co-design sessions and have created a number of digital learning activities that have been used successfully by youth and family patrons at SPL. One example of our completed digital learning activities is the Sphero BB-8¹ project with SPL. We (*KidsTeam UW* and Juan Rubio, Digital Program Manager at SPL) started with two co-designs, asking *KidsTeam UW* children and adults to create collaborative/competitive activities for BB-8 robots. One activity in particular was very popular among the co-design team; using the BB-8 robots to collaboratively and competitively knock each other out of a ring (e.g., sumo wrestling). From these sessions, SPL and UW iSchool derived a set of design guidelines for other librarians interested in this activity. These guidelines include a summary of the sessions, main takeaways and lessons learned, and suggestions for future designs. Next, SPL used these guidelines to create their own set of digital activities for the BB-8 robots. Here, 100 youth patrons have used the BB-8 learning activities with six libraries involved. See **Appendix C for letters of support and D for completed BB-8 materials.**

KidsTeam SPL and “Participatory Design in Libraries” Course. Second, PI Yip and Co-PI Jin Ha Lee have taken on curricular initiatives for design thinking in the UW iSchool MLIS program. We have created a new course for design thinking and librarians to be offered as part of the core curriculum (both local and online). We have also created an MLIS course on PD between librarians, pre-service librarians, and patrons (“Participatory Design in Libraries”). As part of this course, we have developed a second intergenerational co-design group of neighborhood children, MLIS students, and librarians (*KidsTeam SPL*) hosted at SPL

¹ <http://www.sphero.com/starwars/bb8>

(Columbia City branch). On Monday afternoons, we held discussion groups on readings and concepts in PD. On Friday afternoons, students traveled to SPL (Columbia City) together with Drs. Yip and Lee to run PD sessions with children and stakeholders in the library. MLIS students also created and lead their own co-design sessions with children. In Fall 2017, we had 18 MLIS students, 2 librarians, and 15 children (ages 7 - 11) participate in the sessions for 10 consecutive weeks. In the end, MLIS students co-designed a series of design guidelines for librarians to create their own digital learning activities (in this case, it was around story creation around video games). In Spring 2018, five MLIS students from the Fall course have agreed to take on this project as their Capstone and continue to work with the SPL Columbia City branch to test *KidsTeam SPL* employing teen volunteers. What we learn from this pilot testing will help us better structure and deploy our framework during the main research phase. See **Appendix E** for more details on course materials.

Digital learning. Co-PI Sinem Siyahhan currently serves as the principal investigator of a National Science Foundation-funded project where she develops and implements maker activities in collaboration with librarians using the design thinking process to broaden the participation of underrepresented student populations (ages 9-13). The maker activities called “design challenges” integrate 3D printing, robotics, and electronic textiles and invite parents as co-learners with their children. Previously, Dr. Siyahhan served as the Co-PI for the Joint Media Engagement, Play, Literacy, and Learning among Mexican-American Families Project where she investigated how families and young children (age 4 and 7) use digital media technologies in the physical context of their home and the socio-cultural context of family practices and routines. Throughout the last decade, she researched and designed educational video games and applications, and game-based learning experiences and programs for youth and families in schools, museums, and libraries to support STEM learning. At CSUSM, Dr. Siyahhan oversees a required course in School of Education where undergraduate students run STEM-focused maker activities during after school hours.

Proposed Work Plan

Overview of our framework of implementation: Our team comprises of faculty, a UW Ph.D. graduate student, MLIS students, and undergraduate CSUSM students to collaborate with library practitioners and other volunteers in the creation of multiple intergenerational co-design groups and the support system needed to implement these groups. We will refer to Figure 1 as the framework of our implementation.

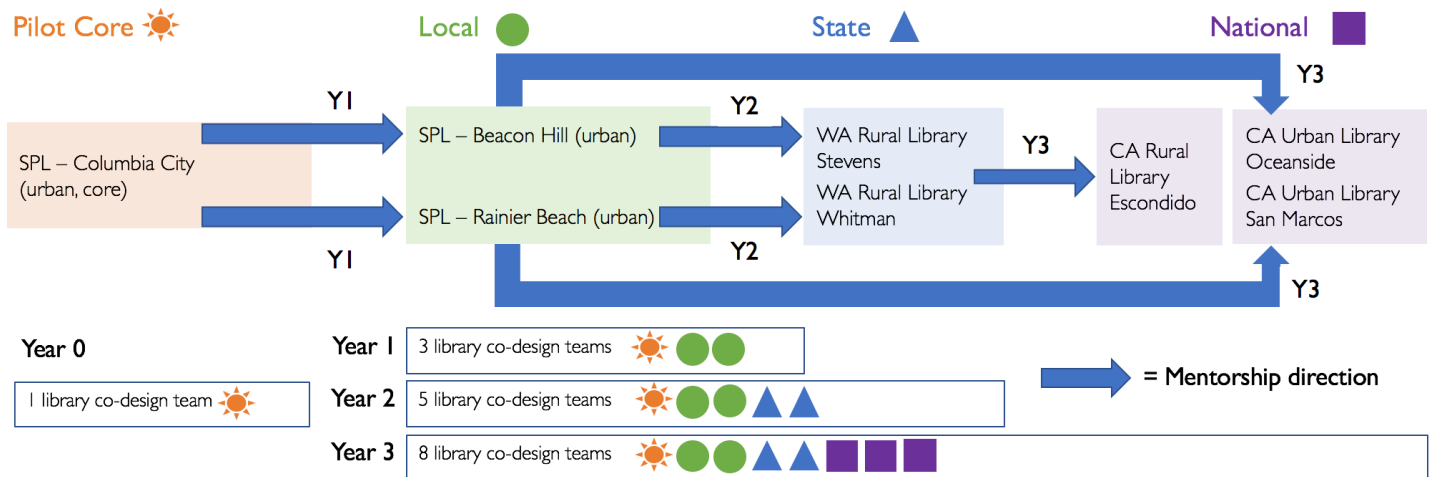


Figure 1. Our framework of intergenerational co-design groups for local, state, and nationwide.

In this study, we will implement three phases of mentorship for supporting intergenerational co-design groups in libraries. In **Year 1** we focus on developing intergenerational co-design teams in urban libraries through **university support**. In this framework, we will work closely with libraries using MLIS students (UW) at The Seattle Public Library (SPL). Our pilot study has already set up the first core co-design team at SPL - Columbia City. In Year 1, we will start two more co-design teams at SPL (Beacon Hill and Rainier Beach). SPL - Columbia City will act as a mentor for these two new startups. This framework tests if we can successfully implement intergenerational co-design teams in public libraries utilizing university resources and at the same

time, offer valuable practical experiences to the students. **Year 2** emphasizes implementation support from the **community**. Here, we will focus on two WA rural libraries. To support the wider implementation of co-design groups in rural libraries, we will have SPL Beacon Hill and Rainier Beach provide guidance with online mentorship and UW iSchool providing site visits. We will be working with these libraries using teen volunteers as facilitation and support. This is to ensure that our framework can also work in public libraries that may not have direct access to university resources and students. Finally, **Year 3** examines the feasibility of intergenerational co-design in a **national mixed implementation**. This is to ensure that librarians can independently support and mentor new co-design teams in other libraries in other states to make the framework nationally sustainable. We will focus on the San Diego, CA area with two urban (Oceanside, San Marcos) and one rural library (Escondido). The WA rural libraries from Year 2 will mentor Escondido, and the urban SPL libraries will work with Oceanside and San Marcos. Over the three years, the number of libraries we are going to work with will increase (as shown in Figure 1). The UW research team will always serve as mentors for all the libraries, but we also want to ensure that the partnering libraries can independently implement and train other librarians who are interested in establishing co-design teams. Please see **Schedule of Completion** for more details about the timeline.

Year 1: To setup the initial framework and relationships for co-design

Setup KidsTeam SPL and develop digital learning activities. In Year 1 - Phase 1, our team will continue to setup, expand, and investigate how MLIS students, SPL, and children (ages 7-11) will engage in intergenerational co-design groups designing digital learning activities. Based on the foundational pilot work in building *KidsTeam UW* and *KidsTeam SPL*, the PI will have MLIS students support three different libraries (Columbia City, Beacon Hill, and Rainier Beach) in Seattle to engage and establish co-design groups to design digital learning activities. Given the successful pilot of the course “Participatory Design in Libraries”, we will continue the framework of MLIS service-learning through PD. Here, we will establish three KidsTeam SPL sites, with the librarian (Richard Council) from the Columbia City branch mentoring Beacon Hill and Rainier Beach. This will provide an opportunity for us to observe the mentorship process, and together with the librarians, reflect on what worked well and what can be improved for the mentorship that will take place in the second year. In Fall 2018, we will teach the PD MLIS class; for Spring 2019, we will work with MLIS students on a capstone project or directed field work in supporting both KidsTeam SPL at the three sites. In Beacon Hill and Rainier Beach, we will focus on helping them recruit more adolescent volunteers to become facilitators in the co-design team. This experience will give these volunteers an opportunity to learn more about human-centered design and help youth via the volunteer program in their local community. PI Yip has had experience successfully working with teenagers at the University of Maryland as facilitators of co-design for younger children. Each library will collect data, such as video recordings, photographs, analytic memos, and artifacts. During this phase, SPL librarians will work with MLIS students to create new digital learning activities for their branches. First, librarians will work with MLIS students to go through the co-design data and generate design guidelines for the development of digital learning activities. Next, librarians will use the guidelines they generated to develop the activities and find ways to try them out in their local contexts.

Building relationships with WA and CA libraries. In Year 1 - Phase 1, PI Yip and Co-PI Lee will begin outreach to two WA rural libraries serving a high needs population to engage in developing their own “KidsTeam” intergenerational co-design groups. We will begin site visits, interviews, and observations to determine what needs they have and how to build a relationship between these non-SPL libraries to create co-design groups. For Year 1 - Phase 2, we will also begin coordinating with Co-PI Siyahhan and setting up co-design groups with three CA libraries in the San Diego area (Oceanside, San Marcos, Escondido). The SDPL site will be a way for us to better understand how to develop a national program for intergenerational co-design groups and how scalable co-design library groups can be as community anchors. Both Oceanside and San Marcos libraries are urban libraries in the SDPL area that serve a diverse population, including lower SES families. Escondido is a rural library site the north of San Diego.

Training WA librarians and supporting recruitment efforts. Finally, in Year 1 - Phase 3, we will begin to train the two rural WA librarians to engage in co-design methods for implementation in Year 2. We will 1)

invite all WA and CA librarians to participate in intergenerational co-design groups at SPL, both in-person or through telepresence robots; 2) provide webinars that will guide librarians through the PD methodologies; and 3) host an annual in-person workshop at the UW and additional online workshops for librarians to meet and support each other. During Year 1, we will use surveys and interviews of librarians to investigate the viability and their context-specific need to create intergenerational co-design groups. We will also make site visits and observations of SPL co-design implementations and examine the affordances and challenges of the co-design process for both local Seattle, WA state, and out-of-state San Diego. During this time, we will determine for each site a digital learning problem that each library wants to design for. We will work with librarians to understand their patrons and develop a recruitment strategy for families and children.

Year 2: Local urban and statewide rural implementations of co-design groups.

Continuing co-design groups in SPL. For Year 2 - Phase 1, SPL teams will continue to run their own versions of *KidsTeam SPL*. For Columbia City, this will be their third implementation (pilot, Years 1 and 2) and for Beacon Hill and Rainier Beach, this will be their second time (Years 1 and 2). Each team will again determine a set of digital learning problems they would like to address and use co-design methods and intergenerational teams to find solutions. All three SPL sites will continue working with MLIS students from UW iSchool through Capstone projects or directed fieldwork options.

Establishment of WA intergenerational co-design groups through local to state mentorship. In Year 2 - Phase 1, we will begin the first implementations of co-design with the rural WA libraries. Prior to implementation, we will identify a 8 to 10-week period of time that works for the co-design teams, a design problem for digital learning, and recruitment strategies for each team. During this time, we will still continue our “Participatory Design in Libraries” course for MLIS students and they will also support the rural WA libraries by helping them to analyze co-design data. In previous work, Druin (1999) demonstrated that a small group of three Native American children (age 8) in New Mexico provided insightful design ideas for technological design. We will work closely with the WA rural librarians to recruit a small and manageable group of children, come up with a digital learning problem that necessitates a design solution, and help implement the *KidsTeam* program in this site. For Year 2 - Phase 2, all rural WA state librarians will work on developing digital learning activities for deployment in their local contexts. We will mentor them through the process co-design data to the development of learning activities. Working with Juan Rubio at SPL, we will provide workshops for the librarians on this process. As well, each of the WA state libraries will work with their mentor librarian at SPL to go through the development. Finally, MLIS students will support these WA rural libraries by also working with them to create these digital learning activities from co-design data.

Starting CA intergenerational co-design team planning, recruitment, and training. Finally, in Year 2 - Phase 3, we will work with the CA libraries on recruitment for co-design teams and work with CA librarians. Through telepresence robotic co-design sessions, workshops, and on-site visits, we will support each of the CA libraries on recruitment strategies, professional development on co-design methods, and mentorship from the WA state and SPL local libraries.

Year 3: Local, state, and nationwide implementations of intergenerational co-design groups.

Continuing co-design groups in SPL and WA state. In Year 3 - Phase 1, each of the five libraries (three SPL, two WA rural libraries) will continue their implementation of intergenerational co-design teams in their local area. Each library will identify another digital learning need they would like to explore. As well, we will encourage librarians to also think about youth problems in libraries that could be good challenges for co-design. MLIS students will continue to support these libraries through different service-learning means (e.g., on-site support, data analysis, digital activities setup).

Beginning CA intergenerational co-design teams. In Year 3 - Phase 1, we will work with SPL to set them up as a national leader in supporting intergenerational co-design initiatives. Co-PI Siyahhan will lead the first national implementation of this initiative in the San Diego area. We will have the libraries in SD partner up with already established co-design groups at WA state and SPL for support. We will develop a community of practice (Lave & Wenger, 1991) around co-design in libraries through two to four webinar meetups on specific topics related to co-design, continued robotic telepresence co-design support, online or in-person consultation,

and one all-day online workshop gathering of the interested participants between WA and CA libraries in the final year. Each of the CA libraries will work at different periods of time between September to February (depending on their schedules). The urban CA libraries (Oceanside, San Marcos) will be mentored by SPL (Beacon Hill, Columbia City, and Rainier Beach). The rural CA library (Escondido) will be mentored by the two rural WA libraries. For Year 3 - Phase 2, we will have the three CA libraries develop their own digital learning activities from the co-design session. Similar to Years 1 and 2, we will have the mentor libraries help guide the development of these activities by first working to develop design guidelines from the co-design data. Once the guidelines are developed, librarians will work to develop digital learning activities for their local contexts and try testing them out.

Building guidelines for best practices. Finally, in Year 3 - Phase 3, we will use our primary data sources – interviews, videos, photos, field notes, and design artifacts – to develop a guide of best practices for other libraries across the U.S. to setup their own intergenerational co-design groups for digital learning development. The guide will provide librarians with the knowledge, tools, and best practice for the development of intergenerational co-design group to support digital learning. We will hold final online workshop meetings with all of the interested libraries to determine what affordances and challenges persisted in the implementation. In addition, we will make our PD curriculum available for other universities serving and training librarians in design thinking. Both the guide and the course curriculum will be evaluated and refined based on the findings of this research study.

Data Collection, Analysis, and Outcomes

Table 1 outlines our extensive plan for answering our research questions. Please refer to our **Appendix A** for more specific information on data collection and analysis plan.

Questions	Methods	Analysis focus	Outcomes
(RQ1) <i>What are the affordances and challenges of creating and supporting intergenerational participatory design groups in libraries for digital learning?</i>	<p>Analysis of co-design team data: Video recordings, photographs, artifacts, design guidelines, and learning activities (Years 1, 2, 3)</p> <p>Interviews with librarians, children, and other participants about co-design (post co-design at Years 1, 2, 3)</p> <p>Librarian training workshops: Video recordings, artifacts, memos (Years 1, 2, and 3)</p>	Examine the co-design partnerships focusing on aspects of 1) Relationship building; 2) Co-facilitation of participants; and 3) Designing together; and Ideas generated (Yip et al., 2017)	<ul style="list-style-type: none"> ● Examination of development of digital learning activities through co-design ● Understanding of the needs and limitations of each context for co-design ● Further refinement of the framework of implementation
(RQ2) <i>How can we improve and build community anchor supports for intergenerational participatory design groups across different libraries, both local, state, and national?</i>	<p>Interviews with librarians, children, and other participants about co-design implementation (pre and post co-design sessions in Years 1, 2, 3)</p> <p>Community-based surveys of patrons using digital learning activities (children, adults) (Years 1, 2, and 3)</p> <p>Librarian training workshops: Video recordings, artifacts, memos (Years 1, 2, and 3)</p>	Examine how co-design can be a strategy for library community supports and collaborative anchors for vulnerable populations (Hildreth, 2012; Moxley & Abbas, 2016)	<ul style="list-style-type: none"> ● Understanding of how co-design can play a role in developing community supports and anchors in libraries in different communities ● Guidelines and workshops for how to support librarians in establishing co-design groups and how to anchor them in the community.

(RQ3) <i>What impact do intergenerational participatory design groups have on libraries, children, families, design processes and products, and other factors?</i>	<p>Co-design team data: Video recordings, photographs, artifacts, design guidelines, and learning activities (Years 1, 2, 3)</p> <p>Interviews with children, families, librarians, and other members of intergenerational co-design team. (after implementations of learning activities Years 1, 2, and 3)</p>	Examine what participants are learning through co-design (Guha, 2010; McNally, Mauriello, Guha, & Druin, 2017), such as design thinking skills, social benefits, and other cognitive skills.	<ul style="list-style-type: none"> ● Examination between the connection of co-designing and running digital learning activities for patrons. ● A curriculum of digital learning activities developed for and with children and librarians. ● Design guidelines for digital learning activities through co-design.
	<p>Implementation of digital learning activities with patrons: Surveys, video recordings, learning activities artifacts (end of Years 1, 2, and 3 after co-design sessions)</p>	Examine connected learning (Ito et al., 2013) affordances and challenges of co-designed digital activities.	
(RQ4) <i>How can MLIS students improve their professional practice with libraries and patrons through engagement with intergenerational participatory design groups?</i>	<p>MLIS students: Interviews, class assignments (Fall of Years 1, 2, and 3 for classes, Spring of Years 1, 2, and 3 for Capstone projects)</p> <p>Co-design team data: Video recordings, photographs, artifacts, interviews, design guidelines, and learning activities (Years 1, 2, 3)</p>	Determine how co-design may or may not fit in the future plans of MLIS students and their engagement (Albertson & Whitaker, 2011).	<ul style="list-style-type: none"> ● Guidelines for developing courses on co-design for other MLIS programs. ● Support for other MLIS program on how to develop service-learning through co-design.

Table 1. Logic Model of Research Questions

Project Resources: Personnel, Time, and Budget

We have assembled a project team with exemplary skills, experience, and accomplishments related to the focus of the proposed work.

Project Directors: Drs. Yip, Lee, and Siyahhan will serve as the projects principals. *Dr. Jason Yip*, Assistant Professor at the University of Washington’s Information School will serve as the project director. He is the founder of *KidsTeam UW*, an intergenerational co-design team of children (ages 7 - 11) and adults. Dr. Yip’s current research focuses on how new digital technologies support collaborative learning between children and their family members. He brings an expertise in connected learning principles, joint media engagement, child-computer interaction, and PD. *Dr. Jin Ha Lee* is an Associate Professor at the University of Washington’s Information School and a founder and director of the GAMER (GAME Research) Group. Her research primarily focuses on providing better access to video games and interactive media, understanding user behavior related to games, and using games for informal learning. She is also the program chair of the MLIS program at The Information School. *Dr. Sinem Siyahhan* is an Assistant Professor of Educational Technology and Learning Sciences, and a core faculty member in the Educational Leadership Joint Doctoral Program at California State University San Marcos. She is also the Founding Director of *Play2Connect*, an initiative that aims to support family learning, communication, and connection through gaming. She has experience in multiple digital learning projects with libraries in the San Diego area. All three PIs will function as the overall project managers, coordinating all activities with project partners, advisory board members and the librarians who will be

participating in all phases of the project. The time commitments and responsibilities of Drs. Yip, Lee, and Siyahhan are described in more detail in the attached **Budget Justification**.

Students: This project will fund one graduate student at UW. Kung Jin Lee is a second year UW doctoral student and has years of experience researching in participatory design and libraries. We will also be working with UW MLIS students and CSUSM undergraduates in helping to support the librarians on this project.

Partner Libraries: The project personnel on this project include multiple librarian stakeholders. In The Seattle Public Library (SPL), we are working with Juan Rubio (Digital Media and Learning Program Manager), Richard Council (Teen Services Librarian - Columbia City branch), and Wendy Israel (Librarian - Beacon Hill). We are currently identifying our third librarian at Rainier Beach. In Washington State, we have identified two rural libraries and partners (Jessica Varang in Stevens County and Kristie Kirkpatrick in Whitman County). Finally, for our CA implementation we are working with Oceanside, San Marcos, and Escondido (rural) libraries. Please see **Appendix B** for letters of support and **List of Key Project Staff and Consultants** for more details.

Advisory Board (AB): We have assembled an excellent advisory board whose members hold a wide range of expertise for this project. Susan Hildreth (professor of practice at UW iSchool and former director of the Institute of Museum and Library Services) will advise us on library programs implementation and community anchors. Dr. Allison Druin (associate provost of Pratt University and founder of *KidsTeam* at the University of Maryland) will advise us on co-design implementation strategies. For digital learning support in libraries we will work with Dr. Kyungwon Koh, Assistant Professor in the School of Library and Information Studies at the University of Oklahoma and PI in Learning in Libraries: Guided Inquiry Making and Learning in School Libraries (IMLS LG-81-16-0151) and Dr. Victor Lee, Associate Professor in Instructional Technology and Learning Sciences at Utah State University and expert in design research in rural libraries. Finally, for rural library program implementation we will work with Georgia Lomax (Executive Director Pierce County Library System) and Cindy Aden (Washington State Librarian). We will conduct virtual meetings with AB members twice per year to obtain their continuous feedback and input, and will engage their specific expertise in the development of our framework of implementation for co-design teams.

Facilities, Equipment, and Supplies: Since most of the project activities are hosted at the partner libraries, we will be using the partners' library spaces to host the multiple intergenerational PD teams. For the purposes of the framework development and dissemination, we will leverage existing infrastructures available at UW and CSUSM, such as server, webinar platforms, learning management system, and data storage.

Time: The grant period will run from June 1, 2018, until May 31, 2021. The project timeline is further detailed in the attached **Schedule of Completion**.

Proposed Budget: We are requesting funds are requested for: (1) salary and fringe benefits support for the co-PIs during the summer; (2) support for a graduate assistant including tuition, stipend, benefits and fees; (3) travel support for co-PIs; (4) materials and supplies for co-design sessions; and (5) honoraria for project partners. The total amount requested for this project is \$353,071. Through a subcontract, CSUSM will be requesting \$63,411. See **Budget** and **Budget Justification** for further details.

Plan for Diversity

A key strength of this proposal is our commitment to creating implementation and mentoring support that are targeted towards addressing the needs of different libraries serving marginalized populations. All of the libraries in this study (SPL, WA, and CA) serve a large population of youth and families in marginalized communities. Our "Participatory Design in Libraries" course has developed a collaboration with two library branches (Columbia City & Beacon Hill) serving youth in marginalized communities, including immigrants, refugees, and lower socioeconomic families speaking over 40 languages. We plan to use the existing partnership and process at SPL to recruit youth and families from marginalized communities that would benefit from engagement in co-design processes. Second, we have commitments from libraries from various contexts, from large urban (SPL, San Diego) to small and rural (Stevens, WA; Whitman, WA; Escondido, CA). We

believe that our focus on the needs of urban and rural libraries will help us to better serve patrons from all walks of life. This sampling strategy ensures that not only are we creating a framework of implementation that are scalable and address different contextual limitations, but that we are ensuring that we are producing resources that meet the needs of librarians serving a wide range of patrons from marginalized groups. Finally, because we are working closely with MLIS graduate students at UW iSchool and undergraduates in service-learning at CSUSM, we will be preparing a diverse group of future library learners.

Communication Plan

Our communication plan is ongoing throughout the project lifecycle; we will ensure that our framework of co-design implementation will reach a large and broad audience of librarians. First, we will leverage the extensive professional networks of the PIs, partner libraries, and advisory board members to publicize our work. In our pilot work, our MLIS course on PD and our existing partnerships with SPL Columbia have already raised awareness within the youth-services librarian community, including librarians who have worked with marginalized populations. We anticipate more youth librarians coming to visit each of our 8 library sites to learn more about co-designing with youth. We will keep this group of librarians informed about the development of our co-design teams and framework of implementation. During each year of the project we will present our research findings at YALSA, ALISE, ALA, WLA, AERA, and other conferences. We will publish our work in peer-reviewed publications such as the *Journal of Research on Libraries and Young Adults*, *Library Quarterly*, and *Library and Information Science Research*. Our UW team will also develop a website to host all of the digital learning activities and guidelines developed from the co-design teams. Here, we will publish practitioner guidelines and university curriculum (local and online) on how to establish a co-design group.

We will write blog and print pieces geared toward practitioner audiences to ensure that our framework of implementation and design guidelines become widely known. PI Yip is already an established well-known blogger at The Joan Ganz Cooney Center at Sesame Workshop on family digital learning. We will target outlets, such as YALSA's blog, *American Libraries*, ConnectedEducators.org, *School Library Journal*, and *Young Adult Library Services*. We will use social media (e.g., Twitter, Facebook) to circulate these pieces around to they reach a more broader audience. In Year 3, we will work with all of our AB members to help develop free webinars. They will be used to introduce the framework of implementation and the research behind its development and evaluation to interested audiences, including public and school librarians, public library directors, school administrators, and LIS and digital technology researchers. We will adapt Davis and Subramaniam's *ConnectedLib* (funded by IMLS LB21) format of webinar outreach and toolkit development to support librarians.

Sustainability Plan

The local, state, and national mentorship plan of this study will contribute greatly to its sustainability. First, we have already developed a strong core based on PI Yip's independent *KidsTeam UW* and their existing relationship in co-designing with SPL. In addition, our MLIS service-learning course on PD already serves local SPL libraries. The resulting core allows UW iSchool and SPL to act as a mentorship hub for other libraries interested in creating their own intergenerational co-design groups. We anticipate that our librarians participating in Year 1 will be the founding members of this co-design community. Second, our mentorship structure focuses on helping libraries get started, but allowing them independence for adaptation to local contextual factors. Future libraries that want to establish co-design teams will have a community of practice in which eight other libraries have established their own teams. As this community grows, libraries within our community can provide advice, resources, and if possible, mentorship to other libraries. Third, we are establishing MLIS curriculum for PD in libraries. We will work with other LIS programs across the U.S. to help them adapt our service-learning curriculum and help continuously build local library-university partnerships in supporting the development of co-design teams. Finally, this study examines both urban and rural library implementations of co-design of youth digital learning activities. Our plan is to continuously learn and adapt our framework of implementation for different contexts. In particular, under-resourced libraries can learn from our framework of implementation to show that even smaller co-design teams can make a difference.

DIGITAL PRODUCT FORM

Introduction

The Institute of Museum and Library Services (IMLS) is committed to expanding public access to federally funded digital products (i.e., digital content, resources, assets, software, and datasets). The products 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 can be challenging. 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

- Please check here if you have reviewed Parts I, II, III, and IV below and you have determined that your proposal does NOT involve the creation of digital products (i.e., digital content, resources, assets, software, or datasets). You must still submit this Digital Product Form with your proposal even if you check this box, because this Digital Product Form is a Required Document.

If you ARE creating digital products, you must provide answers to the questions in Part I. In addition, you must also complete at least one of the subsequent sections. If you intend to create or collect digital content, resources, or assets, complete Part II. If you intend to develop software, complete Part III. If you intend to create a dataset, complete Part IV.

Part I: Intellectual Property Rights and Permissions

A.1 What will be the intellectual property status of the digital products (content, resources, assets, software, or datasets) you intend to create? Who will hold the copyright(s)? How will you explain property rights and permissions to potential users (for example, by assigning a non-restrictive license such as BSD, GNU, MIT, or Creative Commons to the product)? Explain and justify your licensing selections.

The intellectual property status of the digital products we intend to create (e.g., guidelines, reports, digital learning activities) will be licensed under a Creative Commons Attribution 3.0 - Noncommercial U.S. License. We will explain to potential users they are free to share any reports, guidelines, curriculum, and digital learning activities as long as they attribute the source. With proper attribution, they can copy and redistribute the material in any medium or format. They are also allowed to adapt, remix, transform, and build upon the material for any purpose, even commercially. We have chosen this form of intellectual property status because we want different libraries, MLIS programs, and designers to use our materials and adapt them to their local contexts. However, we believe that attribution to institutions and designers should be given to properly credit them for their work, and also inform the people using the materials whom they can contact for questions and suggestions.

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 ownership rights our organization will assert over new digital products will focus on attribution and appropriate credit. Our digital products will be for open access; we only need appropriate credit. We will notify potential users about relevant terms or conditions by placing a human-readable summary of the Creative Commons Attribution 3.0 U.S. license in our materials.

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.

Because our work involves children, we will take extra precautions to ensure safety and privacy. First, for any materials involving children's names, we will only refer to them through pseudonyms and generic demographics (e.g., age, gender, ethnic background). For any publications involving children's faces (e.g., videos), we will either digitally blur children's faces, select photos that do not show their faces, or we will obtain consent and assent from parents and children for their usage.

Part II: Projects Creating or Collecting Digital Content, Resources, or Assets

A. Creating or Collecting New 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 format you will use.

- One project website providing general information about our work and contact information, hosted by University of Washington;
- Two to Four webinars in Year 3 on specific topics related to participatory design and library implementation;
- Materials for two online workshops in Year 1 & 2, and one online and one in-person workshops in Year 3, including agenda and description of activities;
- Minimum of 8 sample lesson plans explaining goals, design guidelines, activities, and outcomes;
- Course syllabi for "Participatory Design in Libraries" which is annually updated; and
- Final report of the project published via project website.

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

All the hardware and software necessary for this research are provided by the University of Washington Information School. The Project Director (PD) and the research assistant will be using workstations provided by the UW Information School. We will use *Dedoose* for coding most of our data including videos, audio recordings, and transcripts. We will use OneDrive to save and share any project data among the research team members to meet the FERPA requirements.

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

DOCX (Word documents), PPT (Powerpoint presentations), MPEG Streamclip & MP4 (Video, compression H.264, frame size of 1920 x 1080 (unscaled), MPEG4 AAC (Audio, 256kbps), JPEG (Photo, uncompressed, 3024 x 4032).

B. 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 PIs and graduate student researcher will train librarians to collect and maintain the research data in a safe, private, and confidential way. Librarians will be given secure UW accounts to upload any video and audio data they collect to the shared OneDrive, and PIs will regularly review the data in order to ensure that they meet our standards for quality and privacy. The course syllabi and lesson plans will also be uploaded to the shared OneDrive folder and will be organized so that they are easily accessible to all team members.

B.2 Describe your plan for preserving and maintaining digital assets during and after the award period of performance. Your plan may 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 of our project outcomes will be hosted on the OneDrive which is offered as part of the University of Washington's computing resources for faculty. We have unlimited storage and it is FERPA/HIPPA compliant. After the award period, the data will be continued to be stored on the OneDrive indefinitely for future research. Other instructional materials (e.g., lesson plans) will be offered via the project website which will be hosted by the University of Washington.

C. Metadata

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

We will be providing basic metadata tags for our instructional materials on the project website to aid the searching/browsing of librarians and other users. We will use Dublin Core to provide the metadata for the website itself.

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

We will instruct any team members uploading relevant materials to the website to provide basic metadata tags and ensure that they are associated with the materials themselves.

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).

We will be using the websites of multiple organized research units at the University of Washington Information School such as Digital Youth Lab, and Game Research Group as well as major social media platforms such as Twitter and Facebook as well as various listserves relevant to libraries (e.g. YALSA) to promote our work to facilitate widespread discovery and use of our work.

D. 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).

All of our project outcomes will be freely available via project website under a Creative Commons Attribution 3.0 - Noncommercial U.S. License. We will make preprints of our journal and conference articles available via ResearchWorks, University of Washington's digital repository based on DSpace. With proper attribution, anyone will be able to use, redistribute, as well as modify instructional materials. All the project outcomes will be accessible with standard web browsers.

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

Please see our Appendix for digital content created between KidsTeam UW and The Seattle Public Library.

Part III. Projects Developing Software

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) it will serve.

Not applicable for this project

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

Not applicable for this project

B. Technical Information

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

Not applicable for this project

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

Not applicable for this project

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

Not applicable for this project

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

Not applicable for this project

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

Not applicable for this project

C. Access and Use

C.1 We expect applicants seeking federal funds for software to develop and release these products under open-source licenses to maximize access and promote reuse. What ownership rights will your organization assert over the software you intend to create, and what conditions will you impose on its access and use? 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 and justify any prohibitive terms or conditions of use or access and detail how you will notify potential users about relevant terms and conditions.

Not applicable for this project

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

Not applicable for this project

C.3 Identify where you will deposit the source code for the software you intend to develop:

Name of publicly accessible source code repository: Not applicable for this project

URL: Not applicable for this project

Part IV: Projects Creating Datasets

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

We plan to collect the following data:

Research question 1

Analysis of co-design team data: Video recordings, photographs, artifacts, design guidelines, and learning activities (Years 1, 2, 3)

Interviews with librarians, children, and other participants about co-design (post codesign at Years 1, 2, 3)

Librarian training workshops: Video recordings, artifacts, memos (Years 1, 2, and 3)

Research question 2

Interviews with librarians, children, and other participants about co-design implementation (pre and post co-design sessions in Years 1, 2, 3)

Community-based surveys of patrons using digital learning activities (children, adults) (Years 1, 2, and 3)

Librarian training workshops: Video recordings, artifacts, memos (Years 1, 2, and 3)

Research question 3

Co-design team data: Video recordings, photographs, artifacts, design guidelines, and learning activities (Years 1, 2, 3)

Interviews with children, families, librarians, and other members of intergenerational co-design team. (after implementations of learning activities Years 1, 2, and 3)

Implementation of **digital learning activities** with patrons: Surveys, video recordings, learning activities artifacts (end of Years 1, 2, and 3 after co-design sessions)

Research question 4

MLIS students: Interviews, class assignments (Fall of Years 1, 2, and 3 for classes, Spring of Years 1, 2, and 3 for Capstone projects)

Co-design team data: Video recordings, photographs, artifacts, interviews, design guidelines, and learning activities (Years 1, 2, 3)

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?

Yes, the proposed data collection and research activity will require approval by an IRB. Our proposed research activity has already been approved based on our pilot work in 2017. For this study, we would do a modification of our current IRB.

A.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).

We will collect personally identifiable information for recruitment purposes only (name, phone number, emails). To protect the data, we will store all personally identifiable information on an encrypted hard drive with password protection. We will also anonymize all data involving participants by blurring faces for photographs, using pseudonyms, and identification numbers for participants.

A.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 be collecting consent (parents, adults) and assent (children) forms. We will store paper copies of the documentation in a locked file cabinet at the University of Washington's office. We will also scan consent and assent forms and store them on OneDrive (HIPPA/FERPA compliant).

A.5 What methods 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).

We will be collecting video recordings, photographs, and analytic memos through participant observation methods. We will also be collecting audio/video recordings of interviews. We will be using online surveys as well.

Video recordings: We will be recording videos using video cameras with MP4 format and compressing them using H.264 (1920 x 1080p resolution, unscaled, audio at 256 kbps). Video data will be uploaded to University of Washington's OneDrive servers (FERPA/HIPPA compliant). All data access is password protected using UW identification.

Audio recordings: We will be using dedicated iPod Touches for recording using Voice Memos app (AAC format). All iPod Touches are password protected. Audio data will be uploaded to University of Washington's OneDrive servers (FERPA/HIPPA compliant). All data access is password protected using UW identification.

Photographs: We will be using dedicated iPod Touches for photography using Camera app (jpg format). All iPod Touches are password protected. Images will be uploaded to University of Washington's OneDrive servers (FERPA/HIPPA compliant). All data access is password protected using UW identification.

Analytic memos: We will write analytic memos using DOCX files. Memos will be uploaded to University of Washington's OneDrive servers (FERPA/HIPPA compliant). All data access is password protected using UW identification.

Survey data: Survey data will be done through University of Washington's Catalyst system. Data will be uploaded to University of Washington's OneDrive servers (FERPA/HIPPA compliant). All data access is password protected using UW identification.

A.6 What documentation (e.g., data documentation, codebooks) 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?

We will be generating codebooks and using a web-based coding tool called *Dedoose* (www.dedoose.com). None of the data will have identifiable information. The codebook documentation will be stored University of Washington's OneDrive servers (FERPA/HIPPA compliant). All data access is password protected using UW identification. For coding in Dedoose,

analytic memos will be wiped of any identifiable information prior to upload. We will associate all data using identification numbers and pseudonyms of users.

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

We will be archiving and managing the data indefinitely on University of Washington's OneDrive servers. We will store data on OneDrive (HIPPA/FERPA compliant) and it will only be accessed through UW identification and passwords. We will be disseminating the data in the form of peer-reviewed journals, conference papers, books and book chapters, white papers, reports, blogs, and design guidelines. All dissemination will not have any personal identification and use pseudonyms.

A.8 Identify where you will deposit the dataset(s):

Name of repository: University of Washington's OneDrive
URL: <https://onedrive.live.com>

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

We will be reviewing this data management plan twice a year (once every six months). The implementation plan will be monitored by the PI to ensure privacy, confidentiality, and security. The PI will monitor the data management by 1) creating a list of users with access; 2) going over data management plan with students (e.g., all data must be on secure encrypted password protected drives. ; 3) having students and researchers participate in CITI training to best understand how to treat data; and 4) check the data for any privacy and confidentiality concerns.