

Keene Public Library, Keene, NH

Little Makers: Library STEM and Maker Activities for Very Young Learners

Keene Public Library (KPL), a Maker Ed Maker Corps site since 2013, is seeking a three year Community Anchors Project Grant of \$248,020 with \$54,213 cost-share to study how combining maker and early learner STEM activities with family engagement affect the acquisition of new knowledge and skills. Partners include Maker Ed, Keene State College, Peer Associates, SAU29, and the Cheshire Children's Museum. The project will deliver open-ended STEM and making learning experiences for young children to foster science process skills acquisition, as well as provide training and resources that equip librarians and educators to offer high-quality science instruction and facilitation with young children and families. The work will result in the following: 1) a model of family engagement with young children and STEM, making, and tinkering activities; 2) a research-based effective practices framework for developing STEM and making experiences for very young children in libraries; 3) resources for librarians and educators, including a facilitator guide, 4) professional development at conferences; and 5) evidence-based case studies of family participation and library facilitation.

STATEMENT OF NATIONAL NEED: Today most libraries have hosted STEM programs for children and families but programs are not always offered to our youngest patrons. A 2016 survey of librarians and science educators conducted by the STAR Library Education Network found the most common STEM-rich learning experiences are hands-on investigations, art-based STEM projects, STEM-related storytimes, and demonstrations. 34% of the respondents indicated that they offer library makerspaces. The most common general age levels targeted by these experiences are elementary school age students (87%), middle school students (64%), and then Pre-K students (57%). (Hakala and MacCarthy. 2016) "An impressive 97% of libraries are interested in offering more STEM programming to patrons, but are unable to accomplish this due to limited time, staff, and resources; a lack of support for new technology; and a lack of confidence in teaching STEM material." (Hakala and MacCarthy. 2016)

RELEVANCE TO LIBRARIES AS COMMUNITY ANCHORS: This project will develop tools, processes, methodologies, mindsets associated with effectively facilitating STEM, making, and tinkering. This will allow Youth Librarians to engage patrons and support lifelong learning. The project will serve communities by building the capacity of Youth Librarians to integrate making and tinkering learning into existing programs and to expand skills for engaging families. New project tools and resources will positively affect the quality of library STEM programs and enhance libraries' relevance in the community.

PROJECT DESCRIPTION: This project will focus on measuring learning outcomes for children from ages two through six, build capacity, engage both the library community and local organizations, and create durable partnerships and curricula that will support early childhood STEM learning in libraries. We will develop library making and tinkering programs to study how these early learner STEM activities affects the acquisition of new knowledge and skills in young children. In particular, we will answer these questions: 1) How can STEM facilitators shape parent-child conversations during hands-on activities that will influence children's interest and understanding of STEM? 2) What are the potential effects of making activities on children and family engagement in areas such as language skills, real-world problem-solving abilities, or parental comfort with supporting their child's learning? We will use the answers to these questions to develop new tools and a framework, which will help Youth Librarians to deliver effective library-based making and tinkering programs for young children with confidence.

PROJECT PARTNERS: Our partners include Maker Ed, Keene State College, Peer Associates, the Cheshire Children's Museum, SAU 29. Maker Ed will serve as a project advisor. We will work with Keene State College to develop student practicums in which upper-level science education college students will work directly with young children and families. Peer Associates will evaluate the project. SAU29 and the Cheshire Children's Museum will offer an alternative location for programming.

PROJECT DESIGN AND WORKPLAN:

Year 1: The coordinator of this project will be Gail Zachariah, the Head of Youth and Community Services at KPL. She will work with Dr. Deborah Black, Professor of Education at Keene State College, to develop the programs and

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space. She will hire an Early Childhood STEM Librarian who will serve as a part-time coordinator and who will manage the project day-to-day. The KPL STEM librarian will train existing staff and recruit STEM facilitators to develop curricula and present family programs. At least 24 Science Saturdays will be scheduled and promoted. Families with children ages 2 to 6 will register and attend these activities involving language and sensory awareness play, along with authentic materials, tools, and processes. We will do special outreach to ensure that we have participation from both boys and girls and people of all economic situations. KPL will work with Peer Associates Senior Research Associate Joy Kubarek, Ph.D. to design tools that recognize and measure productive patterns of family participation and their associated learning outcomes in the library programs. We will pilot instruments for data collection during the first year of the project.

Year 2: With Peer Associates, we will conduct a mid-point evaluation and refine our Saturday Programs based on results of the evaluation. KPL will build a community of practice and invite Youth Librarians and early childhood educators to participate. The project team will provide training and resources that equip librarians and educators to offer high-quality science instruction and facilitation with young children and families.

Year 3: We will continue Science Saturdays and expand our programming to the Cheshire Children's Museum and SAU29 preschools. We will analyze data to inform the development of a facilitation guide. KPL staff will seek to present project findings at various professional conferences including the American Library Association, New England Library Association, Association to Library Service to Children, Public Library Association, and National Association for the Education of Young Children as well as showcases such as Maker Faires. Articles will be written and submitted for publication to School Library Journal and Children and Libraries: The Journal of ALSC. Results will be shared on KPL's website and on social media.

NATIONAL IMPACT: At the end of this project, we will have produced a replicable and scalable research-based effective practices model, a toolkit for museums, libraries, and other organizations serving young children, and a facilitators guide. We will have presented at least three professional conferences. Because Keene, N.H. is a town of 23,419 people, in a county of 76,612, we will create a model that can be sized up but that is workable in small communities, which in many cases is the only place available with free quality science enrichment activities. Drawing conclusions about effective practices, the project will build the capacity of youth service librarians to integrate participatory STEM learning into existing programs or to expand their programs and effectively engage youth and families with STEM and maker activities.

PERFORMANCE GOALS: The goal of this grant is to develop and provide inclusive and accessible learning opportunities for young children and their families or care-providers. KPL will design a robust learning space for facilitating programs and develop 24 Science Saturday programs for children ages 2 to 6 and their families. 240 individuals will attend these programs. The specific learning outcomes of the project are: 1) Youth develop an interest in pursuing STEM and maker learning activities; 2) Youth and their families develop capacity to productively engage in STEM and maker learning activities; and 3) Youth and family develop expanded value for and commitment to pursuing STEM and maker learning activities.

PROJECT EVALUATION: We will track progress towards outcomes regularly and make adjustments. We will use a variety of evaluation methods including pre and post surveys, interviews, and observation. We will begin with a detailed logic model to capture the intended theory of change as well as the plan for implementation to accomplish that change. Measures will include parental interest and self-efficacy in supporting their children's engagement in science both pre and post experience. We will observe families during STEM explorations and conduct a discourse analysis of conversations.

BUDGET SUMMARY: The proposed three-year \$248,020 budget is allocated as follows: Salary \$121,649 for a 28 hour librarian and coordinator; Student Costs \$6,000 for practicums; Travel \$22,000 to make research visits to other model sites, to attend conferences, and to host a national advisory council member convening; Supplies, Materials, and Equipment \$15,000 for hands-on STEM materials and consumables; Contracts \$59,000 for evaluation services and \$6,000 for advisory members; Indirect Costs \$18,371 (8%). Cost share of \$54,213 will include \$49,213 of administrative staff time and \$5,000 of additional supplies, equipment, and materials.