



Public Libraries & STEM:

A National Conference on
Current Trends and Future Directions
August 20–22, 2015 • Denver, Colorado



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BACKGROUND

Libraries across the country have been reimagining their community role and leveraging their resources and public trust to strengthen community-based learning and foster critical thinking, problem solving, and engagement in STEM. What started some years ago as independent experiments has become a national movement. The Space Science Institute's *National Center for Interactive Learning* (NCIL), in partnership with the Lunar and Planetary Institute (LPI), received funding from the National Science Foundation for the first-ever *Public Libraries & STEM* conference, at the Sheraton Denver Downtown Hotel in Colorado, August 20-22, 2015. This conference brings together leaders from local, state, and national libraries; professionals from related associations; STEM leaders from informal science education institutions, universities, and research institutions; and individuals engaged in evaluation, funding, and policy.

Conference sessions and networking events are designed to foster productive collaborations; explore promising practices in designing effective programs; help define a new 21st century vision of STEM learning in public libraries; and develop the foundation for a future evaluation and research agenda for libraries and their partners engaged in STEM education efforts. "Background Reports" are available on the conference website that highlight research in how people learn through out-of-school-time (OST) experiences; the importance of collective impact; lessons learned about how to better engage audiences that libraries are serving; and the ways libraries are continuing to evolve to meet their community's needs. The conference's work and published proceedings will inform future development of informal STEM learning programs in libraries and their communities.

www.stemlibraryconference.org



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CONFERENCE SESSIONS ARE ORGANIZED AROUND FIVE TOPICS

TOPIC 1: 21st Century Visions of STEM Learning in Public Libraries

Oral presentations, poster presentations, and discussions under this topic focus on how the following contribute to a broader ecosystem that supports STEM learning: 1) the development of the profession and the needs of librarians and other library staff to facilitate STEM learning and 2) promoting interest, engagement, and literacy of library patrons. Discussions around this topic focus on defining what STEM learning in a 21st Century library looks like in terms of space, staffing, management, and connections to the community and other organizations.

TOPIC 2: Case Studies of Successful STEM Implementation in Libraries

Poster presentations under this topic focus on the lessons learned in implementing STEM learning experiences in libraries or with libraries as partners. Presenters share tools, resources, strategies, outcomes, and community impacts that others can use. Conference participants should walk away not only with solid “nuts and bolts” ideas, but also with an understanding of implications and relevance to aid them in applying lessons learned as they implement their own initiatives.

TOPIC 3: Effective Collaboration Models between Libraries and STEM Organizations

Oral presentations, poster presentations, and discussions under this topic highlight “scalable” and “spreadable” collaborations (local and/or national) to provide STEM learning experiences. Presenters share examples of ways in which public libraries and STEM organizations (e.g., science museums, STEM professional associations, universities/colleges, schools, research institutions, state and federal agencies) are working together to increase access to and availability of quality STEM learning opportunities in urban, rural, and low-income communities. Presentations highlight effective principles for collaboration, including strategies for managing and sustaining partnerships and collaborations.

TOPIC 4: Strategies for Reaching Groups Underrepresented in STEM Fields

Libraries and other informal STEM education providers seek to effectively engage underrepresented audiences in learning opportunities. Oral presentations, poster presentations, and discussions under this topic highlight evidence-based practices and key strategies for designing and developing successful in-reach/out-reach interactions to engage targeted audiences in relevant, mindful, and active learning. This topic strand offers an excellent opportunity for all to share and learn from each other’s successful efforts at engaging underrepresented audiences in STEM learning.

TOPIC 5: Building a Foundation for Evaluation and Research for STEM Learning in Public Libraries

Oral presentations, poster presentations, and discussions share what is currently known about the nature of STEM learning in public libraries and how learning impacts are evaluated across all library types. Presentations also examine the critical factors that lead to rich and effective STEM learning experiences in libraries and compare them with the corresponding impacts from other informal education institutions. Discussions begin to map an agenda for future STEM learning research and evaluation in public libraries.

ABOUT NCIL AND LPI

The **National Center for Interactive Learning (NCIL)** at the Space Science Institute (SSI) is dedicated to expanding the understanding and participation of families, youth, educators, and citizens in science and technology through innovative programs and learning research. NCIL programs span a range of audience needs and delivery methods, including traveling museum exhibitions (e.g., *Giant Worlds: A Journey to the Outer Solar System* and *Great Balls of Fire: Comets, Asteroids, and Meteors*) and library exhibitions (e.g. *Discover Earth* and *Discover Health*); award-winning educational films (e.g., *Are We Alone?*), videos, and websites; hands-on teaching resources and activities; and educator workshops and webinars. Visit www.nc4il.org for more information.

Providing high quality STEM learning opportunities for all Americans is essential to creating an educated citizenry who understand the complex issues confronting our nation and the world. STEM professions and the pipelines that produce those professionals lack ethnic diversity, even as the nation is undergoing a significant demographic shift. To attract a diverse body of students, STEM programs must be relevant and easily accessible. NCIL is leading a new direction for STEM education in partnership with the American Library Association, Lunar and Planetary Institute, and the Afterschool Alliance (along with many other strategic partners) to provide interactive STEM exhibits, programming, and training to public libraries nationwide. This groundbreaking, NSF-funded library initiative, called the *STAR Library Education Network (STAR_Net)*, is reaching and positively impacting underserved and underrepresented communities. STAR stands for **Science-Technology Activities and Resources**. Nearly 1 million patrons have visited *STAR_Net's* Discover exhibits, over 50,000 have participated in hundreds of programs conducted by host libraries, and over 1,000 librarians and STEM professionals are part of the *STAR_Net Online Community*. Other funders and sponsors of *STAR_Net* programs, including the *Public Libraries & STEM Conference*, are the National Institutes of Health, FIRST and the LEGO Foundation, NASA, and KEVA Education. See www.STARnetlibraries.org for more information.

The **Lunar and Planetary Institute (LPI)** has designed space science programming resources with and for libraries for over fifteen years through the *Explore* program, and more recently, in partnership with the *STAR_Net* team. LPI has expertise in developing planning tools for children's and youth library staff to use in facilitating hands-on science and engineering learning experiences. The *Explore* model incorporates input from scientists and engineers, science educators, and library staff to design engaging, relevant experiences for the diverse youth of our nation, while taking into consideration the unique strengths and opportunities of the library learning environment. Training opportunities are designed to complement the existing skill set of library staff, while helping them develop the confidence and background knowledge needed to facilitate STEM learning experiences. Thanks to generous funding from NASA and the National Science Foundation, over 1,000 library staff have been trained to use the materials, and these partners are using them to attract new audiences and further their missions to instill habits of lifelong learning and literacy in their patrons. Visit www.lpi.usra.edu/explore for more information. The **Universities Space Research Association (USRA)** brings over 40 years of expertise in planning and implementing meetings for the scientific community. Through the expertise of meeting coordinators and LPI education staff, USRA supports the design and implementation of the *Public Libraries & STEM* conference.

CONFERENCE ORGANIZERS

Conference Conveners

Paul B. Dusenbery
SSI's National Center for Interactive Learning

Keliann LaConte
Lunar and Planetary Institute

Local and National Organizing Committee Members

Local Organizing Committee

Anne Holland
SSI's National Center for Interactive Learning
Naomi Carlson
SSI's National Center for Interactive Learning

National Organizing Committee

Jeanne Braha
American Association for the Advancement of Science
Sharon Cox
Queens Library
John Falk
Oregon State University
Tena Hanson
Estherville Public Library
Margaret Glass
Association of Science-Technology Centers
Dale McCreedy
Franklin Institute Science Museum
Jennifer Nelson
State Library Services/Minnesota Department of Education
Marsha Semmel
Education Consultant
Sandra Toro
Institute of Museum and Library Services
Maddie Zeigler
Education Consultant

ADDITIONAL CONFERENCE SPONSORS

Thanks to the generous contributions of the following organizations:

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GOLD LEVEL



SILVER LEVEL



BRONZE LEVEL



Carrie Morgridge and the Morgridge Family Foundation



Carrie Morgridge is the author of *Every Gift Matters* and the Vice President of the Morgridge Family Foundation. For the past fifteen years, she and her husband, John, have worked tirelessly to leverage their foundation's funds, spark innovation, and fuel transformation. She graduated summa cum laude from International Academy of Design and Technology, giving her an edge on design innovation. Carrie is recognized nationally for her work as a philanthropist, student advocate and the creator of innovative professional development programs for teachers. She and her husband split their time between Colorado and Florida.

Carrie imagined and founded the Student Support Foundation—creating youth philanthropy clubs that teach students how to best distribute financial gifts, and showing them that small gifts, given properly, do matter. She also formed and built *Share Fair Nation*. This national event has trained thousands of teachers on how to integrate technology in the classroom and promotes inquiry-based learning coupled with creativity. STEMosphere, the public side to *Share Fair Nation*, has allowed students, teachers, and families to experience hands-on/brains-on learning in a fun and inspired environment.

In 2010, Carrie Morgridge received the distinguished Frances Wisebart Jacobs, Woman of the Year award from Mile High United Way. She currently serves on the Board of Trustees at the University of Denver, the Denver Museum of Nature and Science, Colorado Mountain College Board of Overseers, Colorado Succeeds and the New Jersey Center for Teaching and Learning. She has been publicly recognized for her work at National Jewish Health and Denver Academy. Carrie serves in an advisory capacity and speaks nationally to education advocacy and technology-focused forums.

The Morgridge Family Foundation is a private family foundation. It invests in transformative gifts in education, conservation, health & wellness, and the arts. The Foundation has taken a leadership-funding role in projects with the Denver Museum of Nature and Science, National Jewish Health, University of Central Florida, University of Denver, Mile High United Way, KIPP Schools nationwide, The Nature Conservancy, and Second Harvest Food Bank in Orlando, Florida.

PROGRAM-AT-A-GLANCE

Thursday, August 20, 2015

7:00 a.m.	Majestic Foyer	Check-in
7:30 a.m.	Majestic Foyer	Continental Breakfast
8:30 a.m.	Majestic Ballroom	Welcome Remarks
8:50 a.m.	Majestic Ballroom	STEM Learning: Reflection and Discussion
10:10 a.m.	Majestic Foyer	Break
10:25 a.m.	Beverly	21st Century Visions of STEM Learning in Public Libraries
10:25 a.m.	Capital	Building a Foundation for Evaluation and Research for STEM Learning in Public Libraries
10:25 a.m.	Columbine	Effective Collaboration Models Between Libraries and STEM Organizations
10:25 a.m.	Terrace	Strategies for Reaching Groups Underrepresented in STEM Fields
11:10 a.m.	Vail	Poster Session I <i>Posters</i> <i>Demonstrations</i>
12:15 p.m.	Majestic Ballroom	Lunch (Keynote Address)
1:15 p.m.	Majestic Ballroom	National STEM Library Survey Results
2:00 p.m.	Breakout Rooms	Breakout Discussions: Keys for Successful STEM Implementation
3:00 p.m.	Majestic Foyer	Break
3:30 p.m.	Denver Public Library Conference Center	Breakout Discussions: Reports and Whole Group Discussion
4:00 p.m.	Denver Public Library Conference Center	Expect More: Why Libraries Cannot Become STEM Educators
4:30 p.m.	Denver Public Library Conference Center	Transformation of Public Libraries for the Digital Age
5:00 p.m.	Denver Public Library Vida Ellison Gallery, Level Seven	Tour and Reception

Friday, August 21, 2015

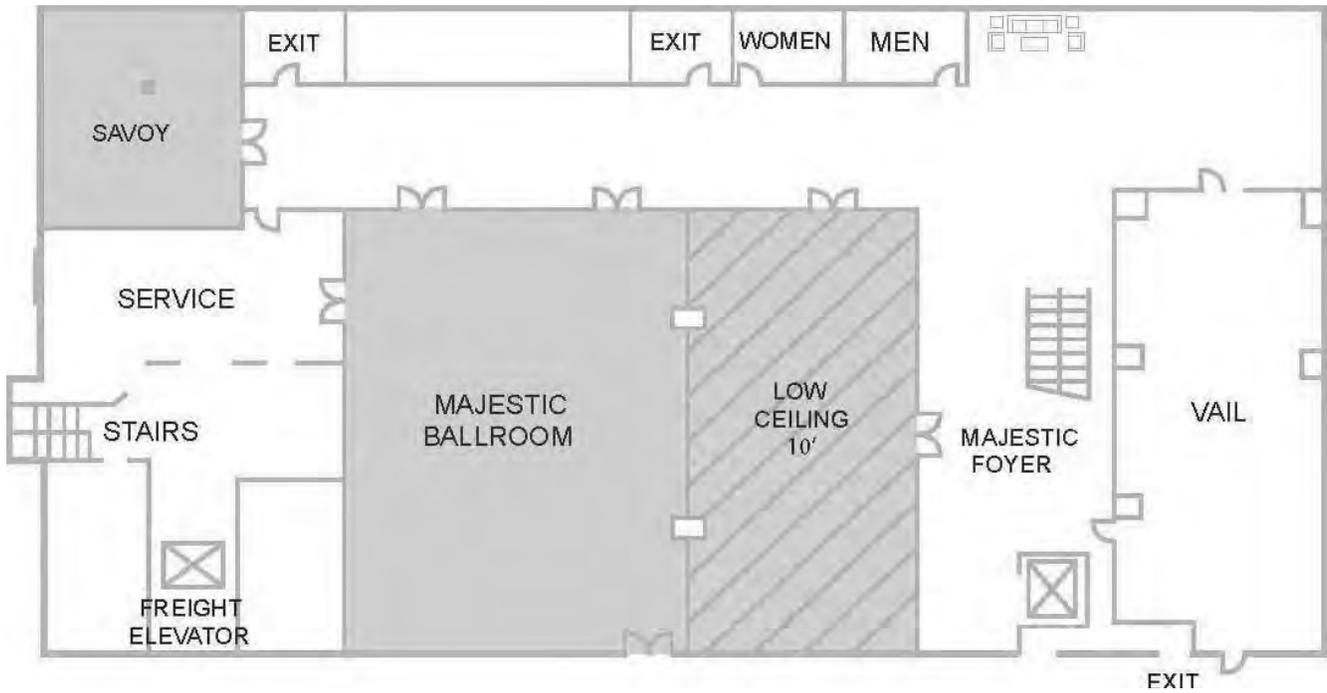
7:30 a.m.	Majestic Foyer	Continental Breakfast
8:20 a.m.	Majestic Ballroom	STEM Icebreaker Activity
8:30 a.m.	Majestic Ballroom	Reflection and Discussion of Day 1
8:50 a.m.	Majestic Ballroom	Reaching Underserved Communities and Underrepresented Populations
9:50 a.m.	Majestic Foyer	Break
10:10 a.m.	Majestic Ballroom	Effective Collaboration Models Between Libraries and STEM Organizations
11:10 a.m.	Vail	Poster Session II: Outward-and Forward-Looking Efforts <i>Posters</i> <i>Demonstrations</i>
12:15 p.m.	Majestic Ballroom	Lunch (Keynote Address)
1:15 p.m.	Majestic Ballroom	The Next Library
2:00 p.m.	Breakout Rooms	Breakout Discussions: Topics to be Determined by Participants
3:00 p.m.	Majestic Foyer	Break
3:20 p.m.	Majestic Ballroom	Breakout Discussions: Reports and Whole Group Discussion
3:50 p.m.	Majestic Ballroom	Evaluating STEM Programs in Public Institutions in Communities: Focusing on Equity
4:30 p.m.	Majestic Ballroom	Open Forum: Evaluating the Impact of STEM Programs in Libraries
4:45 p.m.	Majestic Ballroom	Open Forum
6:00 p.m.	Denver Museum of Nature and Science	Reception and Banquet (Keynote Address)

Saturday, August 22, 2015

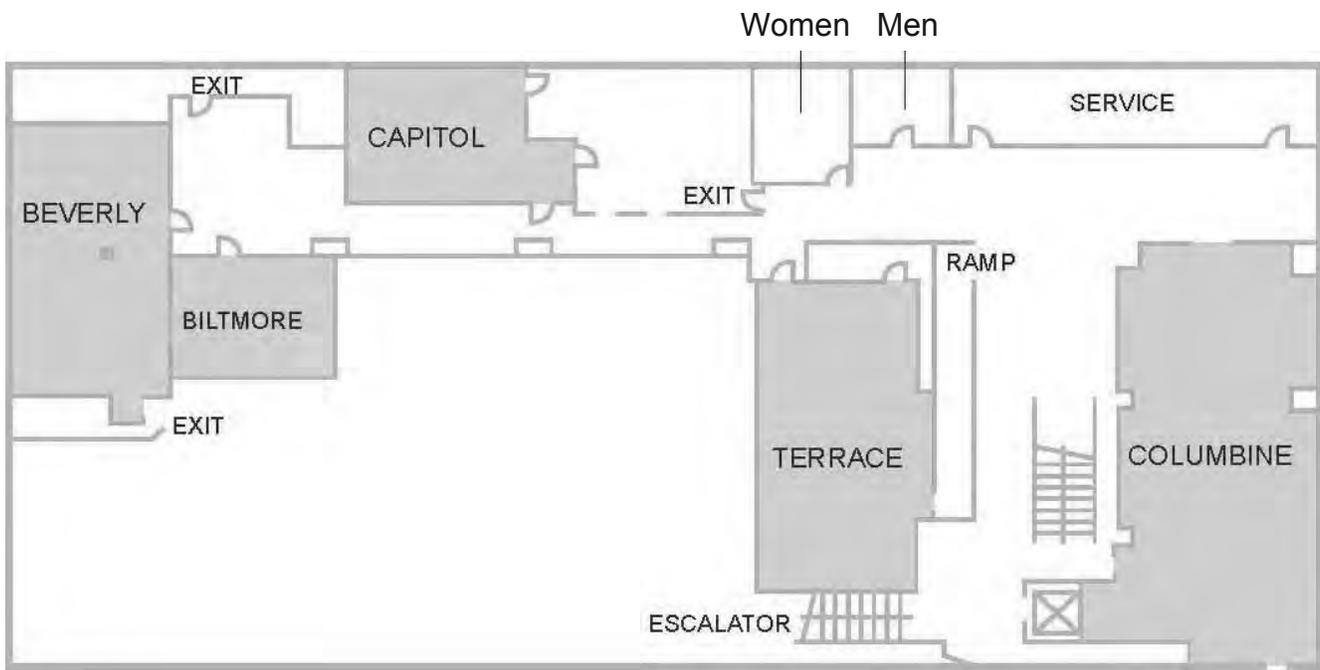
7:30 a.m.	Majestic Foyer	Continental Breakfast
8:30 a.m.	Majestic Ballroom	Reflection and Discussion of Day 2
8:50 a.m.	Majestic Ballroom	Trending....STEM and Libraries: Learning with the ALA's Center for the Future of Libraries
9:30 a.m.	Majestic Ballroom	Funding and Resources for Moving Forward
10:10 a.m.	Majestic Foyer	Break
10:30 a.m.	Majestic Ballroom	STEM Learning in Libraries
10:50 a.m.	Majestic Ballroom	Whole-Group Discussion: Next Steps
11:30 a.m.	Majestic Ballroom	Closing Remarks
12:00 p.m.	Majestic Ballroom	Close

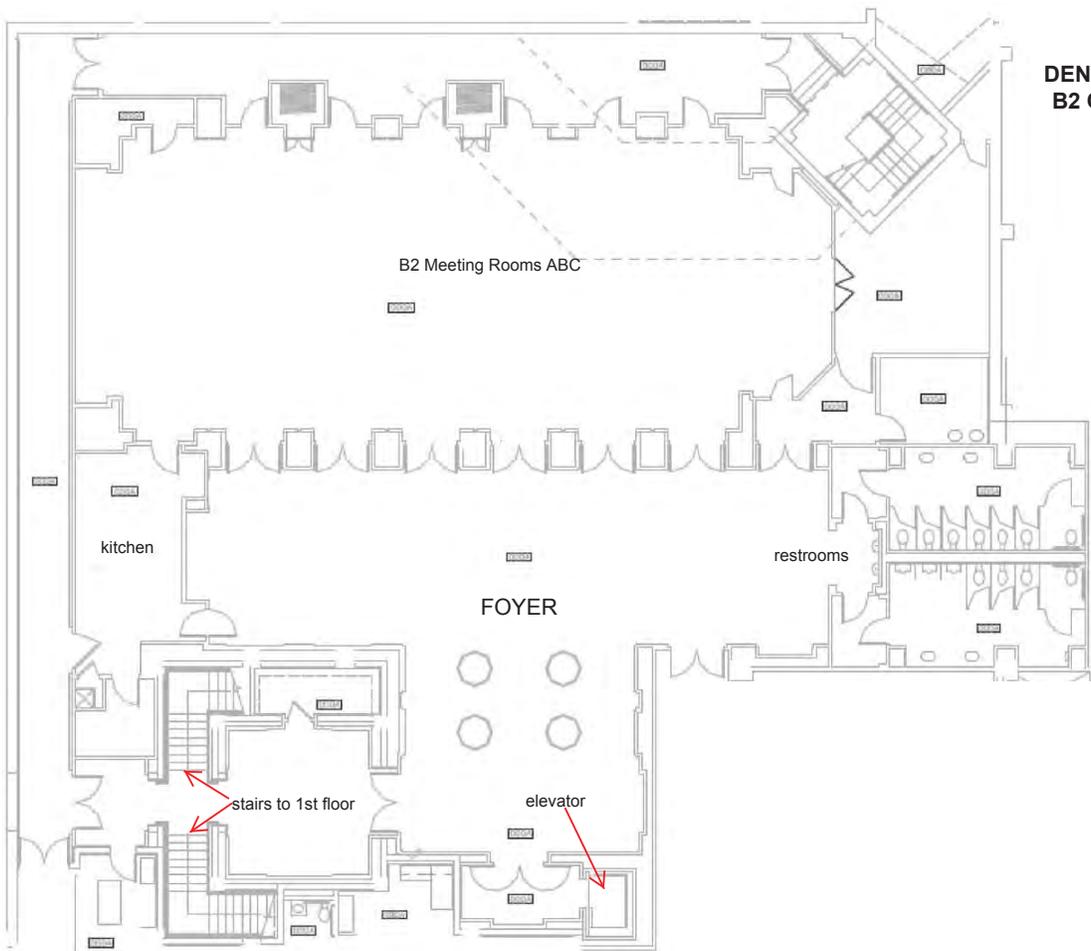
MAPS

Tower Building Majestic Level

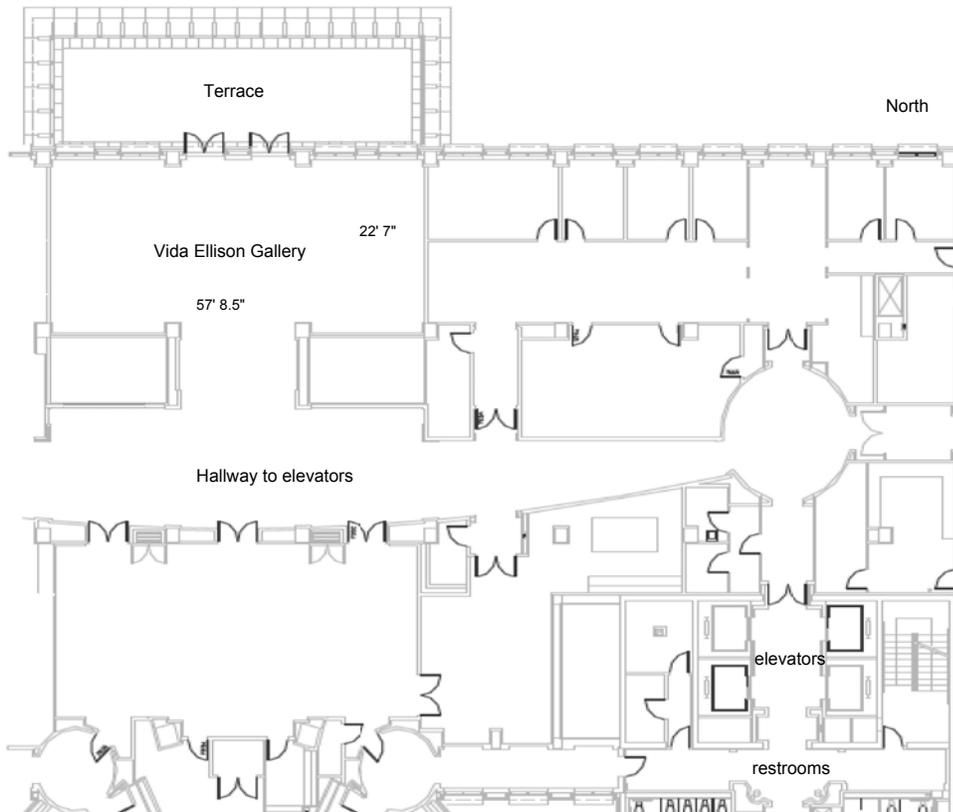


Tower Building Terrace Level





**DENVER PUBLIC LIBRARY
B2 CONFERENCE ROOM**



**DENVER PUBLIC LIBRARY
L7 VIDA ELLISON GALLERY**

DETAILED PROGRAM

Thursday, August 20, 2015

WELCOME REMARKS

8:30 a.m. Majestic Ballroom

8:30 a.m. *Welcome Remarks*
Paul Dusenbery
Wyn Jennings
Keliann LaConte

STEM LEARNING: REFLECTION AND DISCUSSION

8:50 a.m. Majestic Ballroom

8:50 a.m. Falk J. *
The Science Learning Ecosystem [#1087]
There is a revolution occurring in how, when, where and even why people learn science. Learning today is continuous and on-demand. Learners of all ages seek science educational experiences from myriad sources and across multiple platforms – while at home, on weekends and even while on vacation. Unlike in the past, most science learning today is free-choice, driven primarily by an individual’s needs and interests. In fact, research indicates that the much of current disparity in how much science a person knows derives from inequities in access to quality out-of-classroom learning opportunities. Schools remain important components of the new science education ecosystem, but increasingly important are informal educational institutions and resources such as libraries, museums and national parks.

9:00 a.m. Semmel M. *
Collective Impact and STEM Learning: Joining Forces to Make a Difference in Communities [#1081]
Today, policy makers, funders, and government agencies alike are grappling with the need to use resources efficiently and effectively in order to make a measurable difference in addressing some of today’s pressing significant social, cultural, and educational challenges. When dealing with such “wicked problems” as domestic abuse, health and nutrition, poverty, educational achievement, and STEM learning, it’s not enough for an organization to deliver results that contribute only to its bottom line. Increasingly, authorizers and supporters are promoting a “collective impact” approach that moves beyond individual organizational effectiveness to foster (and even require) multi-organization collaboration to drive systemic change. This presentation describes collective impact and its evolution in the policy, philanthropic, and programmatic arenas, with a specific focus on STEM learning. When is it appropriate to use a collective impact approach? What are some examples of STEM-related collective impact efforts, including those involving libraries? What types of STEM-relevant collective impact ‘metrics’ and evaluation strategies have been developed, and what are the implications for libraries engaging the STEM arena?

9:10 a.m. *Paired, Small-Group, and Whole-Group Discussions*

10:10 a.m. BREAK

Thursday, August 20, 2015
21st CENTURY VISIONS OF STEM LEARNING IN PUBLIC LIBRARIES
10:25 a.m. Beverly

Leader: Susan Considine

10:25 a.m. Considine S. C. *
Introduction

10:30 a.m. Considine S. C. *
A Strategic Team Approach to Developing STEM Services and Spaces in a Community

10:35 a.m. Koh K. *
The Critical Role of Information in Informal STEM Learning

10:40 a.m. Maloney M. A.
Pushing the Limits: Rural Librarians and Their Libraries as STEM Gateways

10:45 a.m. Randall C.
*Re-Imagining Public Libraries in the 21st Century as Community Science Learning Centers:
10-Years of Hands-On Experience*

10:50 a.m. Compton E. A. *
Make It at the Library!

10:55 a.m. Edwards M. *
Collaborative Vision for the 21st Century Library

11:00 a.m. Considine S. C. *
Discussion and Closing

Thursday, August 20, 2015
BUILDING A FOUNDATION FOR EVALUATION AND RESEARCH
FOR STEM LEARNING IN PUBLIC LIBRARIES
10:25 a.m. Capital

Leader: Kate Haley Goldman

10:25 a.m. Haley Goldman K. *
Introduction

10:30 a.m. Haley Goldman K. *
Building Evaluative Thinking Within Library Programs [#1064]
 Libraries are one of the most common forms of informal learning spaces within the United States, and in many areas they serve as the sole informal learning space accessible to the community. A library's role may encompass home to resources and entertainment, training provider, exhibitions, homework help, community forum, gathering spot, maker space, refuge, literacy counselor, innovation incubator, and educational, cultural, and scientific program provider. Patron needs are discovered and addressed through tracking of requests, programmatic attendance, and in-depth conversations and deep listening by library staff regarding the needs of their communities. Many, if not most, libraries track request metrics. Some libraries go far beyond that in developing means to analyze the success of their offerings, and plan for strategy to better serve their communities. This session will focus on how to build an evaluative culture within an informal learning institution, paying particular attention to the unique needs and attributes of libraries and their patrons. Attendees will hear a number of strategies for fostering evaluative thinking, finding an appropriate and useful set of evaluation methods, and common roadblocks in implementation an evaluation program.

10:35 a.m. Krishnamurthi A. *
Afterschool Providers and Libraries: Partners in Out-of-School-Time STEM Education

10:40 a.m. Regalla L. *
Open Portfolio Research Brief Series

10:45 a.m. Buxner S. R. *
Bringing STEM to Libraries Through the Explore Program: Findings from a Follow-Up Survey

10:50 a.m. Fitzhugh G. *
Can Libraries Provide STEM Learning Experiences for Patrons? Findings from the STAR_Net Project Summative Evaluation

10:55 a.m. Teasdale R. M. *
Evaluation of Library STEM Programs: Learning from the BISE Project

11:00 a.m. Haley Goldman K. *
Discussion and Closing

Thursday, August 20, 2015
EFFECTIVE COLLABORATION MODELS BETWEEN
LIBRARIES AND STEM ORGANIZATIONS
10:25 a.m. Columbine

Leader: Stacey Forsyth

10:25 a.m. Forsyth S. *
Introduction

10:30 a.m. Skidmore E. S. *
The Cycle of Intentionality: An Effective Collaboration Model

10:35 a.m. Rokos S. Z. *
Science @ the Library

10:40 a.m. LaConte K. M. *
Bringing STEM to Libraries Through the Explore Program: A Model for Responsive Collaboration

10:45 a.m. Chilson S. J. *
STEM in the Public Library — Start Small, Grow Big!

10:50 a.m. Solórzano R. M. *
Delivering Specialized STEM Programming via Makerspace Activities and Local Partnerships

10:55 a.m. Klein E. *
Little Did We Know: The Challenges and Achievements of a Seattle Public Library/Pacific Science Center Partnership

11:00 a.m. Forsyth S. *
Discussion and Closing

Thursday, August 20, 2015
STRATEGIES FOR REACHING GROUPS UNDERREPRESENTED IN STEM FIELDS
10:25 a.m. Terrace

Leader: Amy Koester

10:25 a.m. Koester A. E. *
Introduction

10:30 a.m. Koester A. E. *
Building STEAM Among Diverse Youth

10:35 a.m. Waldrop S. R. *
*Successful Collaboration Between Science Museum of Virginia and Library of Virginia
Delivering STEM to Statewide Libraries*

10:40 a.m. Jakubowski R. D. *
Researching Libraries as Conduits for STEM Delivery: An Example Approach

10:45 a.m. Treece T. *
Summer DevCamps for Teens

10:55 a.m. Koester A. E. *
Discussion and Closing

Thursday, August 20, 2015
POSTER SESSION I: CASE STUDIES OF SUCCESSFUL
STEM IMPLEMENTATION IN PUBLIC LIBRARIES
11:10 a.m. Vail

Ashooh W.

STEM in a Box: Simple STEM Solutions for Your Library [#1010]

At the Central Rappahannock Regional Library system, we put the materials and guidelines for various STEM activities in a bin that circulated throughout the library system for staff use. This method allowed eight library branches to share the resources and provide fun and engaging hands on science activities and programs. The activities that were presented came from several of the workshops presented by the Lunar and Planetary Institute. After attending the workshops, I returned to my branch and created several bins. After preparing the bins, I shared the contents and guidelines with my colleagues in youth services using Google Docs. Similarly, a calendar was created that allowed library staff to sign up for the bins. This system of ready made science activities not only helped assuage the fears of library staff who were concerned about creating science programs but it also proved to be a cost effective way providing STEM programs to the public. The bins were used at a local elementary school's science night as well as an after school program for grades K-6. The activity ideas contained in the bins were easily assembled as they used readily available materials that were easily replenished. This procedure helped alleviate the need for long staff hours needed in order to prepare a program as the program came "ready in a box." My proposed poster presentation will outline this process and provide guidelines for other libraries to create a similar situation.

Beach J. H.

Astronomy and Environmental Education: Maximizing STEM Programming Through Focused Offerings [#1045]

Kenton County (KY) Public Library's Erlanger Branch is uniquely positioned to maximize elementary and family STEM programming efforts by concentrating on two specific areas of science experiences. Focusing training and resources in these two areas of concentration allows for maximizing program offerings while minimizing costs; encourages depth of training for the programming librarian; and secures the library as a trusted learning resource within the community; while simultaneously providing for variety in program experiences. By selecting the subject areas of astronomy and environmental education, programmer Jennifer Beach provides STEM opportunities in content areas which are otherwise limited or non-existent in the surrounding community. Concentrated training combined with hands-on experiences and a wide variety of partnerships provides multidimensional experiences to enhance in-school learning in a non-formal setting. National, state, and local affiliations in both subject areas assure depth of knowledge, wide networking opportunities, breadth of resources, and on-going learning support for the programmer; and enhanced learning experiences for the community.

Brice D.

Make Your Own: 3D Printer Build [#1050]

3D Printers are becoming a standard program in urban public libraries. For the smaller more remote public libraries, it may be more difficult to implement by themselves. These libraries do not have the same quantity of local resources available to them as most urban libraries. They need to be more imaginative as to where these resources can be found. So, how do these remote libraries find STEM organizations to partner with? In 2014, the Eastern Lancaster County Library learned about the maker group, make717. They were a group on Meetup which is a social media site. After they met, the two decided to collaborate and hold a 3D printer build at the ELANCO Library. The library organized and managed the event, ordered the kits, and registered the participants. The make717 group managed and facilitated the one-day build. Groups of one or two would build one printer. The kit cost \$385.00 which included the 3D printer kit plus additional supplies. The Library had 12 sets of printer builders attend the project. There were pairs of parent and child, teacher and student, husband and wife and just friends and a good mix of ages and experience. The cost was reasonable and could be shared. The make717 group did the program at no expense to the library. With the amount of printer kits that were ordered, the library got one free and gave it to make717 as compensation. Everyone went home with a working printer and a new maker experience. The ELANCO Library is planning a Maker Open House for the participants to display of the items they built with their printers.

Chilson S. J.

STEM in the Public Library — Start Small, Grow Big! [#1054]

Where we started: Spokane Public Library made a commitment to integrating STEM concepts in library programming over 7 years ago. We started with storytimes and events for the very young and for elementary school students. Staff quickly began to see the benefit and fun of including STEM concepts in library programming. Our big break through with staff was partnering with TINCAN (a local tech training non-profit) to apply for and host Discover Tech. Seeing the power of offering robust informal STEM learning opportunities really energized our staff so we added Build! a weekly building program featuring building materials. Staff are now regularly developing classes investigating everyday things like bubbles and peeps that encourage children and care givers to explore together. Where we are now: When TINCAN became insolvent last year, all of their computers and equipment were gifted to SPL. Along with the equipment, our director had the foresight to hire their Executive Director to continue to develop and offer tech classes for all ages, expanding our STEM reach and commitment to a larger audience. We currently host Mobius Science, Spokane's local science museum on an interim basis while their new home is remodeled. In addition, we've been able to partner with the school dist. to bring Lego robotics into our libraries and are looking forward to expanding that offering. Embracing STEM learning at SPL for all has made our libraries more exciting places for our staff and our customers.

Cummings J.

Frisco Public Library: STEM Spots, STEM backpacks and Technology Classes [#1028]

The STEM Spots during Story Time classes consist of staff-led demonstrations. Take home sheets with directions and extension activities are made available to participants.

<http://www.friscolibrary.com/stemspot>. We created the STEM backpacks for K-5th grade students in order to encourage families to continue STEM learning at home. We have five themes with five identical backpacks per theme: buoyancy, magnetism, human body, weather and outer space. Each backpack includes four books, a DVD, interactive learning objects, factual inserts with information and instructions for additional experiments along with a quiz STEM Backpacks are rarely on the shelves. On average there are about 5 of the 25 backpacks on hold at any one time, and only one or two available for checkout. The library plans to increase the collection to better meet demand. Our plans for elementary and teen technology classes for Summer 2015 include: Two Virtual Explorers classes for students entering the 3rd-5th grades featuring Google Earth searches for landmarks and capitals. Two coding classes for students entering 3rd-5th grades. Four Tech It and Take It classes-A hybrid class and come-and-go activity that will feature guided, hands-on activities resulting in technology-based creations for teens going into the 6th-12th grades to take home. Two computer classes for teens going into the 6th-12th grades featuring Alice and JavaScript.

Duckworth S.

Empowering Public Libraries to be Science Resource Centers for Their Communities

Portland Public Library is a pilot for a major grant project – “Empowering Public Libraries to be Science Resource Centers for their Communities.” This initiative will test and refine the decade long experience in Maine of public libraries partnering with Maine’s State Library Agency (SLA) and Cornerstones of Science. The grant engages three additional SLAs (MA, VT, & RI) and their professional association: Chief Officers of State Library Agencies. Other partners include five pilot public libraries in two states; thirteen non-profit research, library, private foundations and informal science organizations and two science and technology corporations. The main goal is for the nation’s SLAs, regardless of organizational structures, to have field-tested, replicable science literacy models and tools. It will advance library practice and empower public libraries to build science literacy capacity that enables them to connect their patrons and communities to engaging and meaningful informal science and technology experiences, equipment, books, media, and exposure to the scientific community. PPL engages with the community through subject based teams. The Science and Technology Team offers a multitude of regular programs, such as Science Cafes, maker initiatives, computer science classes, engineering experiences and clubs. PPL partners with the scientists in the community to educate people on topics of local interest. We’ve developed a continuum of learning so that patrons can move from borrowing a state park pass, to checking out a geology backpack, to participating in a science café, to contributing to citizen science initiatives. PPL is a powerful resource for providing and enhancing science literacy and economic development.

Golden G. Race M.

Aliens, Astronauts and Asteroids! Bringing Space Exploration to your Library [#1097]

The Lafayette Library & Learning Center, part of Contra Costa County Public, is an innovative model for libraries. Home of the Glenn Seaborg Learning Consortium, this partnership is comprised of distinguished educational and cultural resources, leading to a wealth of STEM programming, including the future of space exploration. This poster session features the “Mission: Mars” program including activities culminating in a visit from Dr. Pascal Lee, Chairman of the Mars Institute, author of “Mission: Mars.” Children participated in varied learning activities: Mars fact-finding, astronaut training, telescope viewing, “Gravity” presented by Lawrence Hall of Science, and a presentation by NASA scientist Dr. Race discussing the search for life, followed by a “Make a Martian” challenge based on atmospheric conditions on Mars. Children wrote essays detailing why they would be the best candidate for future missions to Mars, with responses judged by NASA scientists. Participants received prizes and completion certificates. Program sponsors included NASA, SETI Institute, Mars Institute, Chabot Space & Science Center and Lawrence Hall of Science. The display focuses on visually providing ideas for libraries to adapt for their own Space Science programming. It includes “Mission: Mars” promotional materials, the program’s “Training Manual,” and event photographs. This poster session was presented at the ALA Conference in SF and is a scheduled program for the upcoming CLA Conference.

Greenberg C. B. Falo J. K. Bunt N. R. Fierle M. Lease B. Murawski C. Rose G.
Tananis C. A. Trahan K. Winters D.

Collaborative, K–8, STEM Pilot Project for Library Summer Reading Club: Bridging Scholastic Learning Semesters [#1008]

Four professional organizations in Western Pennsylvania are collaborating on a two-year pilot project (2014-15), whose broad goal it is to advance K-8 STEM learning at public libraries. The specific goal is to bridge in-school, scholastic learning semesters with informal, out-of-school, summertime learning, by embedding STEM content and pedagogy into annual Summer Reading Club (SRC) programming. Annually, and nationally, public libraries have been sharing a themed set of guidelines and activities for K-8 Summer Reading Clubs for about twenty years. For the first time, in 2014, the theme was explicitly science-based. The collaborators are: (1) Murrysville Community Library (MCL); (2) the Westmoreland Library Network (WLN) of 24 libraries, MCL being one; (3) the Math and Science Collaborative (MSC), an educational service provider department of the Allegheny Intermediate Unit 3 (AIU3); (4) the Collaborative for Evaluation and Assessment Capacity (CEAC), School of Education, University of Pittsburgh. The pilot program has been designed to have the MSC staff professionally train librarians, administrators, and volunteers for STEM learning based on scholastic Common Core State Standards (CCSS) in Mathematics/English Language Arts, and Next Generation Science Standards (NGSS). This poster session describes the activities and progress for the two-year pilot, including 2014 results from CEAC’s external evaluation.

Gurton S. P. White V. Hurst A.

Engaging 3–5 Year Olds in Astronomy at Libraries in Oakland [#1015]

In 2012 the Astronomical Society of the Pacific received an NSF grant, My Sky Tonight: Early Childhood Pathways to Astronomy (Grant No. DRL 1217441) to work with early childhood researchers to develop activities and professional development for museum educators to introduce their youngest visitors (ages 3-5) to astronomy. We report here on a pilot of the materials in a new venue, Oakland public libraries.

Heid C. A.

Successful STEM Programming in Small-to-Medium Sized Public Libraries [#1048]

Albert Einstein once said: “The only thing you have to learn is the location of the library!” Libraries desire to be thought of as the ‘one-stop shop’ - A place of learning, entertainment, community, and support. With over a billion visitors per year, partnering with public libraries makes sense. However, as community needs continually change, technology needs increase, and budgets decrease, libraries can be overwhelmed trying to meet the needs of everyone walking in through the doors. Adding one more thing to the long list of things to accomplish can feel overwhelming to librarians. At times, librarians may even ponder; “Why do I need to include one more item into my overwhelming schedule?” The proof is in the numbers. In the past five years, Johnston Public Library has successfully presented STEM programming on a large and small scale using national, state, and local partnerships. In just a sampling of two months, the library received over 1,300 people participating in STEM programs. For a small-to-medium sized library, these numbers prove a great victory to all partners. Exposing all who walk in through the doors to the wonderful items Johnston Public Library can offer and also sparking an interest in various aspects of STEM. Success will happen upon finding viable partnerships, utilizing the right resources and tools, marketing, and discovering the library’s niche within your community.

Hill D. H.

Growing STEM Programming in a Library System [#1013]

Developing STEM programming into a library system can be a challenge with outdated facilities, unenthusiastic staff and not know where to begin. STEM programming can grow to an integral part of libraries strategic goals by building upon success, identifying key individuals, working with community partners, conducting events outside of the physical walls of the Library and ensure engaging activities. The Marin County Free Library went from some resistance to introducing STEM to having a diverse offering of programming year-round throughout the County. Simple experiments, 3D printing, collaborating with schools, attending community events. Community reception to STEM programming has been very popular and has brought youth to the Library.

Lanotte A.

Transcendental STEM: NASA Education Resources to Engage All Audiences

NASA resources exist to encourage all populations to be more than consumers, yet awareness can be elusive, particularly for those who don’t traditionally see themselves as contributors to these fields. Reaching out to typically underrepresented audiences is crucial for the vitality of robust exploration in aeronautics, space, and technology. Throughout history, many new developments have been created by those who thought “outside the box” and would have been categorized as underrepresented individuals. The proposed poster highlights the many resources available to excite and guide all audiences. Whether it is the availability of free eBooks that cover historical technical challenges and accomplishments; cutting edge research that will take us farther than we ever have before; educational resources that allow audiences to learn about everything from the basics of flight to cryogenic fuel storage; or the many scholarship and internship opportunities, these resources are available for everyone, no matter their background. They have already reached millions of people, and many individuals at NASA began their careers with the help of these resources. Many more individuals, particularly underrepresented groups, are still unaware of what is available to them, and this presentation of materials will allow libraries to highlight and use these resources with all audiences.

Lietzau Z. Treece T.

Summer DevCamps for Teens [#1035]

In the summer of 2015, Denver Public Library will be providing multiple free DevCamps for local teenagers. Each DevCamp includes a week of instruction in HTML, CSS, and JavaScript, tours of local tech companies, guest speakers from the tech industry, and group work which teaches some of the soft skills necessary for professional success. Placed in groups of 5 and paired with a mentor, participants produce a website during the week and then present it to a panel of industry professionals who evaluate content and technical expertise. Participants earn a base of technical skills and an awareness of possible career paths, while the city as a whole is a step closer to a larger pool of Colorado natives who have the necessary skills to help fill in-demand technology jobs. For some DevCamps, DPL worked with Denver Public Schools to recruit and provide transportation for students from high-risk areas, while technology industry partners help recruit mentors, provide speakers, and arrange tours. DevCamp aims to build interest in STEM-related fields among underrepresented populations and build a passion for learning that bleeds over into at-risk children's formal education. During 2014's DevCamp, 72% of participants said they could see themselves working in web development in the future, and 86% wanted to keep learning more after camp.

Long A. L.

The Public Library and the STEM Community: Working Towards a Common Goal [#1071]

Though libraries have always been seen as places of information and education, it is more important than ever for us to make available concepts of Science, Technology, Engineering and Mathematics. The Haltom City Public Library has partnered with community STEM entities such as Haltom High School, Bethesda Private School, Fort Worth Museum of Science and History, the University of Texas at Dallas, area business leaders, of course the Lunar and Planetary Institute. Our city is economically, educationally and culturally diverse. The rate of high school graduation is only about 35%. It is the goal of our library employees, city leaders and STEM partners to increase education and the love of learning in our children.

Marshall A. K.

3D Printing is just one Result: Combining Process and Maker-Think with 3D Printing [#1052]

In 2014, the Craig Public Library was the recipient of a Teen Tech Week Grant from the Young Adult Library Services Association (YALSA). The plan was to purchase a 3D printer for patron use, the first in Alaska. The twist: the teens would build the 3D printer from a kit purchased with grant funds supplemented by funds raised for the purpose. The teens would meet during Teen Tech Week and have the printer completed and ready for a community demonstration at the library's Annual 3/14 Pi-Einstein Day Celebration. As the teens and adult mentors, with supporters and 3D printing enthusiasts standing by on Facebook and Twitter (including the technical staff of Airwolf3D whose printer we selected to build), rolled up their sleeves and got to work, it was evident that this was going to be more than a "several-hours-later-tada!" project. The group persisted and even grew over the course of the week. By late-Wednesday evening, as the printer began to resemble to photo on the instruction manual, it dawned on the group: now that we've built it, how do we USE it? The first run of the printer really was in front of 70 assembled community members who came by for the inaugural printing. We were all relieved when it worked. The teens played with a number of websites with ready-made and customize-able files. Then, branched out with CAD programs, SketchUp, and are now creating innovative solutions to challenges not just on Prince of Wales, but in the world. Truly a program with staying power.

Pannebaker S. E.

Introducing STEM into Small Rural Libraries [#1009]

The Block Parties program is a simple way to introduce STEM programming into small libraries with limited staff. The idea came from a presentation by the Pierce County Public Library System at a STEAM program at the American Library Association Conference in 2013 on their Block Party program targeting at-risk preschoolers. Through a Library Services and Technology Act (LSTA) grant 65 libraries across Pennsylvania have been given \$2,200 worth of materials to implement the program. This poster session will focus on the implementation in two small rural libraries and the changes it has brought.

Race M. S.

Astrobiology and Science Programs: Not just for Students! [#1098]

The Lafayette Library & Learning Center is home of the Glenn Seaborg Learning Consortium, a partnership of regional education and cultural institutions and resources, that has developed a wealth of programming centered on space exploration, astrobiology and science in the news. In addition to offering a variety of STEM programs linked with standard K-8 curricula, we haven't ignored younger or older library visitors either. We believe in the importance of life-long learning—following the mantra "Don't reinvent the Wheel." Building upon diverse templates, we found ways to develop diverse programs that easily adapt to library audiences of all ages. This poster provides case examples and suggestions adaptable anywhere, using free or low-cost materials, and tailored to local needs and audiences. Examples include the use of stand alone photo-exhibits, thematic book collections, and simple activities with traditional story-telling programs for young crowds; family drop-in programs linked with NASA missions & space events in the news (e.g. transit of Venus; Mars landings; Pluto flyby)—often in collaboration with local volunteer astronomers who set up telescopes outdoors; career nights for middle and high school students; and Science Cafés featuring notable scientists who present STEM along with societal or technological issues aimed at adult audiences and informal evening gatherings—complete with beverages, book signings and desserts. The sky's the limit!

Ryer H. Eisenhamer B. Smith D. Summers F. Cordes K.

Visions of the Universe: Bringing STEM to Libraries and Their Communities [#1034]

Libraries play a clear role in engaging learners of all ages and backgrounds on multiple levels, and provide free and convenient access to resources. However, there is an identified need for library programs that target multiple audiences while presenting accurate, authoritative, up-to-date scientific information. This was the main inspiration for the "Visions of the Universe: Four Centuries of Discovery" exhibit. Produced in partnership with the American Library Association and the Harvard-Smithsonian Center for Astrophysics, "Visions of the Universe" consists of six two-sided panels that include images and captions that highlight relevant, historical discoveries in astronomy. The exhibit also highlights the technological advancements that made these discoveries possible. The exhibit traveled to 64 libraries in under-served communities from 2009-2012, reaching over 300,000 visitors nationwide. Copies of the exhibit are now available for loan to other venues, bringing STEM to thousands of additional people across the country each year. The exhibit also has been integrated into other educational and exhibit programs. This poster will highlight the short and long-term impacts of the "Visions of the Universe" exhibit, lessons learned, and how the exhibit has served as a springboard for other STEM initiatives with libraries and other venues of informal learning.

Solórzano R. M.

Delivering Specialized STEM Programming via Makerspace Activities and Local Partnerships [#1006]

The E.P. Foster Library in Ventura, CA, has risen to meet the educational needs of its community by offering exciting new STEM-related programs. A major component of this effort is the library's new makerspace—called the Library LAB—which is equipped with a 3D printer and a laser cutter/engraver that are freely available for the public to explore. As part of our LAB programs, library staff have directed workshops for all ages on 3D modeling and printing and have facilitated a series of STEM-related activities for school-aged children. These activities ranged in cost from \$0.50 to \$7 per participant and required minimal staff training and time commitment (one facilitator and one assistant). Response from the public—particularly parents—has been overwhelmingly positive, and a second series of activities is in the planning stage. Additionally, the library has been able to partner with California State University, Channel Islands, on a number of STEM-related events, including the 2014 Science Carnival (aimed at elementary school students) and the 2015 STEM Expo (middle and high school students). In both instances library staff volunteered to help plan and execute learning activities under the CSUCI banner while creating awareness of the library as a resource for STEM programming. Thanks to its partnership with CSUCI, the library has been able to use shared resources and knowledge to perform outreach at local schools and bring attention to the LAB as a community asset.

Stawowy M. M.

Growing Scientists: Community Engagement for Preschoolers and Families through STEM [#1093]

San Rafael Public Library's children's services librarians became enthusiastic about presenting STEM programs for preschoolers after attending an Association of Library Services for Children (ALSC) conference in 2014. In the San Rafael community, due to hectic schedules, families with preschoolers are a challenging demographic to significantly engage in recurring library programs. STEM (also referred to as STEAM) has proven successful right from the start. When designing programs for preschoolers, it is imperative to consider best practices for preschool learning by incorporating age appropriate education elements, such as stories, songs, games, experiential activities, and experiments. Families respond enthusiastically as reflected in attendance statistics and a mention on a local mother's website. The program was also covered in a local newspaper feature article (<http://www.marinij.com/general-news/20150307/preschoolers-get-ahead-of-steam-learning-with-new-library-program>). San Rafael Public Library will continue to present preschool STEM programs, both staff-developed and in partnership with local organizations such as the Bay Area Discovery Museum.

The Studio Team Yang M. Thorp K.

The Studio — Digital Learning Labs and Makerspaces in Libraries [#1041]

At The Studio, it's not just what you do, but who you will become. The Studio at Anythink is an interest-driven learning space and concept that engages library customers in projects supported by technology. The skills learned in The Studio promote critical thinking, creativity, skill-building and civic engagement through a unique mix of mentors, digital resources, books and relevant programming and workshops. With a strong focus on informal learning, The Studio provides an opportunity for customers to expand their skills outside of a school setting. Anythink uses the HoMaGo concept ("Hanging Out, Messing Around, and Geeking Out: Kids Living and Learning with New Media" by Mimi Ito, et. al. 2010), which focuses on friendship-driven learning and participation (hanging out), interest-driven learning and passions (messing around), and knowledge-building and opportunities based on customer interests, leading to "geeking out." This approach to participatory learning is integrated beyond just The Studio and is applied anytime and anywhere throughout the library.

Wierman K. W.

Jr. FIRST LEGO League for Libraries: Making the most of Maker Spaces [#1002]

Junior FIRST® LEGO® League addresses the need for high-quality STEM learning by offering youth ages 6 to 9 experiences designed to promote STEM awareness, exploration and learning. Jr.FLL is an out-of-school program, ideal for a library setting, which prioritizes building, teamwork and exploration, and activates children's interest in STEM. Jr.FLL is a hands-on program featuring a real-world challenge, to be explored through research, critical thinking and imagination. Guided by adult coaches and the Jr.FLL Core Values, team members work with LEGO elements and motorized parts to build ideas and concepts and present them for review. Each yearly Challenge is based on a different theme and has two main parts, the LEGO Model and the Show Me Poster. Teams consist of 2-6 children and are guided by at least two adult coaches. During the season they will conduct research about the current Challenge theme. In addition teams, build a LEGO Model based on the Challenge instructions that contains both a simple machine and a motorized part. Teams display their findings on a Show Me poster which includes information about the team and their journey in working together and learning about the Challenge topic. The culmination of the hard work for many teams is the participation in a Jr.FLL Expo. Volunteer Reviewers at the event interview the teams to learn about their LEGO Model and Show Me poster. All the teams are celebrated and leave with an award.

Thursday, August 20, 2015
POSTER SESSION I: DEMONSTRATIONS
11:10 a.m. Vail

Zeigler M.

Public Libraries as Dynamic Community Resources for Advancing STEM Learning: From Books to Interactive Exhibits, Activity Kits, and Family Events [#1053]

In the past two decades, public libraries have been actively transforming themselves into being far more than just a place for books and quiet reading. This provides an excellent opportunity for advancing STEM learning in diverse communities across the globe. This poster/presentation will highlight two decades of successful experiments stretching the traditional view of what a public library currently is and will be in the future. Featured projects include: A Library Services & Construction Act and National Science Foundation funded project that designed and circulated small, highly interactive museum quality exhibits through public libraries. Topics included *Dino Stories, Brain Teasers, Animals As Architects, Light & Color, Earth Quirks, and Move It!* Incorporating hands-on STEM activities into library resources such as Raising A Reader book bags and small take-home discovery kits. Innovative collaboration between public libraries, family support agencies and local school districts called *Supporting Early Engagement & Development in STEM (SEEDS)*, to advance STEM learning and school readiness at the PreK and Kindergarten levels. Hosting hands-on Family STEM events in public libraries and other community settings using resources from the Foundation for Family Science & Engineering.

Koester A. E.

The BOOMbox: STEAM Learning for All Ages [#1022]

The BOOMbox at Skokie Public Library is an interactive, flexible STEAM space; the overarching theme of activities and equipment in the BOOMbox rotates on a 3–4 month basis. Rotations have included Fabrication, Big and Small, and Gardening and have involved a range of related technologies and equipment. The BOOMbox was conceived to bridge a gap in technology access between local junior high and high schools. The high school district is well equipped with modern and emerging technologies and equipment; several of the feeder junior highs do not provide access to these elements. A major objective of the BOOMbox is to expose youth in grades 6–8 to some of the equipment, software, and skills they will see when they enter high school. Another major objective is to facilitate the development of a STEAM mindset for learning and exploration in library patrons of all ages. The BOOMbox is a connected learning space in conjunction with the library's computer labs, craft spaces, and outdoor spaces. Patrons engage in learning through skills- and activity-based programs; drop-in sessions; MOOCs; and outdoor events. Staff provide some structured learning in these events, but activities are largely self-directed and can be extended beyond a formal program. Equipment utilizes free software, and the library has installed these programs on other computers and tablets in the building so that patrons may continue to develop and apply learned skills outside of the BOOMbox.

Lawler T.

Phoenix Public Library and MACH1 Makerspace STEM Programming [#1003]

The Phoenix Public Library has implemented STEM in our system of 17 libraries in a variety of ways. The MACH1 Makerspace has programming for all age groups covering topics such as Robotics, Science Cafes, Paper Engineering, Coding, Meetups for Javascript, Clojure, HTML and Homeschoolers, Game Design, and more. In addition, with Drop in STEM programming we have added a new element to STEM programs that makes for easily run sessions with limited supplies. We have also incorporated STEM into storytimes with the creation of DiscoveryTime, a non-fiction and science based storytime with experiments for kids ages 3–5. One of our most successful and long running programs is Hacker Haven. In Hacker Haven, we set out a variety of tools and experiments and let people play on their own. We also welcome the public to come in with their own projects and work with others. I will give an overview of the variety of programs, some great resources and some detailed information on Drop-In STEM and on Hacker Haven.

Yang G. Jenner F. Noomnam P.

Shaping STEM Learning Experiences Through Community Partnerships and Staff Education [#1024]

The Mamie Doud Eisenhower Public Library has been offering science programs to the Broomfield community since 2004. The primary focus has been to build foundations in STEM concepts for tweens and teens (ages 9–14). In 2014, the library launched the Discovery Lab- a STEM/Makerspace which both increased and challenged our abilities to present a wider variety of science education through staff education, renovated space, and new community partnerships. In this session, library staff will share our experiences, successes, and challenges in developing five new programming formats including: Drop-in hands-on exploration; Multi-session skill building; Passive programming; Pilot programs and community partnerships; and Maker-in-residence with community artists. We will provide an overview of the realities of current STEM programming and how staff resources and community partnerships shaped the structure and nature of the STEM learning experiences we could offer. We will consider future needs and ways to strengthen partnerships with community members and organizations.

LUNCH

12:15 p.m. Majestic Ballroom

Thursday, August 20, 2015
STEM IN LIBRARIES: NATIONAL SURVEY RESULTS
1:15 p.m. Majestic Ballroom

- 1:15 p.m. Hakala J. S. *
STEM in Libraries: National Survey Results [#1051]
 In the winter of 2015, the STAR_Net project team developed and implemented a two phased front-end evaluation of Library Professionals and STEM professionals utilizing an on-line front-end survey and conducting telephone interviews with select participants. The goals of evaluation were to determine: 1. What STEM programming is currently in place in libraries, and how do libraries approach and implement STEM programs? 2. What obstacles prevent libraries from incorporating more STEM programming? 3. What kind of training and resources would be most helpful to librarians? 4. And what factors influence and enhance the success of establishing and maintaining a “Community of Practice” or professional learning community? Over 500 library and STEM professionals completed the survey and 25 participants were interviewed. This presentation will focus on the results of the evaluation, implications of the results, and recommendations to the project team.

BREAKOUT DISCUSSIONS: KEYS FOR SUCCESSFUL STEM IMPLEMENTATION
2:00 p.m. Majestic Ballroom, Beverly, Capital, Columbine, and Terrace

- 2:00 p.m. *Discussion: Keys for Successful Stem Implementation*
Facilitators:
Jeanne Braha
Linda Braun
Margaret Glass
Tena Hanson
Jennifer R. Nelson
Sandy Toro

- 3:00 p.m. BREAK

BREAKOUT DISCUSSIONS: REPORTS AND WHOLE-GROUP DISCUSSION
3:30 p.m. Denver Public Library Conference Center

- 3:30 p.m. *Breakout Session Reports and Discussion*
Jeanne Braha
Linda Braun
Margaret Glass
Tena Hanson
Jennifer R. Nelson
Sandy Toro

Thursday, August 20, 2015

EXPECT MORE: WHY LIBRARIES CANNOT BECOME STEM EDUCATORS

4:00 p.m. Denver Public Library Conference Center

4:00 p.m. Lankes R. D. *

Expect More: Why Libraries Cannot Become STEM Educators [#1088]

America's public libraries can play an important role in furthering STEM education. However, this will be true only if STEM learning efforts focus on librarians and librarians acting as facilitators. Librarians must create platforms within a community to unleash STEM expertise within the communities they serve. This will involve changing the concept of libraries in the minds of librarians and community members alike.

TRANSFORMATION OF PUBLIC LIBRARIES FOR THE DIGITAL AGE

4:30 p.m. Denver Public Library Conference Center

4:30 p.m. Hildreth S. *

The Transformation of Public Libraries for the Digital Age [#1084]

Expanding access to education, learning opportunities and social connections for all is one of the great challenges of our time. It is a challenge made more urgent by the rapid transition from old industrial and service-based economic models to a new economy in which knowledge and creativity are the drivers of productivity and economic growth, and information, technology and learning are central to economic performance and prosperity. It is not only the economy but all of society that is being reshaped by these trends. Amid these changes, there are divides in wealth, digital inclusion and participation that threaten to widen if we as a nation do not commit to new thinking and aggressive action to provide these opportunities for all. This is a time of great opportunity for communities, institutions and individuals who are willing to champion new thinking and nurture new relationships. It is a time of particular opportunity for public libraries with their unique stature as trusted community hubs and repositories of knowledge and information. The Dialogue on Public Libraries was created to help advance the work that public libraries are doing to address community challenges and to support the transformation of public libraries for the digital age. The results are summarized in the report, "Rising to the Challenge: Re-Envisioning Public Libraries."

TOUR AND RECEPTION

5:00 p.m. Denver Public Library Vida Ellison Gallery, Level Seven

Friday, August 21, 2015
REFLECTION AND DISCUSSION OF DAY 1
8:30 a.m. Majestic Ballroom

8:30 a.m. *Reflection and Discussion of Day 1*
 John Falk
 Marsha Semmel

REACHING UNDERSERVED COMMUNITIES AND UNDERREPRESENTED POPULATIONS
8:50 a.m. Majestic Ballroom

Facilitator: Maddie Zeigler

Panel Members: Donna Brice
 Sharon Cox
 Sandy Toro

Zeigler M.

Evidence-Based Strategies for Engaging Underrepresented Audiences in Informal STEM Initiatives

As providers of informal STEM education, including libraries, grapple with the issue of offering inclusive programs and meeting the needs of their specific communities, potential program facilitators seek knowledge and guidance to develop and deliver effective STEM programming for underserved populations. Questions that might be posed include: Have best practices been identified for effectively engaging underserved audiences? What key strategies, if any, have emerged from previous informal science education efforts that can inform new program development? Over the past 10 to 20 years, museums, science centers, and youth-focused organizations that have taken the lead in informal science programming have developed and evaluated outreach programs for racial/ethnic groups in their communities, particularly Latinos/as. This has resulted in evidence-based strategies that can be used by other informal STEM program developers/facilitators to base the theoretical and practical underpinnings of new program initiatives.

Cox S.

Science in the Stacks — Children’s Library Discovery Center [#1040]

Science in the Stacks is a new concept in library services to children- a fully integrated , multisensory, informal learning environment which provides accessible STEM learning to children from 3–12 including linguistic and ethnic minorities and other underrepresented communities. In 2000, Queens Library received one of the first National Awards for Library Service from the Institute of Museum and Library Services in recognition of outstanding service to the most ethnically diverse community in the U.S. In Queens 46 percent of the residents were born in foreign countries, 67 percent represent ethnic minorities and 17.1 percent live below the poverty level. By encouraging regular class visits by day care centers, camps and facilities for children with special needs, early childhood development programs and providing a safe place with after-school activities for the children of working parents, Queens Library, Children’s Library Discovery Center demonstrate its ability to provide and reach a very diverse audience and introducing them to STEM programming and activities.

Toro S.

Overview of Various Efforts to Reach Underrepresented Groups (In and Out of Library Settings) [#1070]

The Institute of Museum and Library Services provides leadership through research, policy development, and grant making. Museums and libraries help learners build mutual knowledge, skills, and self-efficacy through the use of exhibits, outreach programs, and environments; act as stewards of cultural, scientific, environmental, and historic heritages; and work to close the digital divide for all children, parents, and caregivers (Howard, 2013). These sites can foster productive educational practices among diverse populations. When researchers view learners as agents of learning and knowledge producers, the field can gain insight into both what learners believe works for them and how educational settings can better suit their needs (Martell and Antrop, 2008). The presenter, Sandra Toro, will provide an overview of IMLS-funded STEM projects designed to serve underrepresented groups such as one public library's project to help first generation Americans from homes where English is not the primary language better integrate into a world of state-of-the-art digital media technology. She will discuss how select project teams have engaged in measurement and assessment of learning in relation to learners' identities. And, she will talk about how, in order to support science learning identities, educators in informal settings must provide learners with opportunities to engage with science in ways that meaningfully integrate the world of science with their social worlds (Bevan, 2011).

Brice D.

STEM Programming: Working Around Limitations in the Rural and Small Communities

Along with traditional educational institutions, public libraries have also become an additional location to access STEM resources. Urban public libraries who offer STEM programs sometimes have an advantage over the smaller and rural public libraries. The initial and continual cost of some STEM programs can be prohibitive to the lesser funded libraries. The urban library with the larger budget is able to offer more technical projects than the library located in a rural, less populated and funded area. The availability of STEM resources and experienced staff can be limited in some rural areas. Those libraries may need to use their imagination in choosing the right program, finding the resources needed and the instructors needed to accomplish their goal. Along with the cost, smaller and rural libraries will need to take into consideration a few more elements in the decisions they make. Will a partnership with a local or distant organization, such as a museum or a corporate partner enable them to offer the most appropriate program for their community? Another element is the age of the community members. Does the library want to target a specific age range per program or encompass the community as a whole and offer a more general program? Whatever limitations there may be for the small and rural communities, it is possible to find a work-around using a little creativity with the resources you have.

9:50 a.m. BREAK

Friday, August 21, 2015
EFFECTIVE COLLABORATION MODELS BETWEEN LIBRARIES AND STEM ORGANIZATIONS
10:10 a.m. Majestic Ballroom

Facilitator: **Robert West**

Panel Members: **Dale McCreedy**
 Margaret Glass
 Jeanne Braha

West R. M.

The Rationale for STEM Organizations to Collaborate with Libraries [#1067]

There are a large number of organizations that are engaged in serious STEM work: research, education, conservation and environmental organizations in the public and private sectors. These include government research laboratories, private and corporate research and development laboratories, university academic departments, science centers, natural history museums, environmental organizations, national and state parks, and private individuals. Not all of these organizations have affiliations with libraries. Those that do include science centers, natural history museums and government and university research departments and laboratories. There are effective partnerships with different compositions and objectives. Among those to be discussed are the Franklin Institute and the Free Library of Philadelphia's LEAP Into Science program, the Oregon Museum of Science and Industry's distribution of exhibitions to the Libraries of Eastern Oregon (LEO), and The Center of Science and Industry's (COSI) partnership with the Columbus, Ohio, Public Library onsite at the science center. The presentation will explore how the existing programs provide insights into the various kinds of collaborations that are realistic and then explore some of the other, as yet undeveloped, relationships through which diverse organizations can pool their resources to mutual benefit, both to the institutions themselves and to the broad public. Audience input will be solicited throughout the presentation.

McCreedy D.

LEAP into Science: A National Collaboration Supporting STEM and Literacy in Out-of-School Time [#1083]

LEAP into Science began in 2007 as a museum-library partnership between The Franklin Institute and the Free Library of Philadelphia. It is now in 10 cities nationwide, each consisting of 2 to 3 institutional partners, creating a network of 27 diverse organizations nationwide including science centers, children's museums, public libraries, statewide afterschool networks, school districts, universities, and public TV. It is designed to build the capacity of OST providers to engage underserved children and families in STEM and literacy learning by connecting hands-on science activities with children's books. LEAP into Science has reached nearly 1100 OST educators with in-depth trainings, and these professionals have in turn served 38,500 children and 12,400 parents and caregivers using the program's curriculum materials. The program consists of evidence-based curriculum resources for children in preK through 5th grade, as well as high-quality professional development resources to enrich the capabilities of a wide range of educators to engage children and families in STEM and literacy learning. LEAP into Science is completing its 8th year with the support of three federal grants (2 NSF and 1 IMLS). Partners convene monthly by phone or webinar to discuss strategies for engaging communities in science and literacy, functioning as a robust nationwide network. They are active partners in evaluation and research efforts.

Braha J.

Elements of Successful Collaborations to Engage Scientists and Public Audiences [#1082]

Scientists want to engage with public audiences around emerging socioscientific issues; libraries offer an opportunity to reach diverse audiences in nearly every community in the United States in a space designed for civic engagement. Drawing on the theory of public engagement with science and science communication research and examples of successful collaborations between scientists or scientific organizations and public-facing institutions, including libraries, this talk will characterize the elements that lead to success, particularly when direct engagement with a scientist is desired.

Glass M.

Learning Labs in Libraries and Museums: Case Studies in Collaboration [#1091]

The Learning Labs in Libraries and Museums program was launched in 2011 by a public-private partnership between the Institute of Museum and Library Services (IMLS) and the John D. and Catherine T. MacArthur Foundation in response to President Obama's Educate to Innovate initiative. Through two cycles of national competitions, libraries, museums, and other community partners at 24 sites were funded to create innovative teen spaces that followed the principles of the emerging Connected Learning Framework. Learning Labs often involve partnerships and collaborations between libraries and other community organizations as they create new programs in STEM and the arts. The experiences at these sites document a wave of organizational change in libraries associated with new roles as community education partners.

Friday, August 21, 2015
POSTER SESSION II: OUTWARD- AND FORWARD-LOOKING EFFORTS
11:10 a.m. Vail

Aviles F. A.

Content Analysis of Websites of Mathematics Education Programs in Public Libraries [#1049]

AIM: Research on public library websites has primarily focused on website design and accessibility. This study examines how public library websites represent their educational role and their incorporation of math education on their websites. METHOD: I used Altheide and Schneider's (2013) ethnographic content analysis (ECA) method to guide the document selection, data collection, protocol development and analysis of the data. This method utilizes the five stages of ECA: (a) selecting documents, (b) protocol development and data collection, (c) data coding and organization, (d) data analysis, and (e) report (Altheide and Schneider, 2013). ANALYSIS: Data from the chosen web documents were compared and coded. This method involves the analyses of numerical and narrative data via constant comparison, contrasts, and theoretical sampling to discover concepts, emergent patterns, and themes (Altheide and Schneider, 2013). FINDINGS: Findings revealed themes of internal and external conflict among the representation of the educational roles and their integration of mathematical education on public library websites. The implications express an organization that is careful to maintain its identity as it walks the fine line between single subject teacher and librarian.

Buxner S. R. Jaksha A. LaConte K. M.

Bringing STEM to Libraries through the Explore Program: Findings from a Follow-Up Survey [#1073]

We report on a follow-up study of library staff who had attended in-person and/or online professional training to facilitate hands-on Earth and space science learning experiences through the Lunar and Planetary Institute's Explore program. End of workshop evaluations consistently demonstrate that participants leave with increased content knowledge and intent to use what was modeled at the workshop. Our survey was completed by 183 individuals who had completed training from 1998–2013. The survey asked respondents to share information about their institution and responsibilities, their use of materials or reasons they did not use the materials, and to share barriers to program implementations, partnerships they had created and successes they had in program implementation. Findings show that participation in the Explore program resulted in changes in participants' beliefs and behaviors around leading science programming at their institutions. Sixty percent of the respondents reported that they were very committed to providing science and engineering experiences for their visitors, compared to 16% before the training, and over 75% reported that they were more likely to advocate for including science and engineering in the programs offered at their facilities. Respondents reported gains in the skills, knowledge, confidence, and a virtual network of support to bring STEM programming to their communities and reported ways in which they integrated it into their existing programs.

Chang S. Keune A. Pepler K. Regalla L.

Open Portfolio Research Brief Series [#1060]

Maker Ed's national portfolio project aims to develop a common set of practices for portfolio creation, reflection, sharing, assessment, and technology solutions to create an open, decentralized, and distributed lifetime portfolio system for makers. Portfolios allow for informal and formal education environments to document students' accomplishments, capture learning and make the case for the value of making experiences. Rather than showing the learner knows what has been taught, the portfolio demonstrates that the student can do what has been taught. We explored the use of portfolios through (1) a thorough investigation of the research literature on traditional and e-portfolio systems; (2) a systematic feature analysis of existing tools to identify design features that best promote learner documentation, reflection, and curation; and (3) a series of iterative design experiments to test potential prototypes. The outcomes will inform the guiding philosophy of a portfolio system that can be created and managed by any student/maker, aggregated by schools, community organizations, libraries, and informal learning institutions, and be independent of any single website or software.

This project is directed by Maker Ed in collaboration with Indiana University's Creativity Labs and made possible by the generous support of the Gordon and Betty Moore Foundation. All research briefs are available at: <http://makered.org/opp/research-briefs/>.

Compton E. A.

Make It at the Library! [#1007]

Offering rich and engaging out-of-school programming is an important step toward preparing our youth for the future. Libraries are at the heart of many communities and perfectly poised to provide rich and meaningful learning opportunities during out-of-school time. And since the typical 18-year old has only spent 18% of their time in formal educational settings, out-of-school time is critical to success!

The Idaho Commission for Libraries developed and launched the Make It at the Library project in 2012 to implement innovative "maker" programming in libraries across the state. Their model incorporates extensive training through hands-on workshops, the provision of innovative and easy-to-use tools and materials, and ongoing support to ensure sustainability and success. The focus is on creating activities that are not only fun but which teach critical thinking, creativity, and twenty-first-century skills as emphasized in the Common Core and the new Next Generation Science Standards.

In year three we have 19 public libraries and 2 school libraries offering everything from soldering and programming to 3D design/printing and robotics. These libraries are located in communities large and small and in 2014 reached over 23,064 teens and tweens through in-house and outreach programming. The program has gained national attention and has been represented at numerous convenings, conferences, and workshops over the past two years.

Considine S. C. Portier M. P.

A Strategic Team Approach to Developing STEM Services and Spaces in a Community [#1005]

At the Fayetteville Free Library (FFL), we strive to anticipate and meet the needs of our community. As STEM learning moves to the forefront of attention, we are taking strategic steps and making critical decisions that will ensure our community has the support and the space for engaging in STEM learning. Participants in this session will hear about the monthly forums we hold for staff to come together and share ideas, the regular training staff engages in to learn new skills, the constant evaluation of spaces and services to ensure our community's needs are being met, and the drive that led the FFL to develop three dedicated STEM learning spaces in the library building.

Edwards M.

Collaborative Vision for the 21st Century Library [#1075]

I preface this by saying, I am not a scientist. And this is important because the majority of librarians we hope to reach to promote STEM programming are not scientists either. Librarians come from varied backgrounds but generally, science, as recognized here, is not one of them. If we hope to create a vision for 21st Century STEM Learning in Public Libraries this fact has to be acknowledged. Creating STEM programming from this position requires more of an effort in collaboration and training. AND IT REQUIRES A MISSION STATEMENT. True vision suggests scope, scope suggests opportunity-and this conference is an opportunity for many voices to be heard. Many voices from all walks of life need to be a part of this 21st century equation if we want this to succeed. Several years ago, I attended a 'scientific' training solely for the purpose of improving the quality of programming I offered my patrons. Theater, stories, plays, arts, music, crafts, books-I offered literacy in all shapes and sizes except math and science. I knew I needed to do better-to be better- for my patrons- to prepare them for school and life. This fundamental need to offer our patrons more, to be the bridge to their future-this is why many librarians have embraced the STEM effort across the country. We want to give our patrons opportunities to learn and explore and we need training and encouragement to make this happen. Creating and implementing a community vision will be the core of my presentation.

Finton J. L.

Using Volunteer Scientists and Engineers to Conduct STEM Activities: Finding, Developing, and Growing Relationships with STEM Professionals [#1072]

One way for libraries to offer a variety of hands-on STEM experiences is to recruit presenters from the world of STEM professionals--and amateurs. How do you find quality presenters who will do it for free? Learn ways to locate the local branches of national societies and work collaboratively with other organizations including hobby groups and universities. Jeannine Finton is a Maryland certified Library Associate. While working for the Harford County (Maryland) Public Library she developed the award-winning LEAP: Science is Fun! program (3rd – 8th grade) and co-developed Little Leapers for pre-K. In addition to her library experience she managed educational programs at the Maryland Science Center, Liberty Science Center, and Baltimore Museum of Industry and is currently the Senior Manager of Pre-College Outreach for the American Society of Civil Engineers.

Finton J. L.

Dream Big: How Rural (and Other) Libraries may be Eligible to Show a Giant Screen Film on Engineering [#1074]

Dream Big: How Rural (and Other) Libraries May Be Eligible to Show a Giant Screen Film on Engineering. "Dream Big: Engineering Marvels of the World" is the working title of a film that will show in IMAX theaters around the world. Developed with direct input from a variety of engineering societies, Dream Big will showcase engineering in a new and dramatic way. The organizations funding Dream Big want to make it accessible to audiences who may not be close to a giant screen theater. Libraries in communities that are geographically distant from such theaters will be able to show it for free, and take advantage of the wealth of engineering outreach materials available. Learn more about this unique opportunity and become part of the Dream Big community.

Fitzhugh G. Coulon V.

Can Libraries Provide STEM Learning Experiences for Patrons? Findings from the STAR_Net Project Summative Evaluation [#1033]

We will highlight evaluation findings from the first phase of STAR_Net (the Science, Technology, Activities and Resources Library Education Network). STAR_Net, was developed by the National Center for Interactive Learning and its partners with funding from the National Science Foundation. STAR_Net brought inquiry-based STEM learning experiences to 18 public libraries through two traveling exhibits, associated programming for library patrons, and a virtual community of practice for library staff and others interested in bringing STEM programming to libraries. Evaluation and Research Associates (now part of Education Development Center) evaluated the implementation of the project and its impact on library staff and patrons. The evaluation found that the project had a positive impact on participating librarians, library staff, and library patrons. Librarians and library staff reported that the project increased their knowledge, interest, and confidence in offering STEM programming in their libraries. The exhibits appeared to spark the interest of many patrons to learn more about science and engineering. Many libraries reached out and developed connections with organizations and individuals they had not worked with previously. The majority of libraries that hosted the exhibit reported that they planned to continue to offer STEM programming. Data suggests that the project may have a lasting impact on some libraries' interest in and capacity to educate their patrons about science.

Fooshee J. Wiehe B.

Beyond Our Walls: What Does It Mean to Reach Out to a Community [#1046]

Libraries, schools, universities, and museums have always shared a major feature in common: they are all defined by their facility. But that traditional assumption is shifting. Just as digital initiatives have radically transformed the idea of what audiences such organizations might serve, the past decade has seen experimental approaches to live public science events that have helped these institutions redefine what it means to be present in the community. What does it mean for the general public to have a substantial interaction with a museum, university, or library without ever actually coming in the door?

Forsyth S. A. Barrett B. Lane K.

Public Libraries as Venues for Communicating Current Science [#1039]

Public libraries offer tremendous potential for communicating current science to diverse public audiences. For the past three years, CU Science Discovery, based at the University of Colorado Boulder (CU), has partnered with area libraries, including Louisville, Lafayette and Boulder Public Libraries, to excite youth about STEM fields and connect public audiences with current science and scientists. Successful program models include: After-school STEM Programs, in which CU undergraduates majoring in STEM fields lead engaging classes tied to kids' books (e.g., Magic Treehouse); STEAM Saturday Workshops that integrate art, technology and the engineering design process; and Outreach Events, such as Hour of Code and NanoDays, that provide library visitors with opportunities to explore STEM topics in a hands-on way. In the coming year, Science Discovery will connect library visitors to CU scientists as part of the Portal to the Public network, which trains and supports STEM professionals to communicate their research to the general public. Trained scientists will each develop a hands-on activity that demonstrates key concepts in their work and participate in a culminating Meet-a-CU-Scientist event at the Boulder Public Library. Partnering with local libraries has enabled Science Discovery to reach a larger, more diverse public audience than it otherwise would and at the same time, has enriched its STEM programming with literacy connections that appeal to a wide range of students.

Golden J. Hudson J. MacKinnon P. Hildreth S. Couch S.
Libraries and Multi-Stakeholder, Cradle-to-Career, Regional STEM Networks **[1094]**

Emerging regional STEM education networks across California and in many other states bring a wide variety of stakeholders (i.e. formal and informal educators, the business community, libraries and science centers, non-profits, foundations, etc.) together in an effort to improve the preparation of today's youth in science, technology, engineering, the arts, and mathematics (STEAM). In many instances, this work involves the examination of research and local data, the development of strategic plans, and the alignment of effort by many entities that are autonomous. Actors in such networks (or STEM ecosystems) need to see value in aligning their own work in ways that also contributes to the needs of the network. This session will highlight the unique contributions being made by library systems in the San Francisco Bay Area to the regional Gateways East Bay STEM Network, and the reciprocal value being created for the library systems. It will show the ways library leaders at the local, regional and statewide levels are collaborating with a university, a nonprofit and the private sector to leverage existing technologies and to develop new technology resources that have the potential to advance STEM work of libraries and the work of regional STEM networks across the nation. It will also show the value to local K12 and higher education partners, and the ways these partners are shifting their work to support youth in new ways in partnership with the library systems.

Haley Goldman K.
Building Evaluative Thinking Within Library Programs **[#1064]**

Hall M. K. Mayhew M. A. Madrid T. M.
Teen Science Cafés: A Collaborative Model to Enhance STEM in Libraries with a Focus on Reaching Underserved Groups **[#1031]**

The Teen Science Café Network (teensciencecafe.org) is an open community of practice engaged in developing Teen Science Cafés led by teens for teens. Ideas and resources are freely shared, as well as lessons learned in developing cafés in each location. The Teen Science Café Network provides professional development, mentoring and small grants for starting a new program to new Members. In this presentation, we will share insights into starting a Teen Science Café within a library and the impacts these programs have on both the teens and the STEM expert presenters. We will also discuss how the structure of the program incorporating STEM experts and teen leaders can provide a foundation for additional STEM programming within libraries. Teen Cafés are informal, interactive programs that promote exploration, creativity, and life long learning in STEM. Teens explore the latest ideas in science and technology through stimulating conversations with scientists, engineers, and inventors in an informal and relaxed setting. Free food is served. Key elements of successful teen cafés are strong partnerships with local STEM organizations and teen leadership of the program. STEM organizations can provide access to eager and engaging STEM experts for the teen café and beyond. Teen leaders take great pride in helping to bring something new to their community. Teen leaders also can help libraries gain insight into how to serve teens better.

Holland A. Dusenbery P.

The STAR_Net Community of Practice: Lessons Learned and Next Steps [#1044]

The STAR_Net Community of Practice has undergone multiple revisions in the course of the program. These changes are the result of formative evaluation, community input and changing technology access. The original goal of the STAR_Net Community was to provide STAR_Net exhibit host sites a central location to view exhibit related materials (such as packing lists and exhibit guides). The community has grown to over 600 members in every US state, Canada, Puerto Rico and the Philippines. The site is home to a vibrant blog (ran by librarian volunteers), a forum, resources and activities, a directory and a gallery space. Traffic to the site is increasing every month, as are links from outside organizations (such as AISL and NASA). Future plans for the site include creating a searchable database for resources and activities (arranged by age, learning goals, topic, etc.), porting the site to a more powerful platform, creating better tools for match making between librarians and STEM professionals, and creating a more meaningful forum space. This poster will focus on the processes used to determine the current scope of the site, success stories out of the site, and future plans.

Jakubowski R. D. Reeder B.

Researching Libraries as Conduits for STEM Delivery: An Example Approach [#1047]

Through an NSF-funded partnership through the Space Science Institute and the National Center for Interactive Learning, Datum Advisors is investigating whether or not libraries are well suited to deliver STEM experiences to patrons from underserved and underrepresented populations, and determining how common library structures can be leveraged to help libraries more intentionally deliver STEM content. To make this determination, researchers plan to directly engage libraries to inventory current library practices, determine library professionals' knowledge, attitudes, and awareness of issues surrounding STEM education, and measure other factors to help determine site-specific STEM delivery potential. Once evidence of impact emerges, we also aim to investigate how impacts realized with library staff and patrons align with existing learning models. This information will be used to determine if existing approaches are sufficient for understanding learning in library-initiated education settings, or if a new model is needed. This session will start with an overview of our current research design, and will quickly move into dialogue focused on the key considerations researchers need to make to better prepare libraries, library staff, and the wider profession to become the next frontier for effective STEM delivery. This session will be a unique opportunity to hear "what's important" perspectives from other library professionals and to inform the direction of current research.

Julien H. Latham D. Gross M. Witte S.

Exploring Collaboration Between Public Librarians and High School Science Teachers [#1004]

The development of multiple 21st Century literacies, particularly in STEM areas, continues to be a growing area of focus in education. However, the role of public libraries in supporting STEM education at the high school level has not yet been thoroughly explored. This study examined how high school science teachers and public librarians can collaborate most effectively to help students develop 21st Century Skills in order to prepare them to be full participants in their communities and workplaces. Separate focus groups with public librarians and science teachers were conducted to explore their experiences with collaboration to support content learning and incorporation of 21st Century Skills in science and math courses. Participants were asked about best practices related to collaborating, challenges and barriers, and the degree to which collaboration was covered in their pre-professional training. The focus groups were recorded, recordings were transcribed, and data were analyzed qualitatively. Results show that these public librarians are supporting math and science curricula in their local schools, but a number of significant challenges and barriers exist. Participants from both groups indicated that they received little or no instruction in collaboration during their pre-service training. Most respondents described their relationships as good; however, these have not translated into true collaborations, with few exceptions.

Karl R. K.

Strategies for Engaging Girls in STEM: The SciGirls Seven [#1018]

SciGirls is a PBS television show, website and outreach program aimed at engaging and inspiring girls in STEM. Why girls? Even though girls and boys sit side-by-side in educational settings nationwide, women are much less likely to choose STEM careers than men. SciGirls is founded in academic research on gender equity and STEM and is funded by the National Science Foundation. Our collected strategies for encouraging girls in STEM, the SciGirls Seven are fundamental to our educational programming and promote collaboration, creativity, meaningful projects, feedback that engenders a growth mindset and the use of role models. SciGirls partners with girl-serving STEM educational organizations and provides them with training and resources to implement STEM programs in their communities, with an emphasis on Hispanic populations. SciGirls has 115 partner organizations in 34 states including science centers, museums, community organizations, schools and universities who host gender equitable STEM clubs, camps and afterschool programs for girls (and boys!). Our resource guides include: our NSTA-recommended STEM Activity Guides; our gender equity handbook, the SciGirls Seven: How to Engage Girls in STEM (with practical tips and teaching strategies); our guide for working with Hispanic girls and families, Engaging Latino Families: Key Ingredients for Successful STEM Program; and our guide for female STEM professionals: Role Model Strategies: Encouraging Girls to Consider STEM Careers.

Klein E. Braun L.

Little Did We Know: The challenges and Achievements of a Seattle Public Library/Pacific Science Center Partnership [#1063]

In 2014 the Seattle Public Library (SPL) and Pacific Science Center (PSC) began an institutional partnership. At the time, SPL was working to transform their summer reading program to a summer of learning program with a focus on including more science, technology, engineering and math (STEM). At the same time PSC was eager to build community relationships and reach new audiences. The partnership formed organically among program managers at each institution who saw an opportunity to collaborate, had similar outcomes in mind, and who as a result developed a strong working relationship. This small team across the two institutions ultimately earned the support of their respective institutional leaders because of their commitment to the partnership and support of youth and families in informal learning environments. There were challenges the first year: we encountered bumps in the road around communication, institutional buy-in and capacity. Overall, the partnership is a clear benefit to both institutions and year two has - for the most part - been a smoother experience. Linda Braun from the Seattle Public Library, and Eve Klein from Pacific Science Center propose a poster that describes the past and future of the PSC/SPL partnership, including the a look at the risks, failures, successes and achievements of building a long-term sustainable partnership.

Koester A. E.

Building STEAM among Diverse Youth [#1023]

Libraries are optimal institutions to provide informal learning: we can structure programs around our own goals instead of formal curricula, and our offerings are freely available to anyone in the community. Yet it is vital that we recognize that the children who attend our programs—especially STEAM programs—are likely not all on a level playing field. Young students of color routinely score lower in math and science than their white peers due to lack of access and preparation in STEAM areas, which has contributed to a longstanding underrepresentation of minorities in STEAM education and professional fields. The library can help bridge this early STEAM gap with programs developed with the intent of having a positive impact on every child who participates. Libraries have had success developing and offering STEAM programming that is both engaging and participatory by taking stock of the interests of the community. These types of programs provide motivation to pursue STEAM areas that is integral to continued learning and success. Libraries can highlight diversity in their STEAM programs as well, prioritizing sharing information about scientists of color and integrating cultural beliefs and wisdom into explorations of STEAM topics. Partnerships and collaborations have also allowed libraries to offer dynamic, transformative informal STEAM learning opportunities to underrepresented minority children.

Koh K.

The Critical Role of Information in Informal STEM Learning [#1037]

This poster reports findings from an IMLS-funded research project on STEM learning in library MakerSpaces and Learning Labs. This research explores how youth under 18 create scientific information and learn STEM concepts and skills. In 2014, the researcher investigated how middle schoolers learned in a meteorology-themed Learning Lab over three months in Oklahoma. Students made different projects following their own passions and interest, including 3D models of hails and storm shelters, weather forecasts, severe weather preparedness tutorials, weather comics, and more. It was prevalent that youth assimilated STEM concepts and skills by interacting with information. They learned by seeking information (e.g., facts, tutorials, and tips) on their own and through other people such as mentors and peers. Innovative learning occurred when they shared and created information, such as teaching other students and producing scientific information. The findings suggest information professionals can meaningfully contribute to STEM learning by focusing on the fundamental assets of libraries, i.e., information literacy instructions and 21st century skills such as critical thinking, creativity, and inquiry skills. Traditional information literacy instructions, which tended to focus on searching skills, must be updated to teach youth how to create and share information effectively, creatively, and ethically.

Krishnamurthi A. Wegener V.

Afterschool Providers and Libraries: Partners in Out-of-School-Time STEM Education [#1036]

Afterschool programs and libraries share many common characteristics as providers of informal STEM education programs. Afterschool providers have embraced STEM programming and hence there has been significant investment in supporting program implementation, research, and infrastructure supports to increase the number of such programs and improve quality. Libraries are increasingly becoming destinations for young people after school and in the summer and often look for partnership opportunities with afterschool programs. We will share the state of afterschool STEM programming with the library community to help increase exchange and collaboration: research findings on the importance of offering STEM learning in out-of-school-time settings; efforts made in the afterschool field to establish an outcomes framework for STEM programming; and evaluation studies describing the impact of afterschool STEM programs. We will describe a key support - the statewide afterschool networks (SANs), public/private partnerships that work within their states to foster partnerships and policies to develop, support and sustain high-quality afterschool and summer learning opportunities for children and youth. The SANs support quality STEM learning through a variety of ways including brokering partnerships, and creating professional learning communities in the state. Many work with libraries in their states and we seek to increase awareness of this vital support network to librarians in all states.

LaConte K. M. Shipp S. S. Shaner A. S. Shupla C. S. Buxner S. R. Jaksha A.
*Bringing STEM to Libraries Through the Explore Program: A Model for
 Responsive Collaboration* [#1076]

The Lunar and Planetary Institute collaborates with library staff, state libraries, professional library organizations, NASA scientists and education specialists, and evaluators to provide quality STEM library programming materials and training. These professionals contribute their expertise through an advisory board and by participating in materials development and training implementation. State libraries and professional organizations provide reach to libraries that serve populations underrepresented in STEM fields, as well as rural and low-income communities that look to their libraries to provide STEM learning opportunities. Over the program's 17-year-history, 1000+ library staff and community educators (from 35 states) have joined the Explore network. The Explore network and collaborators are engaged through ongoing communication and frequent follow-up opportunities. The Explore program's collaboration model iteratively solicits and responds to the needs, capabilities, and motivations of public library staff. The members of the Explore program network participate in advancing national STEM education goals by providing hands-on Earth and space science activities and information for their patrons. The Explore program serves as a model for effective materials development and training practices for bringing STEM to libraries. Specific collaborative approaches that contributed to the success of the Explore program are outlined in this presentation for others to build upon.

Lindskog L. Bruner A. Nelson J. Cristostomo D.
Partnering to Promote STEM Careers [#1059]

Pierce County Library and the University of Washington Tacoma co-created an ongoing summer reading initiative that focuses on STEM career exploration for K-3 students. The program, "Passport to Professions" ran successfully at all 18 branch libraries in 2014, creating a platform for families to explore STEM topics as an extension of their regular summer reading engagement. Three STEM careers were featured: computer engineer, environmental scientist and healthcare professional; children were encouraged to participate in all three programs to earn a "Super Scientist" certificate. Key to the success of the initiative was its mutually beneficial nature. UWT was able to promote college-going culture in our largely rural and suburban county, while also highlighting careers that can be pursued through their own degree programs. PCL was able to provide more quality summer programming that suited the needs of its patrons, while expanding its STEM offerings. Positive internal and external feedback has led us to expand the partnership in 2015 to include storyteller training for UWT student workers. Our mutual goal is to leverage the specialties of each institution to provide high quality, career-oriented STEM programming. Our poster will focus on the rewards of building sustainable community partnerships around STEM priorities, providing attendees with solid ideas to take home to their own communities.

Lucas K. G.

STEM from the Start [#1019]

At the Madison Public Library we create meaningful STEM experiences for children ages 3 - 5 years both in the Public Library and in Head Starts and Preschools. This poster session will demonstrate examples of quality STEM experiences with Madison Public Library's (MPL) WonderWorks programs, our 2014 University of Wisconsin Geology Museum collaboration, and our initiative to create circulating STEM kits for Head Starts and preschools. MPL's WonderWorks programs began in 2012. They include a book aligned with the topic and 2-4 hands-on experiments - opportunities to explore the topic and share conversations about what is being learned with parents/caregivers. WonderWorks programs have inspired a blog that was mentioned in School Library Journal, and sharing via Pinterest. In 2014 the UW Geology Museum (funded by the NASA Astrobiology Institute) was responsible for funding Madison Public Library's Summer Reading Club. This included providing science-themed play materials for libraries, science themed prizes for Summer Reading, including free books, and a wealth of programming from archeology to space exploration. In 2015 MPL will be taking WonderWorks on the road by creating kits for Head Start teachers to use in their classrooms. Our goal is to introduce young children to STEM experiences to increase interest, competence and vocabulary in Science, Technology, Engineering and Math among children who are not able to get these experiences in a physical Public Library setting.

Mokros J. Allen S. Keller T.

Libraries as Anchors in Rural STEM Hubs [#1016]

Local libraries are a key component of Maine Mathematics and Science Alliance's work to connect rural youth with STEM opportunities. Libraries in rural areas are not only active community hubs, but also serve as strong levers for educational and economic development (Hilferth, 2007). We are a nonprofit STEM organization that is partnering directly with small libraries in three rural areas of Maine. We are also collaborating with Cornerstones of Science, a Maine-based program that distributes STEM tools, such as telescopes, through libraries. Through these collaborations, we are: 1) establishing libraries as "go to" places for STEM resources, including local events, programs, and camps as well as virtual STEM resources; 2) enabling libraries to become gathering places for the implementation of high-quality programs such as the NSF-funded Teen Science Cafes and Boston Museum of Science's Engineering Everywhere programs; 3) building networks of local STEM people—ranging from local organic farmers to arctic researchers—who are connected to youth and to each other through libraries; and 4) acquainting librarians with existing STEM resources that are a good match with their youth audiences. We have developed a Maine-based STEM Resource Bank that is being disseminated through the Maine State Library (www.steminme.org). The project currently involves six rural libraries and will roughly double in size over the next 3 years through funding from the National Science Foundation.

Newman G. J.

Citizen Science, Rural Public Libraries, and the Citizen Science Association: Partnerships for STEM Education, Public Engagement, and Scientific Advancement [#1017]

The Citizen Science Association (CSA) is a new association devoted to serving the needs of the citizen science community. We envision a world where people understand, value, and participate in science. Our mission is to advance citizen science through communication, coordination, and education. Specifically, our goals are to (1) Establish a global community of practice for citizen science, (2) Advance the field of citizen science through innovation and collaboration, (3) Promote the value and impact of citizen science, (4) Provide access to tools and resources that further best practice, (5) Support communication and professional development services, and (6) Foster diversity and inclusion within the field. In striving to enact our vision, reach our mission, and accomplish our goals, the CSA will support the needs of informal and formal STEM learning programs by offering tools, resources, best practices, professional development, coordination, and education. Given such support, we foresee opportunities for the CSA to partner with local libraries across the nation. Such partnerships would afford the CSA opportunities to reach local STEM audiences while providing support to local libraries looking into engaging diverse audiences in STEM learning through citizen science. Here, we discuss partnership opportunities; a suite of support services and roles that the CSA might provide libraries; the benefits of citizen science for libraries; and possible paths forward.

Raj S.

Trailblazer! Driving STEM Success in Underrepresented Communities Through Mobile STEM Museums [#1025]

Texas is big: 269,000 square miles, reaching from the plains of the Panhandle to the smokestacks on the Gulf and down to the Mexican border. Our population is big: over 27.7 million people, almost half of us Hispanic. And STEM is big: by 2018, STEM jobs are expected to grow by 22%. Employers are already struggling to find qualified, local employees. How do we reach across Texas to bring kids into the STEM pipeline? Educators in Texas face both a digital divide and a distance divide: the distance between a family in which no-one has gone past the 6th grade and a career in electrical engineering, and the distance of 300 miles of desert between a school and the nearest college computer lab. Enter the TAME Trailblazer, a mobile STEM-museum on wheels. The Trailblazer program is designed to spark excitement about STEM careers, from cardiology to aeronautics, through hands-on exhibits that tie fun science concepts directly to career paths and salaries. Often anchoring Family STEM Nights at local schools and libraries, the Trailblazers are one part of a comprehensive strategy designed to introduce students and communities to real opportunities in STEM. The program includes pre-visit training for librarians on STEM program design and delivery and access to a collection of curated, frequently updated STEM resources. Librarians report that the program has led to an increase in the number of patrons, increase in STEM books checked out and increased awareness of STEM in the community.

Randall C. Keeley D. McKenney J.

Re-Imagining Public Libraries in the 21st Century as Community Science Learning Centers: 10-Years of Hands-On Experience [#1043]

The nation's 17,000 public libraries have an important role in helping their patrons become more scientifically literate. The challenge is how to provide these science experiences and services in a way that builds on existing infrastructure, knowledgeable staff, other strengths and assets in these institutions. Core elements of this work includes: 1) patron access to relevant ongoing science experiences and resources; 2) a public library environment/culture where patrons can spark their curiosity and nurture a deeper understanding of the world around them; 3) partnerships with local organizations and the science community and, 4) innovative library directors and library staff that are local champions of science and that can facilitate those ongoing experiences in a meaningful, engaging and relevant ways. It is the belief that these core elements must be found functioning and operationalized, on a daily basis, if science literacy is to be successfully sustained within public libraries. Over the past 10-years the Maine State Library and Cornerstones of Science have created a model to build the capacity in an effective sustainable manner that assist libraries to re-imagine themselves in the 21st century and enables them to become science and technology community learning centers.

Rockmore D. N. Bennett A. B. Falk J. H. Gleiser M. Maloney M. A.

Pushing the Limits: Rural Librarians and Their Libraries as STEM Gateways [#1055]

Pushing the Limits is an NSF-funded project that builds capacity of rural and small libraries to enhance public understanding of STEM by strategically integrating professional development (PD) for librarians with library-based STEM programming for adults. The PD includes live webinars and streaming video featuring library and ISL professionals, and three case studies of libraries. The PD supports librarians while they learn about ISL, recruit "Science Partners" as program co-facilitators, and present their own programs. Librarians are also provided program materials for a book-club-meets-science-café series, with books, videos and in-library discussions. Evaluation of 95 participating libraries found that while only 25% of librarians had experience with STEM programs for adults, and fewer than half the science partners had previous experience with adult learners, 79% of library professionals and 85% of science partners rated themselves as very or extremely successful in accomplishing the program objectives. Librarians made large gains in STEM knowledge, comfort in finding science resources and facilitating STEM programming, and gave extremely high marks to the overall quality of the PD. More than half the libraries reported that the series drew more men than usual, and a third had bigger crowds than usual. 59% of library patrons were more interested in the STEM aspects of the event than they had expected, and 96% said they would attend similar programs if offered.

Rokos S. Z. Shapiro R. D.

Science @ the Library [#1014]

The Mohawk Valley Library System's (MVL) Science @ the Library program began in 1992 with a three-fold purpose. It was developed as a means to bring science education to elementary school children and their families outside the confines of the regular classroom. It was designed to offer accessible science programming to member libraries in rural areas that otherwise would be unable to provide for these services. And most importantly, it was created to give children an opportunity to meet and collaborate with real scientists, generating positive science experiences and planting the seeds for careers in science. GE Volunteer scientists direct and provide science programs consisting of 1-1/2 hour sessions in science fair format with hands-on experiments in energy, surface tension, buoyancy, sound, light, electricity, magnetism and chemistry. The program has evolved from "talking at" to "doing with," as we recognized early that children learn best through play and interaction, not words, especially since many GE scientists tended to lecture, which is not the best way to engage grade school children. Early evidence that parents brought their sons to the "hard" science activities and their daughters to the "soft" ones led to lessons that incorporated both aspects, to facilitate learning by boys and girls in both arenas.

Skidmore E. S.

The Cycle of Intentionality: An Effective Collaboration Model [#1066]

To achieve success in this century, we believe organizations must be intentional in their practice by continually clarifying their purpose, aligning all actions, practices, and resources to achieve their purpose, measuring impact, and learning from ongoing work to strengthen their planning and procedures. We use the cycle of intentional practice—four interconnected and continual steps guided by four related questions—to facilitate collaboration among different organizations. A collectively defined notion of impact is placed at the center of the cycle and guides all planning and decision making. The four steps and questions are: Plan—what impact do we want to achieve? Align—how well do our actions align with achieving impact? Evaluate—in what ways have we achieved impact? Reflect—what have we learned; and how can we improve? While one organization can embrace this cycle and apply it to the work of the individual organization, the cycle of intentional practice can also serve as a collaboration model that supports several organizations as they rally around and align their organizational practices with a collective idea of impact. Impact planning is most effective if the work is done together, considering how incredibly difficult it is to achieve impact in the first place. In taking the cycle from theory to practice, two things are important—involving diverse stakeholders and modeling new ways for staff across organizations to collaborate with one another.

Sohus A. M. Johns C. J.

NASA's Museum Alliance [#1079]

NASA's Museum Alliance facilitates access for educators to NASA STEM content and funded by NASA Education's STEM Education and Accountability Program. As a no-fee service, it provides some technical assistance to NASA's Minority University Education and Research Program's Aerospace Academies (MAA) and other stakeholders who may or may not be funded by NASA to further advance access to NASA content. The Museum Alliance is even open to community colleges; minority-serving higher education institutions throughout the United States, so that they too can receive the most recent NASA content designed for use in community or public programs. STEM content is available from all NASA Mission Directorates Aeronautics, Human Exploration and Operations, Science and Space Technology. As a community of practice with members in all 50 states, including museums, planetariums, parks, libraries, and youth-serving organizations, the Alliance delivers NASA aeronautics, Earth science, space science, space technology, and human exploration content. NASA educational opportunities strive to provide authentic inquiry-based experiences for learners. Explore with us! Register at <http://informal.jpl.nasa.gov/museum/About/Application>. The Museum Alliance also aligns to the *Federal Science, Technology, Engineering, and Mathematics (STEM) Education 5-Year Strategic Plan* (https://www.whitehouse.gov/sites/default/files/microsites/ostp/stem_stratplan_2013.pdf).

Teasdale R. M. Grack Nelson A.

***Evaluation of Library STEM Programs: Learning from the BISE Project* [#1021]**

Library staff members face an increasing call to demonstrate the impact of STEM services in public libraries, yet few librarians are familiar with the designs, methods, and measure that can be used to evaluate informal science education (ISE) projects. This poster first introduces a resource to assist librarians in developing our understanding of ISE evaluation and then shares preliminary findings of a study on the outcomes that ISE evaluators currently examine and the methods they use to study those outcomes. The resource to be shared comes from the Building Informal Science Education (BISE) project that was funded by the National Science Foundation in 2010. The BISE project created a database of ISE evaluation reports and developed metadata codes to facilitate searching and analysis of those reports. Librarians can use the BISE database and coding scheme to learn how evaluation is conducted in ISE contexts beyond libraries including museums, after-school programs, and broadcast media. This poster then reports preliminary findings of a study currently underway using the evaluation reports in the BISE database. This investigation examines the reports to understand (a) the types of outcomes that evaluators of ISE projects study and (b) the designs, methods and measures that are used to examine those outcomes. Librarians can use these findings to inform our thinking as we develop approaches for evaluating the impact of STEM learning in public libraries.

Turner J. T.

Climate Literacy Resources Available via the Community Collaborative Rain, Hail and Snow (CoCoRaHS) Network [#1068]

The Community Collaborative Rain, Hail and Snow (CoCoRaHS) network is a community-based network of volunteers of all ages and backgrounds working together to measure, map, and analyze all aspects of the water cycle. From its inception, CoCoRaHS has followed a two-pronged approach of educating the public in climate literacy topics and collecting high quality, high-density precipitation data for use by educational, governmental, and private organizations. Over the last 17 years CoCoRaHS has grown from a local project in Fort Collins, Colorado to support all 50 states, DC, Puerto Rico, the US Virgin Islands, and Canada. In that time, more than 31,000 observers have participated, with more than 18,000 observers currently active, having submitted over 30 million observations in its continually growing data archive. CoCoRaHS has myriad resources available to support STEM education efforts within libraries. As part of its CoCoSchools project, CoCoRaHS has developed a variety of climate literacy products that could be used in libraries. The CoCoRaHS datasets, data summary and visualization tools are all freely available. Lastly, CoCoRaHS provides a participatory science opportunity for libraries and their patrons to learn about their local climate while contributing valuable data to be used by local, state, and national organizations.

Waldrop S. R.

Successful Collaboration Between Science Museum of Virginia and Library of Virginia Delivering STEM to Statewide Libraries [#1038]

In 2015, the Out of School Time department at the Science Museum of Virginia delivered STEM training to over 200 librarians and 42 libraries. With support from the Institute of Museum and Library Services, Virginia Library Association, Library of Virginia, the Science Museum of Virginia provided STEM Resource Kits for rural and low-income communities outside of Richmond. Each kit contained \$3,000 worth of science tools, literature, and technology with the intention of creating informal, STEM programming throughout libraries in Virginia. Museum staff provided full-day workshops at each hub location to train librarians and educators on incorporating the resources into informal learning settings. Workshops were designed to encourage STEM program development in areas that may not have access to facilities such as a science museum. As a kick-off, over 1,500 Jr. STEM backpacks, each containing a science themed book and 5 activities, were compiled by the Museum so families can conduct their own science investigations at local libraries or at home. Interactive, hands-on science activities have been implemented by libraries via Saturday STEM Family Days, community events, and for local school districts. The experiences of the partnership between the Science Museum of Virginia and Library of Virginia will provide a rich dialogue for attendees at the Public Libraries and STEM Conference. An oral presentation is preferred to start interaction between possible partners and participants.

White V. Gurton S. Prosper D.

How to Look Up the Night Sky with Your Local Astronomy Club [#1061]

The NASA Night Sky Network is a nationwide coalition of over 450 astronomy clubs that engage in public outreach in their communities. They regularly partner with public libraries to bring the wonder of astronomy to library audiences. Find out how to access your local astronomy club and learn about the types of outreach resources available. Here we will highlight a few programs across the country as examples of effective collaborations between libraries and astronomy clubs. Telescope lending programs are very popular with patrons, thanks to their ease and simplicity of the set-up. They also come with a built-in community of experts who are easily accessible. Guest lectures from astronomy club members, afterschool programs, and solar observing are just a few of the other ways that clubs partner with their local libraries. Astronomy clubs are volunteer-run and most programs are offered free of charge. Learn tips for making an astronomy club partnership a success in your library. Find out where your local clubs are, what they already offer, and who to contact for more information. The Night Sky Network website has a wealth of resources for connecting with clubs and also for creating displays and leading activities in your library. The possibilities are astronomical!

Friday, August 21, 2015
POSTER SESSION II: DEMONSTRATIONS
11:10 a.m. Vail

Caputo C. Ramos T. Winchowky S. Nichols J.

Visioning STEM Learning in the 21st Century Library Through Innovative Staffing Models and World-Class Collaboration [#1062]

Hands-on STEM programming has helped libraries become more engaging and interactive public spaces in our communities. Using innovative staffing models and exciting collaborations, the sky is the limit for engaging the public in high-quality, STEM and 21st Century learning. Over the past several years, the Free Library of Philadelphia has implemented STEM programming in our 54 neighborhood libraries. A variety of public and privately funded initiatives have leveraged Philadelphia's science and technology capital to better support patrons at any level while, providing new experiences that expand their worlds by increasing knowledge and practical skills. Librarians, with support and mentoring from local and national partners, as well as, work-study students, volunteers, and part-time non-librarian staff, have become skilled at adapting and offering STEM programs for all ages, including hands-on science story times, table-top science activities, family science programs, and innovative intergenerational maker programming, bringing both the wonder and outcomes of STEM programming to Philadelphia's diverse communities.

Guerrero R. M.

Engaging Patrons with Language Barriers [#1065]

As vital sources of information within the community, public libraries must serve a growing number of patrons who have a variety of language barriers. STEM programs with hands-on activities are a natural way to reach patrons who are literate in one or more other languages but do not read or speak English. They can engage very young learners, or students with learning disabilities, who have not developed the language skills required to read or talk about STEM topics. Such activities can also be made more accessible to patrons who have other language barriers, such as hearing or cognitive impairments. This overview will discuss how to accommodate some barriers in an active learning environment by demonstrating basic strategies and noting how patrons benefit from them. Participants will have the opportunity to experience some principles firsthand by performing a STEM activity twice, first using traditional methods and then again with the benefit of supportive strategies. WOW! Children's Museum thanks the NISE Network for the use of NanoDays activities and materials in this presentation, and for their support of sharing teaching strategies that reach diverse audiences.

Jayne P. M.

Community Outreach and STEM Programming [#1056]

As STEM programming becomes increasingly important to public libraries across the country, many libraries are increasing their offerings of STEM programs and events. However, these events are only reaching those who are able to make it to the physical library buildings. In an effort to reach those children and teens who are unable to attend programming at the library, Boone County Public Library (BCPL) has created STEM programming for community stops, tabling events, and after-school clubs. Through established community outreach stops in low-income areas, the BCPL has engaged the children and teens who visit the Community Center on Wheels with simple, low-cost STEM programming. As a result, staff have noticed an increase in elementary and middle school participants, and length of stay has increased. Tabling events also utilize these simple activities originally developed for the community stops, helping to increase traffic to the library table. The Boone County Public Library is also running after-school coding clubs at three middle schools that do not have the staff able to run these clubs, allowing students to experience computer programming in a self-directed environment. These easy-to-implement, low-cost ideas can be adapted by any public library in the county for outreach programming, and will have an impact on the number to participants engaging with STEM opportunities. Examples of activities, limitations, and feedback from participants will also be discussed.

Ristvey J. D. Jr. Schmidt C. Eastburn T.

STEM Education Resources for Libraries from UCAR: Fostering Knowledge of Earth System Science in the 21st Century [#1030]

Learning in the 21st Century is an ever-evolving enterprise as technology becomes more advanced, platforms become more abundant, and educators and learners have increasingly more choices and less time. One thing that remains constant is the need for the most up-to-date relevant and accurate content that is delivered in an engaging and thought-provoking manner. Libraries serve as an important venue for STEM organizations to share resources and expertise. The objective of this workshop is to share online learning and traditional face-to-face resources available from educators at the University Corporation for Atmospheric Research (UCAR). UCARConnect <http://ucarconnect.ucar.edu/> is an online learning portal leverages and expands existing educational assets and newly developed efforts throughout UCAR based on themes of interest for educators. The site engages learners through regular live sessions (colloquia, seminars, talks), expertise (videos, webinars) and resources (online courses, teaching boxes) with scientists and educators in order to share knowledge and build collaboration with stakeholders. The Climate Voices <http://climatevoices.org/> network brings non-partisan conversations about the research findings of the majority of climate scientists to citizens across the United States. Scientists and other experts meet with neighbors and community organizations to initiate discussions about the local effects of a changing climate and possible ways to address impacts.

Thornton I.

NREL Exhibit Makes a Splash at Public Libraries

Libraries across the Denver metro area and beyond are displaying the Energy Department's National Renewable Energy Laboratory's (NREL) history and technology for their patrons. Viewers are treated to displays of examples of renewable energy—from outdoor solar lights and feedstocks for biofuels to photos of electrochromic windows, wind farms, and geothermal plants. The exhibit was developed at NREL, the nation's foremost renewable energy research and development laboratory, to educate people of all ages about solar and wind energy, biofuels and other sources of renewable energy. It was previously a part of the permanent exhibit collection at NREL's Visitors Center. As the Visitors Center transitioned to an Education Center last year, many of those displays were taken down to make room for the newly developed Learning Lab. The Education Center (www.nrel.gov/education_center) now offers hosted programs and introductory tours with an emphasis on engaging students in science and engineering activities that open the door for study and career opportunities in science, technology, engineering, and mathematics (STEM) disciplines. The Education Center offers a range of activities for elementary school, middle school, high school, and college students with the goal of capturing the imagination and curiosity of young scholars and encouraging them to pursue careers in science and engineering. For more information, contact NREL at Ivilina.Thornton@nrel.gov.

Friday, August 21, 2015

LUNCH

12:15 p.m. Majestic Ballroom

Friday, August 21, 2015
THE NEXT LIBRARY
1:15 p.m. Majestic Ballroom

1:15 p.m. Rainie L. *

The Next Library [#1080]

The public has given a clear mandate to public libraries to become more directly involved in working with school systems and children in supporting their education, particularly when it comes to STEM subjects. In surveys by the Pew Research Center, 85% of American adults say libraries should coordinate more closely with local schools to provide resources to children and 82% say libraries should offer free early literacy programs to help young children prepare for school. Rainie's presentation will focus on the latest Pew Research data about library use by underrepresented communities, and, in particular how that applies to the ways libraries connect to the formal education system and ways libraries are trying to provide opportunities for adult learners. He will also discuss the emerging idea that libraries can become a platform for broad community engagement.

BREAKOUT DISCUSSIONS: TOPICS TO BE DETERMINED BY PARTICIPANTS

2:00 p.m. Majestic Ballroom, Beverly, Capital, Columbine, and Terrace

2:00 p.m. *Discussion: Topics to be Determined by Participants*

3:00 p.m. BREAK

BREAKOUT DISCUSSIONS: REPORTS AND WHOLE-GROUP DISCUSSION

3:20 p.m. Majestic Ballroom

3:20 p.m. *Breakout Session Reports and Discussion*

Friday, August 21, 2015
EVALUATING STEM PROGRAMS IN PUBLIC INSTITUTIONS
IN COMMUNITIES: FOCUSING ON EQUITY
3:50 p.m. Majestic Ballroom

- 3:50 p.m. Penuel W. *
Evaluating STEM Programs in Public Institutions in Communities: Focusing on Equity [#1090]
 Broadening participation in science, technology, engineering, and mathematics (STEM) is a priority for educational organizations at the local, state, and national levels. Broadening participation means more than preparing future STEM professionals. It also means preparing people to draw upon STEM knowledge and practices for civic engagement and to address the needs of their communities. Evaluation of such programs must attend to the broad range of goals for STEM participation, document equity of opportunity to participate in STEM-related activities across settings, and support program improvement. In this presentation, I will begin by providing a framework for evaluating a diversity of outcomes of STEM programs in public institutions and for documenting equity in student opportunities to learn. I will illustrate how we are applying this framework to the study of STEM learning in different out of school settings that are focused on promoting interest-related learning. In the concluding part of my presentation, I will describe how evaluation can support continuous improvement of STEM programs in libraries, helping institutions to provide more equitable opportunities for STEM learning that lead to valued outcomes for participants and communities.

OPEN FORUM: EVALUATING THE IMPACT OF STEM PROGRAMS IN LIBRARIES
4:30 p.m. Majestic Ballroom

Facilitator: Bill Penuel

- 4:30 p.m. *Commentary by Researchers and Evaluators*

OPEN FORUM
4:45 p.m. Majestic Ballroom

- 4:45 p.m. *Whole-group discussion on questions, ideas, and concerns relating to the five conference topics*

BANQUET
6:00 p.m. Denver Museum of Nature and Science

Saturday, August 22, 2015
REFLECTION AND DISCUSSION OF DAY 2
8:30 a.m. Majestic Ballroom

8:30 a.m. *Reflection and Discussion of Day 2*
 John Falk
 Marsha Semmel

TRENDING....STEM AND LIBRARIES:
LEARNING WITH THE ALA'S CENTER FOR THE FUTURE OF LIBRARIES
8:50 a.m. Majestic Ballroom

8:50 a.m. Figueroa M. *
Trending....STEM and Libraries: Learning with the ALA's Center for the Future of Libraries [#1089]
 In 2013, the American Library Association announced the formation of a new Center for the Future of Libraries (www.ala.org/libraryofthefuture), with a core purpose of identifying trends relevant to libraries and the communities they serve. Why should we focus on trends? Understanding current trends and the larger context in which libraries and their users operate helps us better define and envision libraries' and librarians' future roles in communities. How is the Center approaching trends? By looking at changes across multiple categories (society, technology, education, the environment, politics, economics, and demographics), not just within our own professional environment, we gain new insights into what libraries are currently experiencing and identify opportunities for libraries to connect with users in ways they may not have been expecting. How do the Center's trends connect with STEM? Whether it's connected learning, income inequality, or urbanization, STEM plays a significant role in addressing current trends and keeping libraries informed of the issues that need to be addressed now and in the future. This session will share some of what ALA is learning through its future of libraries initiative and how it connects to this conference's focus on STEM.

Saturday, August 22, 2015
FUNDING AND RESOURCES FOR MOVING FORWARD
9:30 a.m. Majestic Ballroom

Facilitator: Sandy Toro

Panel Members: Grace Troxel
Wyn Jennings
Timothy Owens

Toro S.

***Funders' Forum* [#1078]**

This forum will provide participants with an opportunity to chat with funders and informal STEM resources experts about trends in the funding of STEM projects and how to write competitive and high quality proposals as well as design strong programs. Representatives from the Institute of Museum and Library Services (IMLS), the National Science Foundation (NSF), and the Center for the Advancement of Informal Science Education (CAISE) will share information to help attendees understand future directions for a selection of research and implementation programs. Presenters will discuss updates and changes in agency priorities and requirements. They will also talk about the peer review process and review criteria, including what reviewers look for in research and evaluation plans. The forum will include ample time for discussion about how attendees can put together competitive applications and design programs that have good partnerships, strong needs assessments, and demonstrate high potential for broad impact. In addition to tips for success, panelists will provide examples of common weaknesses in unsuccessful proposals, discuss when it is appropriate to revise and resubmit, and when it's best for project teams to let an idea go. Examples from libraries around the country that successfully responded to calls for proposals of projects that build STEM knowledge; bridge research and practice; are innovative; and advance the field will be shared along with lessons learned about implementation, sustainability, and communication.

Troxel G.

***Research and Evaluation Resources on InformalScience.org* [#1069]**

Incorporating research and evaluation into program development is a challenge for a wide variety of informal learning experiences and settings, including library programs, exhibits, and more. InformalScience.org provides a wealth of resources to help understand research and evaluation, including a searchable repository that includes both peer-reviewed and grey literature, a database of evaluation reports, and free access to peer-reviewed learning research through EBSCO's Education Research Complete database. Newly designed Research and Evaluation landing pages provide visual portals geared toward helping project leaders and staff draw from and build upon the knowledge base of the informal STEM education community.

Owens T.

Successful Projects Funded by the Institute of Museum and Library Services [#1086]

IMLS is the primary source of federal support for the nation's libraries and museums. We make grants, convene groups, conduct research, and publish in order to build the capacity of libraries to serve the public. Through grant making, IMLS helps libraries provide access to STEM resources as well as demonstrate models and methods for bridging informal STEM education research and practice. Discretionary programs, including the Laura Bush 21st Century Librarian and the National Leadership Grants Programs, fund recruitment and education of library students, continuing education for those in the profession, and development of new programs and curricula. Discretionary also supports a focus on driving excellence in library practice to deliver quality education; innovative use of library spaces; advancement of a national digital platform; and improvement of professional practice beyond grantee institutions. In addition, the Grants to States program is the largest source of federal funding support for library services in the U.S. Using a population based formula, over \$150 million is distributed among the State Library Administrative Agencies (SLAAs) every year. IMLS staff will provide an overview of the grant making and review process and share tips for successful proposal writing as well as discuss national trends in STEM programming as well as future directions for the agency.

Jennings W.

Successful Projects Funded by the National Science Foundation [#1085]

Libraries are in a unique position at the moment. They can change their mode of operation fairly quickly in responding to needs that are either local or broader in scope. For our efforts to enhance the public science knowledge base, there are several venues to choose from: Science Centers, various types of museums and digital platforms. Except for the latter, the others are most often located in cities of large towns. However, libraries are everywhere. If the library can accede to helping the Nation with science literacy enhancement, there are a multitude of opportunities. I think that libraries can embrace this aspect while serving as an agent in their local community. Perhaps, the local community will appreciate new efforts and support the endeavors. So, we think there is an opportunity for libraries to facilitate learning in unique ways. We have programs that accept proposals on Informal and Formal STEM Education and more recently a program for educating youth and adults on the use of computation in typical STEM subjects. One issue that I want to emphasize is that libraries are not limited by typical issues found in Formal Education systems. I will talk briefly about 3 projects that are ongoing and have results.

10:10 a.m. BREAK

Saturday, August 22, 2015
STEM LEARNING IN LIBRARIES
10:30 a.m. Majestic Ballroom

10:30 a.m. Dusenbery P. * LaConte K.

STEM Learning in Libraries [#1092]

Libraries across the country have been reimagining their community role and leveraging their resources and public trust to strengthen community-based learning and foster critical thinking, problem solving, and engagement in STEM. What started some years ago as independent experiments has become a national movement. Libraries have varying levels of commitment to and capacity for promoting the interest, engagement, and literacy of library users in STEM-related topics. Looking toward the future, libraries may become introduced to or more deeply invested in supporting the STEM learning movement by moving along a “Ladder of STEM Engagement.” Librarians may simply increase their focus on STEM resources and services or, in taking additional steps along the “ladder,” they may proactively collaborate with STEM organizations, successfully engage targeted underrepresented audiences in STEM learning opportunities, or help move the field forward in understanding the nature of STEM learning in public libraries by taking part in evaluation and research. Conference participants are invited to contribute to this national movement by establishing a Leadership Forum, whose purpose is to support the creation of STEM learning opportunities in public libraries nationwide. The forum website will be a place to access conference resources; further share promising practices in designing effective programs; define a vision for the future; and contribute to a foundation for evaluation and research.

WHOLE-GROUP DISCUSSION: NEXT STEPS
10:50 a.m. Majestic Ballroom

10:50 a.m. *Group Discussion*

11:30 a.m. *Closing Remarks and Whole-Group Discussion*
 Marsha Semmel

12:00 p.m. *CLOSE*



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