

Public Library STEM Guide and Workbook

Empowering Public Libraries to be Science Resource Centers for their Communities



STEM LIBRARIES

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About the Project

Our overall goal for this project is to provide the nation's 9,000 public libraries with a field-tested and replicable science literacy model that staff can adapt to engage their patrons in meaningful and relevant science experiences.

This Guide advances library practice and empowers public library staff to effectively build their science literacy capacity. The hope is library patrons and their communities are better connected to informal science and technology experiences, equipment, books, media and the scientific community.

In addition to this guide, the grant project includes a Guide for State Library Agencies, online learning tool kits, and STEM resources for libraries.

Project team members and contributors:

Christina Dorman, STEM Liaison, Maine State Library
Dr. Carol Gordon, Researcher, Gordon Consulting
David Keeley, Project Manager, Cornerstones of Science
Janet McKenney, Co-Principal Investigator, Director of Library Development, Maine State Library
Alan Melchior, Evaluator, Brandeis University
Sarah Post, Program and Library Support Manager, Cornerstones of Science,
Laurie Putnam, LP+KC Communication Design
Shelley Quezada, STEM Liaison, Massachusetts Board of Library Commissioners
Cynthia Randall, Co-Principal Investigator, Cornerstones of Science
Holly Valero, Web Development, Hollyworks
Stephanie Zurinski, Continuing Education Coordinator and Data Specialist, Maine State Library

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Introduction

This project was built on the shared observations, experiences and collaborations developed through the Science, Technology, Engineering, and Mathematics (STEM) literacy partnership between the Maine State Library and Cornerstones of Science. These observations included:

1. There is interest and demand for science experiences, tools and resources by librarians and their patrons.
2. Through STEM services and programs, library staff can create public demand for STEM as well as introduce new audiences to their libraries.
3. Presently, many librarians rely on outside program providers to engage their patrons in singular STEM experiences.

We have learned that there is not a cohesive approach to STEM literacy by public libraries. While the availability of STEM programming for children's and youth services have seen a dramatic increase over the past few years complimentary programming for adults are often non-existent. Further, once a program is completed, patron access to STEM information and resources can end abruptly.

Although STEM services, programming activity and awareness has increased since 2015 when this grant was awarded, robust and intentional integration of STEM within public libraries face challenges:

1. Lack of science literacy capacity among library staff;
2. Library staff anxieties around offering science experiences; and
3. STEM literacy is a low priority among librarians whose focus has traditionally been on reading literacy and early literacy.

This project tested and adapted the Cornerstones Model for introducing and supporting STEM programming and experiences. It created user-friendly tool kits and guides that are downloadable through stemlibraries.org. The STEM Activity Clearinghouse, an online repository, is also now available. It provides high quality STEM activities, suitable for public library programming, that librarians can use with youth and adults.

In summary, this Guide provides the tools and methods for public library staff to advance their practice and to effectively connect patrons and communities to engaging and meaningful STEM experiences, equipment, books, media and the scientific community.

Our Results

We have developed and tested a process for public libraries to (1) think about STEM Literacy and (2) to develop a STEM plan via a series of worksheets, educational toolkits and resources based upon the experience we had with our nine pilot libraries. This guide is intended to be used by any individual public library or regional or county system. State libraries may find it useful to use the guide for workshops.

STEM Guide, Toolkits and Other Resources

Libraries may access the guide, worksheets, and resources at the STEMLIBRARIES website - <https://stemlibraries.org/>. Contents include:

- [Public Library Guide and Worksheets](#) – An overview and step-by-step set of worksheets for library directors and staff to create a STEM Development Plan that becomes the library’s roadmap for implementing STEM in an intentional manner.
- [State Library Agency Guide](#) – State libraries can use this guide to assist their public libraries with: the development of the STEM Development Plans; connecting to informal and formal science providers; providing advice and training; and aligning their funding to enhance library STEM literacy capacity.
- [STEM Tool Kits](#) – The ability of public libraries to develop a STEM plan and to sustain STEM literacy for their communities is dependent on staff engagement and professional development. These six toolkits serve as the starting point for successful STEM literacy implementation for library staff.
 1. **STEM Facilitation Toolkit:** Describes how to facilitate and/or develop engaging, relevant science experiences and to provide access to STEM tools meaningful to the community.
 2. **Community Partnerships Toolkit:** Describes how to build sustainable partnerships with informal and formal science providers and other organizations in the community.
 3. **Fund Development Toolkit:** Describes how to secure funds for STEM programs by writing competitive proposals, working with traditional library donors, and members of the community to support the library’s STEM literacy efforts.
 4. **Marketing Communications Toolkit:** Offers 10 tips for better STEM marketing and communications to patrons of all ages, as well as the community around the library’s STEM literacy efforts. Learn how to create public demand for STEM through ongoing exciting programs and services the library offers.
 5. **Logic Model Toolkit:** Provides information on how to create and use a logic model for planning evaluations of your science, technology, engineering, and math programs.
 6. **Evaluation Toolkit:** Use *Project Outcome* and the grant’s sample survey to evaluate your STEM programs and services. Measuring the quality of STEM programs and the impact on patrons is a great source for a library to tell its story to local boards, town/city officials, funders and the entire community.
- [STEM Activity Clearinghouse](#) – an online database of high quality, vetted STEM activities, developed by leading science providers such as NASA, NIH, Exploratorium, and others that are user-friendly and appropriate for use in the library. For access to the STEM Activity Clearinghouse, please visit our partner’s site at <http://clearinghouse.starnetlibraries.org/>

Use of the STEM Guide and Workbook

Overview

The Public Library STEM Guide and Workbook are designed to help public libraries create a STEM Development Plan. One of the results of *"Empowering Public Libraries to Be a Science Resource Center for Their Communities"* was that a library's STEM Development Plan produces more focused and intentional STEM programs and services. The intent of the plan is to:

1. Identify, enhance and improve library service capacities that directly empower your public library to strategically incorporate science literacy long range planning;
2. Create durable community partnerships, around an important science-based community issue or topic. These help to position the library in a leadership role to positively address the issue or topic;
3. Provide patrons sustained access to science experiences, resources and the scientific community;
4. Provide a framework for thinking about STEM literacy holistically as your library begins or expands STEM programs and services;
5. Promote a community- based problem-solving approach to the library's place in assisting the community and organizations to address community issues involving STEM topics.

These worksheets provide a step-by-step process for library staff to create a well thought out and structured STEM Development Plan with an accompanying map/logic model and evaluation strategy. They are designed to identify the types and quantities of specific resources, activities, and partners for successful integration of STEM services and programs at a public library. The content of the completed worksheets will be incorporated into the STEM Development Plan and logic model/road map.

The worksheets assist library staff to:

1. Assess library readiness and capacity;
2. Identify the STEM issue/topic the library and/or community wants to work on;
3. Identify and define the numbers, types and frequency of programs, resources and services; and
4. Assist the library with integrating STEM literacy into its services to develop a sustained, visible, daily presence where patrons and the community can have ongoing access to science experiences, materials and connections with the scientific community.

Best Practices and Suggestions for Developing a STEM Plan

- Include a cross-section of library staff from different departments (e.g. youth services, reference, circulation, etc.) to be part of the team that completes the worksheets.
- Use existing library staff readiness and interests. It is important that libraries incorporate strategies and activities that enhance the ability of staff to promote STEM literacy seamlessly and to ensure they feel confident in the promotion and/or facilitation of STEM activities, experiences and resources within the library.
- Libraries should strive to increase a staff member's and/or library team's abilities to help their patrons find and use STEM resources and feel comfortable doing so.
- Whenever possible create activities and programs that use tools and resources that can be implemented in multiple ways and/or with multiple audiences. This maximizes library resources, infrastructure and organizational capacities and will help the library provide a variety of ongoing programming and services.
- Consider how STEM activities, programs, tools and services can be highlighted in a variety of environments such as: 1) within the library as self-guided or scheduled activities; 2) virtually; 3) as a community outreach effort; and 4) in collaboration with community partners.
- Libraries don't have to create all new materials or programs. There are many high quality, accurate, and reputable pre-existing programs and activities that are available at the STEM Activity Clearinghouse and in the Resources section of the stemlibrarie.org website. You can also find materials by talking with community partners, your State Library, Cornerstones of Science, and other informal science organizations.

Look outside your library for community members and organizations to collaborate on important community-wide projects.

Public Library Workbook

*Empowering Public Libraries to become Science
Resources Centers For their Communities Project.
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Key Terms in the Planning Process

Vision – provides a vivid description of the desired future conditions; an engaging and realistic long-term view of how the library wants to address STEM literacy for children, teens, and adults

Example: We serve a scientifically and technologically strong community.

Capacity - the library's capability to provide existing and new services or programs.

Example: Includes staff, available funds, etc.

Goal - The outcome your target group will receive from your program or service (the focus is on the community NOT the library),

Example: Children, teens and adults are lifetime learners that share a passion for science

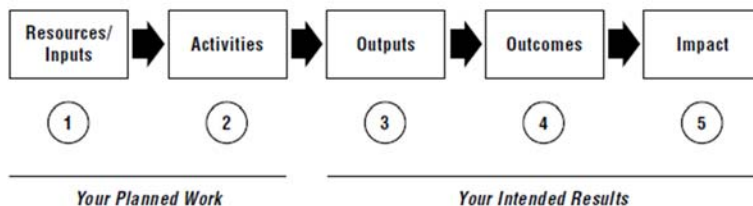
Strategy – How the library will implement the goal.

Example: Visiting scientists and speakers; Hands-on Science programs; Career focused programs; Citizen Science Opportunities

Activity - Specific actions taken to achieve the objectives and goals

Example: create partnerships with science providers, identify and contact speakers, advertise program, create hands-on STEM workstations, locate citizen science opportunities,

Logic Model (Library Road Map) – Provides a road map describing the sequence of related events connecting the need for the planned program with the program's desired results. Mapping a proposed program helps visualize and understand how human and financial investments can contribute to achieving your intended program goals and improvements.



Inputs – resources such as people, materials, time, equipment, space, information, or money that are put into a program or service to obtain a desired output.

Outputs –Direct products of program activities, usually measured in terms of work accomplished.

Example: Number of programs offered, attendance numbers, circulation of STEM materials,

Outcomes –Benefits or changes for individuals or populations during or after participating in program activities, including new knowledge, increased skills, changed attitudes or values, modified behavior, improved condition or altered status.

Example: increased science literacy of children that participate in library sponsored programs; etc.

Worksheets – Instructions and Guidelines

WORKSHEET #1: STEM READINESS ASSESSMENT

This worksheet is an easy chart to get your library to think about their readiness to take on STEM or take STEM to a new level. The focus is on staff willingness, expertise and available resources. *This worksheet will likely take 10-20 minutes.*

WORKSHEET #2: LIBRARY CAPACITY CHART - TEMPLATE AND EXAMPLE

This worksheet builds on knowledge from worksheet #1 and prompts the library to reflect on the impact of integrating STEM and what capacity they can bring to the task. An example from a grant library is provided. *This worksheet will likely take 10-20 minutes depending on how long the discussion of impact takes.*

WORKSHEET #3: SOAR ANALYSIS - TEMPLATE AND EXAMPLE

This is a typical SOAR (Strengths, Opportunities, Aspirations, Results) analysis activity through the lens of STEM. It is one of the building blocks for the STEM Plan and Logic Model/Road Map. Many libraries may have used a SWOT analysis before. SOAR analysis is a strategic planning tool that focuses an organization on its current strengths and vision of the future for developing its strategic goals. This tool differs from the commonly used SWOT (strengths, weaknesses, opportunities, and threats) analysis. *This worksheet will likely take 30 minutes or more.*

WORKSHEET #4: STEM ISSUE/TOPIC – TEMPLATE AND EXAMPLE

This worksheet assists library staff to identify and select a locally relevant STEM issue or topic. This is a crucial step in moving your library from “one off” STEM programming to a thematic, integrative approach. Select a topic or issue that allows the library to address an issue or promote a topic that will touch all community members, provide activities for all ages and encourage partnerships to broaden community impact. Selecting an issue or topic could involve a community survey, analysis of local data, or just a brainstorming session. *This worksheet could take as little as 30-45 minutes or multiple days depending on the size of your library, the number of staff and how the library approaches it.*

WORKSHEET #5: STEM PLAN – TEMPLATE AND EXAMPLE

This worksheet incorporates information from worksheets 1-4 to bring some organization to how a public library will approach integrating STEM into services and programs. The resulting plan provides the library with the necessary information for the road map (or logic model). *The worksheet for the development of the logic model/road map will take at least several hours to complete depending on how many goals and activities in the STEM plan.*

WORKSHEET #6: LOGIC MODEL/MAP -- TEMPLATE AND EXAMPLE

This worksheet is the heavy lift for your library and will challenge you to think about outcomes an impact. The hope is that this process will lead your library to these answers through an intentional planning process. Why are we integrating STEM? How will we do it? Who will do what? How much will we do? How will the library and community change (outcomes/impacts) because of what we do? The

Logic Model Toolkit has a variation on the template used in this worksheet. Staff should review the toolkit as preparation for this worksheet. *The worksheet for the development of the logic model/road map will take at least several hours to complete depending on how many goals and activities in the STEM plan.*

WORKSHEET #7: TEMPLATE AND EXAMPLE OF EVALUATION

This worksheet has two sections. One is for short-term outcomes and the other for long-term outcomes outlined in worksheet 6 – LOGIC MODEL/MAP. These allow evaluation of both your STEM programs and activities as well as your progress toward your goals. Detailed instructions are on the worksheet template. Please refer to the Evaluation Toolkit of more advice on evaluating library programs. *This worksheet will be completed after your plan is implemented and you have completed activities and collected data.*

APPENDIX A: SAMPLE PROJECT OUTCOME SURVEY

This sample survey was created using Project Outcome's free online toolkit. The website is designed to help public libraries understand the impact of essential library programs and services by providing simple surveys and a process for measuring and analyzing outcomes. The online toolkit provides libraries with free access to simple patron surveys, a survey management tool to collect their outcomes, custom reports and an interactive data dashboard to analyze the data.

WORKSHEET #1A: STEM READINESS

For the statements below, circle the answer that fits your library to get an idea about your strengths and opportunities. **Total** your circles at the bottom of each column. This assessment can be done by individual library staff and then compiled or with a group of library staff.

Statement	Possible Responses – add your own if desired		
In your library STEM literacy is	Becoming important	A priority	A core service element
In the community STEM literacy is	Becoming important	A priority and the library is recognized as a STEM venue	A high priority and the community values the library's STEM role
The library offers STEM programming and experiences that are	Developed and presented by other organizations only	Developed by both others and staff	Developed by a staff confident in their ability to present on STEM topics
The library's STEM infrastructure (budget staff, space, equipment, collections) is	Modest	Apparent and there is a specific budget line item	Ongoing and major
My staff is _____ in their STEM skills	Not very confident	Somewhat confident	Very confident
Partnerships with local STEM organizations are	Few	Common	Durable and robust
The library's vision for STEM is	Tactical not strategic or systemic	Emerging as strategic	Integrated throughout library services
Staff view STEM as	Programmatic only	Programmatic with limited workforce and/or economic value	Both programmatic and workforce/ economic driver
STEM literacy, as a core library literacy, is	Partial and may not be sustainable	Emerging with library leadership and community support	Healthy and mature
Totals			
STEM in your library is:	Basic	Emerging	Mature

WORKSHEET #1B: STEM READINESS

Readiness Questions

1. Does library staff read books or magazines or engage in outside programs/activities about science or technology? Describe the STEM resources they use.

2. Describe avocations the staff has. What are the STEM components that can be explored?

Library Resources

What resources does the library currently have that can support STEM activities?

Resources	Yes	No
Specific STEM budget line item		
Designated STEM staff person		
Staff interests that have strong STEM implications		
Current partnerships with community-based organizations		
Science equipment (telescopes, microscopes, 3D printer, etc.)		
STEM collection resources (books, DVDs, backpacks, etc.)		
Existing interactive tools/exhibits (Legos, engineering walls, etc.)		
Library Space		
Do you have room for a designated STEM space?		
Would a mobile STEM station work?		
Does the library have a garden or could container gardens be set up?		
Are there spaces in your community that can be used for STEM?*		
Does your website or social media highlight STEM topics?***		
Could a staff member blog or post on social media about STEM topics?		

*List any community spaces

**List links to those STEM websites

The [Stem Facilitation Toolkit](#) is a good learning tool for staff to increase their knowledge.

WORKSHEET #2: LIBRARY CAPACITY CHART

Use your judgment and rank your library's capacities as identified in Worksheet 1A – STEM Readiness

Capacity	Assign a Rank: 1-5 (with 1 highest and 5 lowest)	Notes
Funds available for STEM		
Staff interest in STEM		
STEM equipment and resources		
Space for STEM		
Existing STEM partners		
Staff time for STEM		
Community interest in STEM		
Other		

Impact

How does the library's capacity impact the development of a STEM Plan?

How will you address capacity challenges in the Plan?

WORKSHEET #2: LIBRARY CAPACITY CHART - EXAMPLE

Use your judgment and rank your library's capacities as identified in Worksheet 1A – STEM Readiness

Capacity	Assign a Rank: 1-5 (with 1 highest and 5 lowest)	Notes
Funds available for STEM	4	
Staff interest in STEM	5	Limitations of staff (time, comfort level with science topics)
STEM equipment and resources	2	Library has underutilized resources
Space for STEM	2	To do programming in the library
Existing STEM partners	3	Work with local Audubon club
Staff time for STEM	4	Competition with other library functions – need to balance responsibilities
Community interest in STEM	3	Presence of biomedical companies is important

Impact

How does the library's capacity impact the development of a STEM Plan?

- The director and staff are involved in multiple activities
- The Library budget is fairly static and may not support new programming efforts
- Staff is small with limitations on their time
- Current schools have not maintained a professional librarian making it difficult to develop connections

How will you address capacity challenges in the Plan?

There will be a new effort to focus on staff engagement around science topics i.e. encouraging attendance at local conferences such as a STEM Summit with a requirement to "report back" at staff meetings

WORKSHEET #3: SOAR ANALYSIS

WHAT IS S.O.A.R.?



SOAR graphic from
"A Different Approach to Strategic Planning: SOAR-building Strengths-based Strategy"
by Stan Capela and Ariana Brooks-Saunders

Strengths – What can we build on that would support our STEM efforts? What do we do well?
(You can use the Readiness and Capacity Assessments to help list your library's strengths)

Opportunities – What are our patron's science literacy-related needs and wants (e.g., convene focus groups, conduct an interest survey, ask library partners, etc.)? What partnerships with community-based organizations should we explore?

Aspirations – Vision

(Answers on this worksheet will be used/transferred to Worksheets #5 and 6)

1. What does the library want to achieve by implementing STEM programs and services? *(Transfer to STEM Plan Library Vision)*

2. How does the library want to respond to the community's and our partner's needs? *(Transfer to STEM Plan vision for community)*

Aspirations – Outcomes

1. What change in the library culture /services/outlook do you want? *(These may be used in the Logic Model/Road Map)*

2. What change in behavior, knowledge, status or skills are you looking for in the community? (These may be used in the [Logic Model/Road Map](#).)

3. What is needed to make these changes happen? (*Transfer to [STEM Plan Strategy for the appropriate goal](#)*)

Desired results (will be used in the [Logic Model/Road Map, Worksheet #6](#))

How will you know that you've been successful in achieving the aspirations? What will indicate success?

How will you measure success?

A large, empty rectangular box with a thin black border, intended for the user to write their response to the question above.

WORKSHEET #4: STEM PURPOSE/SELECTING AN ISSUE OR TOPIC

Instruction: Begin with why. Why do you want to integrate STEM Literacy into library services? Why is it important to the community? What does the community need and how can the library meet that need?


1. What STEM issues or topics have significance to your community? Choose a science-based issue or topic.

2. Why is this issue or topic important? How is it affecting the community? What reasons and facts provide evidence? Are there economic or societal implications around this issue or topic?

3. List the community organizations that are currently addressing the issue or have knowledge or interest in the topic. How are these organizations addressing the issue/topic? What possible assets can the library bring to the table? Do you have an existing relationship? What would it take to form one? Please see the [Partnership Toolkit](#) for advice on partnership development.

4. List the ways the library could like to play a leadership and/or influential role to bringing awareness, attention and being a part of the solution to an aspect of this issue or topic.

5. Reviewing your answers from 1, in one or two sentences, describe how the library can play a leadership role to bring the public's attention and understanding to the issue or topic that will produce change.

A large, empty rectangular box with a thin black border, intended for the user to write their response to question 5. The box is currently blank.

WORKSHEET #4: STEM ISSUE OR TOPIC - EXAMPLE

1. What STEM issues or topics have significance to your community? Choose a science-based issue or topic and describe the importance of it to your community.

Environmental Education/ Environmental Literacy; this is an issue that relates to community interest in saving money but also in saving the earth. People are becoming increasingly aware/concerned about environmental issues including global warming, different choices about energy sources and most immediately a severe drought in the state.

2. Why is this issue or topic important? How is it affecting the community? What reasons and facts provide evidence? Are there economic or societal implications around this issue or topic?

The community has recently been targeted by a number of companies interested in promoting solar energy. The town is currently working on implementing a town-wide aggregation from different energy providers that will reduce costs for residents. Both National Grid and Eversource (energy companies) operate in the town and there is also a natural gas generating plant in the community.

3. List community organizations that are currently addressing the issue, the ways they are addressing it and possible assets these groups can bring to the attention of patrons in the library?

The library has been in conversation with the Department of Public Works (DPW) and the Town Planner. Both organizations have expressed strong interest in working with the library on programming and raising awareness. These organizations could also help the library engage federal agencies such as the EPA. Dean College in nearby Franklin offers both two-and four-year degrees, and there is interest in reaching out to them as a resource. They offer associate degrees in both environmental studies and science.

4. List the ways the library would like to play a leadership and/or influential role to bringing awareness, attention and being a part of the solution.

The library has a strong presence in community issues as demonstrated by its active programming. The library's website features changing activities and maintains a very active Facebook account that many residents follow. The library also sends out messages through a Constant Contact mailing list to keep people in the community up-to-date with their schedule of events.

6. In one or two sentences, describe how the library can play a leadership role to bring the public's attention to the problem and identify how the library will be a part of the solution.)

The library will continue to focus on providing environmental education to the community and promote itself as a logical place for people to seek out information on environmental issues.

WORKSHEET #5: STEM DEVELOPMENT PLAN

This worksheet incorporates information from worksheets 1-4. It helps to organize how a public library may approach integrating STEM into services and programs. The resulting Plan provides the library with the necessary information for the road map (or logic model). *This worksheet will likely take several hours to complete.*

Library STEM Plan Vision (Use information from Worksheets #3 - Aspirations – Vision)

Library's STEM Plan Vision for the Community (Use information from Worksheets #3 - Aspirations – Vision)

STEM Plan Purpose Statement (Information from Worksheet #4)

Library Capacity Statement (Information from Worksheets #2):

Note: The number of goals put forward in the Plan is dependent on the issue/topic and the library and community needs

Goal #1:

Strategy:

Activity:

Activity:

Staff:

Budget:

Goal #2:

Strategy:

Activity:

Activity:

Staff:

Budget:

Goal #3:

Strategy:

Activity:

Activity:

Staff:

Budget:

Goal #4:

Strategy:

Activity:

Activity:

Staff:

Budget:

WORKSHEET #5: STEM DEVELOPMENT PLAN - Example

Library STEM Plan Vision (Information from [Worksheets #3-Aspirations – Vision](#))

The library will be the hub of the community, a place where people will come together in search of knowledge, information and ideas on STEM topics.

Library's STEM Plan Vision for the Community (Use information from [Worksheets #3-Aspirations – Vision](#))

Residents will recognize the library as the best resource for current, accurate and reliable STEM/Science information.

STEM Plan Purpose Statement (Use information from [Worksheet #4](#)):

Members of the community will become more knowledgeable about environmental issues both in their community and beyond.

Goal #1: Library Staff will increase their knowledge and comfort level with STEM/Science topics and embrace the importance of the library as an access point for science information.

Strategy: Staff will be involved in science continuing education opportunities such as the MA Stem Summit and Regional conferences

Activity: Selected staff will attend conferences, meetings, and bring information back to share with colleagues at staff meetings.

Strategy: Library Director will seek sustainability of projects through the CE budget using monies from Municipal Budget, Friends of the Library and tapping into potential partners.

Activity: Library Director will use budgeting process to provide CE continuity.

Staff: Library Director

Budget: Library Director's time

Goal #2: STEM Literacy is integrated into the entire library culture. Library will build science literacy into long range planning efforts ensuring that science topics continue to be on the agenda for programming and future planning efforts.

Strategy: Library will develop an action plan update on a yearly basis that attends to science topics and issues. Long Range Plan will be reviewed and updated every 3-5 years

Activity: Staff will attend and report on CE programs as part of ongoing duties

Strategy: Library will investigate energy efficiencies for the physical building and consider setting up solar panel exhibit on library grounds.

Activity: Library will communicate with solar companies in the community to donate and set up working model of solar panel on library grounds.

Staff: Library Director and department staff

Budget: Library Director's and staff time

Goal #3: Library will promote a Science Topic of the Month that will be featured through programming and in-house efforts i.e. display and mentioned in monthly newsletter and on library's popular Facebook page

Strategy: Staff will participate in more science-based activities and bring this information back to the staff meetings.

Activity: Staff will use the website, Constant Contact Mailing, Facebook Page and Pinterest Board to keep an active online presence.

Activity: Reach out to potential partners beyond identified community such as Children's Discovery Museum and Framingham State University that has strong science curriculum with intention of bringing additional programming to the library.

Activity (Self-guided/Formal Presentation): Staff will develop formal program or in-house exhibit as a result of outside training.

Staff: Library staff, Youth Services and Children's librarians; marketing staff

Budget: Staff time, already paying for Constant Contact; consider if budget allows Facebook promotion of STEM events

Goal #4: The library is a destination for hands-on STEM learning and experiences. Residents consider the library as the best place to look for up-to-date information and resources relative to STEM and Science Topics

Strategy: The library staff believes they are already the destination but are committed to keeping the resources of the library in the forefront by continuing to offer programs on STEM and Science.

Activity: Twelve-month program calendar will be developed for FY 17 and planning for FY18 will begin at this time as well. Possible staff development of "self-guided" displays since items such as the seismograph and 3D printer are constantly on view.

Activity: Continued development of partner activities and outreach activities to Senior Center, Youth Center, and Harvest Fair.

Activity: Continued presence on Facebook, use of website to feature “item of the month” that should be recycled; further development of library’s Pinterest board.

Staff: Library staff, Youth Services and Children’s librarians; marketing staff

Budget: Director time for partnership meetings; Staff time. Consider if budget allows Facebook promotion of STEM events

WORKSHEET #6: LIBRARY ROAD MAP (LOGIC MODEL)

Guidelines

1. Many public libraries have not yet used a logic model as a planning and evaluation tool. The Library Road Map (Logic Model) describes the relationships between resources, activities, outputs and outcomes.
2. There is always a lot of confusion around “Outputs” and “Outcomes”. It is important for the library director and staff to understand the distinctions if these are new concepts. The table below provides definitions as well as descriptions for what answers should like within the library’s STEM Development Plan.

Outputs – How many of the different types of activities the library will be conducting within the period of the plan.	Short-term Outcomes – The short-term outcomes are changes in staff and patron activities.	Long-term Outcomes – The long-term outcomes are changes in attitudes, behaviors and knowledge.
Examples		
Conduct 3 workshops	Staff/community demonstrate learning	Community takes action
Develop 10 Programs	Staff/community raised awareness	Community asks for policy changes
Facilitate 1 Community Partner Summit	Staff/community attitude changed	Community asks for changes in decision-making
	Staff/community aspire to _____	Community changes their behavior
	Staff/community motivated to _____	Community changes practices
	Staff/community increased skills	Community demands social action

WORKSHEET #6: LIBRARY ROAD MAP (LOGIC MODEL TEMPLATE)

Goal #:								
Inputs / Resources	Activities/ Materials/Services (what you'll do)	Time Frame	Who is Responsible?	Outputs (# of things you do, what you count)	Short-term outcomes (benefit received by target audience)	Indicators - Measurable characteristics, actions, or conditions that "indicate" the desired change	Long-term outcomes (benefit received by target audience)	Indicators - Measurable characteristics, actions, or conditions that "indicate" the desired change

WORKSHEET #6: LIBRARY ROAD MAP (LOGIC MODEL) - EXAMPLE

Library STEM Roadmap

Community Need Statement:

The _____ Library understands that STEM is an essential literacy for the community. We are committed to helping people integrate STEM activities into their daily lives and to become a community role model for sustainability.

Target Audiences (for whom?)

The staff (Goal 1), the community, adults, children and teens (Goals 2 & 3)

The target audience needs (what change in skills, behaviors, knowledge or attitude): Needs information and hands-on activities to build confidence, creativity, and awareness of STEM topics; and to feel that STEM learning is safe, fun and accessible.

How can the library help? (We do what)

The library can offer hands-on STEM activities, resources, programs, and speakers. We can model science learning and impact for the community.

Who are the potential partners or stakeholders?

The City, Natural Resources Council of Maine, Gulf of Maine Research Institute, Friends of Casco Bay, Bigelow Laboratory, Jackson Laboratory, etc.

Goal 1: STEM literacy is integrated into the entire library culture

Inputs / Resources	Activities/ Materials/Services	Time Frame	Who is Responsible?	Outputs	Short-term outcomes	Indicators	Long-term outcomes	Indicators
STEM Vision document	Draft vision; develop a communication plan for the vision; hold staff meetings to communicate the vision; develop staff technology training goals	1st Q 2017	Executive Director, Associate Director and Science & Technology Team Leader	Monthly STEM updates to staff, part of existing monthly All Staff Update	Staff understands and can articulate the STEM vision; staff is aware of all STEM library programming	90% of the public service staff can knowledgably talk about the STEM vision	Science &Tech Team - Staff incorporates STEM ideas in programs and services; desk staff can talk STEM with patrons	50% of programming across all age groups incorporates a STEM message
Staff Time	Acquire tech training; acquire understanding of STEM resources currently available at PPL; offer those resources at points of service	Dec 2016- Dec 2017	All public service desk staff, all branches	Attend one technology training session	Staff increases confidence and proficiency with devices, can access all STEM library resources	90% of patron device questions can be answered by all public service desk staff	Staff have increased awareness of library STEM, shares STEM advisory with patrons	50% of the public service desk staff regularly try out new technology
Training Resources	Identify staff tech training needs; create materials that detail current STEM resources available at PPL; conduct staff trainings on these resources	March & Sept, 2017	Science & Technology Team	Provide 2 staff training sessions on STEM resources; pathfinder that details all STEM devices and resources	Staff has quick and easy access to materials to guide them to PPL STEM resources	100% of reference staff can identify all PPL STEM resources	Staff is comfortable referring patrons to available STEM resources at the point of service. (i.e. Circ Desk)	PPL sees 10% increase in circulation of STEM resources, 10% increase in attendance at STEM programs

Goal 2: The library is a destination for hands-on STEM learning

Inputs / Resources	Activities/ Materials/Services	Time Frame	Who is Responsible?	Outputs	Short-term outcomes	Indicators	Long-term outcomes	Indicators
STEM equipment & self-guided curriculum	Hands-on activity station	June 2017	Science & Technology Team	Create 1 new STEM learning station	Patrons explore STEM concepts at their leisure	Library collects baseline station usage data	Patrons learn about STEM and apply science in their lives	
Staff time	Hold programs outside the library in STEM locations; develop programs at library <i>specifically for teen girls</i> ; present science through storytelling	Ongoing 2017	Science & Technology Team, Youth Services Department	Hold monthly summer STEM programs; <i>hold gamer and book group programs for teen girls</i>	Patrons see STEM concepts in action; <i>Teen girls demonstrate increased confidence in their STEM abilities / interests</i>		<i>Teen girls develop a lifelong interest in science as a hobby or career</i>	
Collections	Family Science Backpacks, print and electronic resources	Summer 2017	Science & Technology Team, Youth Services Department	Offer 2 new themes for Family Science Backpacks, purchase current STEM resources	Patrons experience the world and "go do science" with family and friends	10% increase in circulation of Family Science Backpacks		

Goal 3: The library is a community role model for sustainable practices

Inputs / Resources	Activities/ Materials/Services	Time Frame	Who is Responsible?	Outputs	Short-term outcomes	Indicators	Long-term outcomes	Indicators
Staff Time	Portland's Sustainability Series	Monthly, 2017	Science & Technology Team	10-12 speaker programs	Patrons become aware of current relevant issues in sustainability	25% of attendees indicate that their awareness/understanding has increase (use Project Outcome (PLA))	Patrons engage in more sustainable practices	25% of attendees indicate they are working to reduce their impact (use Project Outcome)
Solar Energy Panels & Education Materials	Community solar initiative	Spring 2017	Library Admin & Solar Consultant	Install solar panels on roof: Create public educ displays	The public learns about the feasibility of solar energy in Maine	25% of attendees indicate increased understanding of solar in Portland (Project Outcome)	Portland community pursues solar energy	10% increase in the use of solar energy (reported in City of Portland's Sustainability Office)
Collections	Seed lending library	Spring - Fall 2017	Science & Technology Team	Accept seeds from 2016 season, "lend" new seeds	Patrons experiment with growing their own food and flowers	10% increase in seed library circulation from 2016 season	Patrons expand interest and skill in growing their own gardens	At least 5 patrons request to become "Portland Master Growers"
Budget & Staff Time	Children's Cooking Classes	TBD	Youth Services Department	One cooking program for kids, focus on local food sources	Children understand impact of using local food sources	50% of attendees indicate enjoyment of the meal at the end of the program (observation)	Children gain confidence in preparing their own meal at home, using local ingredients	20% of attendees indicate increased confidence on follow up survey (project outcome)

WORKSHEET #7: EVALUATION

The Evaluation worksheets and examples will help the library assess its success by bringing together the goal indicators and the data collected from surveys and elsewhere to illustrate those indicators.

Guidelines

1. You will evaluate your STEM programs and activities as well as your progress toward your goals with this evaluation. For an overview about the evaluation process, please see the Evaluation Toolkit at stemlibraries.org
2. While you can design your own program survey instrument [Project Outcome](#), a national online evaluation toolkit provides free access to implement and analyze results of surveys for library programs. There is no specific STEM survey, but Digital Literacy, Education and Lifelong Learning and the Civic and Community Engagement surveys should work well for STEM programs. You can add your own customized questions to these. See Appendix A for an example of a customized survey created using the Project Outcome online survey tool.
3. Worksheet #7 utilizes the goals from your Library Road Map/Logic Model (Worksheet #6). Copy each goal from the roadmap into the Worksheet #7 template. Then copy the short-term outcomes and their indicators into the first template and the long-term outcomes and indicators into the second template. Short-term outcomes are usually assessed immediately after the program or class. You will have to decide what long-term means for your library. It might be a three – or six-month follow up. Project Outcome has templates for both so it's a really good tool for evaluating short-term and long-term outcomes and impacts of your programs.
4. Add the data you've collected for each indicator to the template. You might need to do some simple calculations if an indicator was a percent increase, for example in circulation of STEM materials.
5. Finally, think about what the data is telling you. Did you meet your indicator target? How can you keep your success going? Did you fall short? What might have caused that and what can you do to fix it?
6. Don't forget to gather the long-term outcome data and analyze it as well. That will give you a better sense of success than just looking at the short-term results.
7. Share the data with your staff, board and community!

WORKSHEET #7: EVALUATION – SHORT-TERM AND LONG-TERM OUTCOMES

Goal #:			
Short-term outcomes (benefit received by target audience)	Indicators - Measurable characteristics, actions, or conditions that "indicate" the desired change	Data	Conclusions

Goal #:			
Long term outcomes (benefit received by target audience)	Indicators - Measurable characteristics, actions, or conditions that "indicate" the desired change	Data	Conclusions

WORKSHEET #7: EVALUATION - SHORT-TERM AND LONG-TERM OUTCOMES - EXAMPLES

Goal 2: The library is a destination for hands-on STEM learning			
Short term outcomes (benefit received by target audience)	Indicators - Measurable characteristics, actions, or conditions that "indicate" the desired change	Data	Conclusions
Patrons explore STEM concepts at their leisure	Library collects baseline Hands-on activity station usage data (observe and record usage)	In the 3 months since the station was implemented, it has been used 587 times patrons of all ages	The station is popular but usage was greatest in the first month and then tapered off. We need a plan to refresh the station to keep up interest and we don't know anything about the impact on the patron.
Patrons see STEM concepts in action; Teen girls demonstrate increased confidence in their STEM abilities / interests	25% of program attendees indicate on a post activity survey that their confidence has increased (Use Project Outcome surveys to gather this data)	Based on Project Outcome data, all participants in our 3 programs either agreed or strongly agreed that their confidence increased	Staff agrees that these results indicated a need for more programming in this vein for teen girls.
Patrons experience the world and "go do science" with family and friends	10% increase in circulation of Family Science Backpacks (From the circulation system)	Circulation Month 0 - 349 Month 3 - 369 Percent increase: 5%	We fell short of this target. We need to market these backpacks more aggressively.

Goal 2: The library is a destination for hands-on STEM learning			
Long-term outcomes (benefit received by target audience)	Indicators - Measurable characteristics, actions, or conditions that “indicate” the desired change	Data	Conclusions
Patrons learn about STEM and apply science in their lives	25% of the users of the Hands-on STEM Activity stations indicate on a survey that they have applied what they’ve learned in their daily lives.	During the 6 months we’ve closely monitored the station, 784 people/families have used it. We received feedback surveys from 10% (78 people/families) of those users. Of the 78, 16 indicated they are applying what they learned. That is 21% of the population.	So close to the target. We might try being more diligent in getting this feedback so that we have more data to look at. We could also add ask users what issues they are concerned about and design other stations around those.
Teen girls develop a lifelong interest in science as a hobby or career	35% of the attendees indicate on the final program survey that they have an interest in pursuing STEM.	Of the 100 teen girls who have gone through this program series, 30% (30 girls) have indicated that they’ve developed a lifelong interest.	So close to the target. The YA team is happy with the result – maybe our target was a bit too ambitious given the age of the group and the vast number of distractions they face.

Implementing your STEM Development Plan

Congratulations on the successful completion of the STEM Development Plan and Logic Model!

Your library is well on the way to incorporating STEM as a major literacy focus for your community. But, don't stop here. Keep talking with your community about their concerns and interests and keep developing programs and services that address those concerns.

Visit the STEM LIBRARIES website to access additional resources and STEM information at:
stemlibraries.org/

APPENDIX A

SAMPLE PROJECT OUTCOME SURVEY FOR A STEM PROGRAM

This program helps with science literacy and genealogy

Date: _____

Location: My Public Library

Please take a few minutes for this brief survey and let us know if, as a result of participating in the DNA and Genealogy - Science and Your Family program...

1. You learned something that is helpful

Strongly Disagree Disagree Neither Agree Strongly Agree N/A

2. You feel more confident about what you just learned

Strongly Disagree Disagree Neither Agree Strongly Agree N/A

3. You intend to apply what you just learned

Strongly Disagree Disagree Neither Agree Strongly Agree N/A

4. You are more aware of resources and services provided by the library

Strongly Disagree Disagree Neither Agree Strongly Agree N/A

5. What did you like most about the program?

6. What could the library do to better assist you in learning more?

7. You have a better understanding of how DNA relates to genealogy after participating in the library program?

Strongly Disagree Disagree Neither Agree Strongly Agree N/A

8. What is the most compelling thing you learned in the program?

9. The knowledge gained during this program will influence your genealogy research

Strongly Disagree Disagree Neither Agree Strongly Agree N/A

This survey is part of the Public Library Association's Project Outcome, a national initiative to help public libraries measure the impact of their programs and services, with funding from the Bill & Melinda Gates Foundation. For more information about this effort, please visit

www.projectoutcome.org.