

URBAN LIBRARIES COUNCIL



## Partners for Middle School STEM

STRATEGIC PLAYBOOK

### **Dear Leader:**

Industries and education systems alike are in the midst of a tectonic shift. Often called the "Fourth Industrial Revolution," technology's ever-faster advances and applications are rapidly redefining 21st-century industries and the skills workers need for success. As science, technology, engineering and math (STEM) industries continue to lead job creation and economic growth, fostering a STEMready workforce is vital to the future of every community.

Yet, barriers related to socioeconomic status, race, digital access and other systemic divides continue to leave many families and their children without access to high quality STEM learning opportunities. Meaningfully overcoming systemic barriers to STEM education will require community-wide solutions, and every local leader in the ecosystem has a part to play, including local government, school, business and library leaders.

The Urban Libraries Council launched the Partners for Middle School STEM initiative in 2019 to identify new models for how libraries and other community leaders can better collaborate to strengthen STEM learning opportunities and engagement for local youth. Run in partnership with the National Center for Interactive Learning at the Space Sciences Institute and funded by the Institute for Museum and Library Services, this initiative focused on reaching and engaging low-income "tweens" — students who not only face disproportionate education barriers, but are at an age when establishing fundamental STEM skills is especially critical.

This *Strategic Playbook* expands on the Partners for Middle School STEM initiative's findings to guide library leaders in building successful programs and cross-sector partnerships that advance more inclusive and robust STEM learning environments for all youth. Recognizing that the needs of every community are unique and always changing, this document offers a broad toolset of action steps, considerations and resources relevant to libraries of all sizes and in every stage of partnership and program development.

ULC thanks the 11 library systems from the Partners for Middle School STEM learning cohort for their extensive contributions to this *Strategic Playbook*. And, to those reading and using this guide — thank you for your commitment to building a brighter future for children everywhere. Together, we can make a true difference.

Sincerely,

Susan Benton President and CEO Urban Libraries Council

### Contents

#### **1. GETTING STARTED**

Why Is STEM Education Equity Vital? ...2 Who Needs the Greatest Support?......3 What Is the Public Library's Role? ......4

#### 2. BUILDING CAPACITY

Positionin	ig the	Library	for	Growth	5
Fostering	Staff	Success			6

#### 3. DESIGNING STEM PROGRAMS FOR TWEENS

Positive Youth Development7
Impactful Program Design8
Library Program Case Studies9

#### 4. LEVERAGING STRATEGIC PARTNERSHIPS

Why Partnerships Are Important	10
Identifying Promising Partners	11
Building Strong Partnerships	12

#### 5. ASSESSING/REFINING THE LIBRARY'S WORK

Informal Program	n Evaluation	13
Formal Program	Evaluation1	4-15
Further Reading		6-17

Learn more at: https://www.urbanlibraries.org/initiatives/ stem-middle-school

### About ULC's Partners for Middle School STEM Initiative

Run in partnership with the National Center for Interactive Learning at the Space Sciences Institute, this two-year project was designed to identify and raise awareness of effective new tools, techniques and partnership opportunities to help libraries better engage low-income middle school youth in STEM.

ULC thanks the following libraries for their leadership and contributions as members of this initiative's pilot project learning cohort:

- Algona Public Library (Iowa)
- Chicago Public Library (III.)
- Cincinnati & Hamilton County Public Library (Ohio)
- Durham County Library (N.C.)
- Gwinnett County Public Library (Ga.)
- Hartford Public Library (Conn.)
- Mount Vernon City Library (Wash.)
- Pioneer Library System (Okla.)
- Prince George's County Memorial Library System (Md.)
- San José Public Library (Calif.)
- St. Louis County Library (Mo.)



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# 1. GETTING STARTED Why Is STEM Education Equity Vital?

Modern education systems and approaches are falling behind the steadily growing demand for STEM skills in 21st-century industries. Immediate, systemic and strategic intervention is needed by entire communities to ensure every young student has the opportunity, instruction and encouragement needed to achieve success in their education and career.

### Robust and Inclusive STEM Education Is Vital for 21st-Century Economic Growth

- STEM-related jobs represent the fastest growing sector of the workforce and will continue to lead the curve in job creation through the next decade.<sup>1</sup>
- Building STEM skills is linked to greater educational and vocational opportunities, social and emotional well-being, community connectedness and job satisfaction.<sup>2</sup>
- Developing teams that represent diversity with regards to culture, race/ethnicity and gender leads to greater innovation outcomes.<sup>3</sup>
- STEM education prepares today's youth for the higher-order cognitive skills that will be needed for the future workforce, including the "four Cs" of 21st-century learning: collaboration, creativity, communication and critical thinking. Experts predict that demand for these skills will increase by nearly 20% from 2020-30.<sup>4</sup>

#### **Current STEM Education and Career Pipelines Need Urgent Repair**

- There are not enough trained STEM professionals to meet the needs of employers.<sup>5</sup>
- Lack of access to STEM during out-ofschool time decreases youth interest and engagement in STEM throughout their school years, reducing educational and economic opportunities.<sup>6</sup>
- In order to close equity gaps in STEM careers between 2020-30, representation of women in STEM careers will need to nearly double, while representation of Black and Latino professionals will need to more than double.<sup>7</sup>
- While students from diverse racial and ethnic backgrounds enter college STEM majors at similar rates, Black and Latino students drop out of those majors at a much higher rate.<sup>8</sup>

<sup>7</sup> National Science Board. (2020, May). Vision 2030. nsf.gov/nsb/ publications/2020/nsb202015.pdf.

<sup>&</sup>lt;sup>1</sup> Vital Signs. Education Commission of the States. *STEM Demand.* vitalsigns.ecs.org/state/United-States/demand.

<sup>&</sup>lt;sup>2</sup> Peterson, A., Gaskill, M. & Cordova, J. (2018). Connecting STEM with Social Emotional Learning (SEL) Curriculum in Elementary Education. *Proceedings of Society for Information Technology & Teacher Education International Conference* (pp. 1212-1219). Washington, D.C., United States: Association for the Advancement of Computing in Education (AACE). learntechlib.org/primary/p/182681.

<sup>&</sup>lt;sup>3</sup> Levine, S. R. (2020, January 15). Diversity Confirmed to Boost Innovation and Financial Results. *Forbes*. forbes.com/sites/ forbesinsights/2020/01/15/diversity-confirmed-to-boost-innovationand-financial-results/?sh=239ba5cac4a6.

<sup>&</sup>lt;sup>4</sup> Bughin, J., Hazan, E., Lund, S., Dahlström, P., Wiesinger, A., & Subramaniam, A. (2018, May 23). Skill Shift: Automation and the Future of the Workforce. *McKinsey & Company*. mck.co/2DGg7Qs.

<sup>&</sup>lt;sup>5</sup> Ford, R. L. A. H. (2019, June 6). The U.S. Needs to Prepare Workers for STEM Jobs. SHRM. shrm.org/hr-today/news/hr-magazine/summer2019/ pages/the-u.s.-needs-to-prepare-workers-for-stem-jobs.aspx.

<sup>&</sup>lt;sup>6</sup> Allen, P.J., Chang, R., Gorrall, B.K. et al. From Quality to Outcomes: A National Study of Afterschool STEM programming. *IJ STEM* Ed 6, 37 (2019). doi.org/10.1186/s40594-019-0191-2.

<sup>&</sup>lt;sup>8</sup> Garimella, S. & Wilson, H. (2020, December 3). Why Universities Need to Reform STEM Education for Long-Term Health of U.S. Economy. USA TODAY. usatoday.com/story/opinion/2020/12/03/ why-universities-need-reform-stem-education-protect-economycolumn/6462405002.

### 1. GETTING STARTED Who Needs the Greatest Support?

In order for education leaders and entire communities to strategically address STEM education gaps in the ecosystem, it is vital to clearly identify and deliberately engage youth who most need support. Doing so requires recognizing the families and students who face the greatest systemic barriers, as well as gaining an appreciation for the special importance of STEM engagement during early adolescence.

### Middle School Youth Are at a Pivotal Age for STEM Learning and Careers

- Tweens (ages 11-14) experience accelerated brain development and become highly adaptive to learning and exploration.
- During this developmental stage, there are significant increases in capacity for intellectual processes, including the transition from concrete to abstract thinking, deductive reasoning, problem solving and generalizing which are all critical for learning and building confidence with STEM.
- Developmentally appropriate experiences in middle school influence interests and pursuits which youth will explore in high school, college and in their careers.<sup>1</sup>
- Young teens tend to consider and form identities based on careers accessible to them.

### The "Leaky" Pipeline: Systemic Gaps in STEM Learning Opportunities

Many students face disproportionate barriers to STEM learning, education and careers due to systemic gaps and outdated policies that reinforce those divides. As a result of this "leaky STEM pipeline" or "opportunity gap," millions of young learners are falling short of their potential due to factors beyond their control, including their race, gender and family's socioeconomic status.

- Nearly one-third of youth in low-income communities have less access to out-of-school STEM education and activities when compared to their more affluent peers.<sup>2</sup>
- More than one-third (35%) of low-income children's households lack home internet.<sup>3</sup>
- When compared to white students, students of color are more likely to lack reliable access to the internet and tech devices needed to complete their schoolwork.<sup>4</sup>

<sup>&</sup>lt;sup>1</sup> Maltese, A.V., Melki, C.S. and Wiebke, H.L. (2014), The Nature of Experiences Responsible for the Generation and Maintenance of Interest in STEM. *Sci. Ed.*, 98: 937-962. doi.org/10.1002/sce.21132.

<sup>&</sup>lt;sup>2</sup> Afterschool Alliance. (2015, January). Afterschool Programs: Inspiring Students with a Connected Learning Approach. files.eric.ed.gov/fulltext/ ED557938.pdf.

<sup>&</sup>lt;sup>3</sup> Auxier, B., & Anderson, M. (2020, March 16). As Schools Close Due to the Coronavirus, Some U.S. Students Face a Digital 'Homework Gap.' Pew Research Center. pewresearch.org/fact-tank/2020/03/16/as-schoolsclose-due-to-the-coronavirus-some-u-s-students-face-a-digitalhomework-gap.

<sup>&</sup>lt;sup>4</sup> Chandra, S., Chang, A., Day, L., Fazlullah, A., Liu, J., McBride, L., Mudalige, T., Weiss, D., (2020). *Closing the K–12 Digital Divide in the Age of Distance Learning*. San Francisco, CA: Common Sense Media. Boston, Massachusetts, Boston Consulting Group. commonsensemedia.org/sites/ default/files/uploads/pdfs/common\_sense\_media\_report\_final\_7\_1\_ 3pm\_web.pdf.

### 1. GETTING STARTED What Is the Public Library's Role?

The work to elevate libraries as STEM equity leaders is essential to building stronger, more inclusive 21st-century communities. Luckily, libraries are uniquely positioned and well-equipped to take on a greater leadership role in local STEM education ecosystems.

#### Unique Assets of Libraries as STEM Education Partners and Leaders

- Libraries are adept at convening and connecting leaders and players in the local community, making libraries ideal partners for strengthening STEM education ecosystems.
- Youth spend 80% of their time out of school, and libraries are leaders for providing informal out-of-school education opportunities.
- Public libraries are highly trusted and deeply connected, empowering them to engage and build relationships with individuals from populations that are traditionally underserved and/or hard to reach.
- Libraries are adept at quickly pivoting to meet changing needs, which is vital for staying ahead of the rapidly changing nature of STEM technology and the skills needed to use it.

### Unique Opportunities for Libraries as STEM Education Partners and Leaders

- STEM programming reaffirms self-directed learning in library spaces.
- STEM programming appeals to diverse learners and learning styles, offering libraries a powerful onramp for broadening access and engagement.
- Informal STEM learning that is based on the participant's previous interests and formal instruction can build and generate excitement for future learning.



#### Building the STEM Workforce: Quickstart Toolkit

#### From: ULC

Complementing this *Strategic Playbook*, ULC's *Building the STEM Workforce: Quickstart Toolkit* is designed to orient libraries who are new to this work with strategies for short-term, sustainable progress, as well as resources for deeper exploration.

#### ACCESS RESOURCE →

urbanlibraries.org/STEM-quickstart-toolkit

### 2. BUILDING CAPACITY Positioning the Library for Growth

Fostering the skills and mindsets needed for staff to move to an equity-based STEM learning approach requires ensuring their sustained commitment to inquiry-based learning, sharing power with communities of color, co-creating programs and developing partnerships that keep the community top of mind.

#### Cultivating a Healthy STEM Learning Environment at the Library

- Prioritize participant-driven and inquiry-based learning in the library's strategic planning and vision.
- Adapt staff, programs and services to serve people with divergent learning styles.
- Design programs based on open-ended learning that inspires curiosity and models experimentation.
- Build effective partnerships with STEM providers, community groups, schools, businesses, local government offices and other civic organizations.
- Co-create programs with community members to ensure alignment with their needs.
- Create experiential learning through selfdirected and flexible experiences based on the "four Cs" — collaboration, creativity, communication and critical thinking.
- Develop rigorous impact-based evaluation practices that measure outcomes over outputs (see pages 13-15).

#### Committing to Building Equity and Inclusive Practices

Public libraries uphold equal access as a critical value, and are trusted institutions and essential participants in the movement for racial and social equity. To act and stand as leaders for STEM education equity, libraries must intentionally:

- Dismantle race and social equity barriers in programs, services, policies and practices.
- Foster and maintain a safe, inclusive and respectful environment for learning.
- Identify and actively reach and engage youth of color in the community through outreach, partnerships and multilingual programming.
- Co-create learning experiences to serve as platforms for youth voice and choice.
- Serve as conveners and facilitators of conversations and partners to address community challenges.
- Be forthright on tough issues that are important to the community.

### 2. BUILDING CAPACITY Fostering Staff Success

Ongoing and rigorous staff development supports teams at all levels of the library. Sustained training allows staff to learn from failure and take new chances in order to successfully implement innovative new programming models. A crucial component of STEM programming success is moving staff from a facilitator mindset to becoming co-learners or "guides on the side."

### Tips for Growing Staff Confidence and Capacity with STEM Programming

- Give staff the freedom to experiment and fail without preconceived outcomes.
- Provide opportunities for staff at all levels to practice, learn and ideate together.
- Equip staff with resources and support for experiential programming in the name of scientific endeavor.
- Encourage staff to create a safe learning environment that promotes joyful learning, not only for youth but also for themselves.
- Model and promote a growth mindset across library staff.
- Ensure staff understand and are fostering multiple literacies, including science and technological literacies.
- Transition staff from serving as program facilitators to acting as "guides on the side."



#### Be a Guide on the Side for Effective STEM Learning

*From:* The Space Science Institute's National Center for Interactive Learning

Learn how STEM program facilitators can adopt a "Guide on the Side" approach to allow participants to actively drive their learning.

#### ACCESS RESOURCE -----

urbanlibraries.org/SSI\_STEM\_Guide\_on\_the\_Side

### 3. DESIGNING STEM PROGRAMS FOR TWEENS **Positive Youth Development**

Adapted from the "Five Cs Model of Positive Youth Development," the following offers a framework for understanding youth development by focusing on connection, confidence, character, contribution and competence.

#### Connection

The library builds well-being and healthy relationships for people and institutions by:

- Partnering with STEM professionals who represent the diversity of the community.
- Creating a bridge beyond youth to families and larger support systems.
- Linking diverse community settings and local issues meaningful to youth participants.

#### Confidence

The library empowers youth to believe in their capacity to solve problems and succeed by:

- Allowing youth to learn about STEM career pathways.
- Helping youth foster a growth mindset.<sup>1</sup>
- Allowing for co-learning (facilitating programs as a "guide on the side").

#### Character

The library supports youth working both independently and in groups where they can model shared values and goals by:

- Promoting prosocial behavior.
- Developing collaborative problem solving.
- Celebrating shared contributions.

#### Contribution

The library allows all youth to participate in meaningful ways by:

- Supporting group inquiry and collaborative investigations.
- Developing teamwork skills.
- Providing time and space for reflection to deepen learning.

#### Competence

The library helps build youths' ability to contribute effectively to shared goals by:

- Introducing new technologies, experiences and scientific thought.
- Allowing for skill development and attainment.
- Recognizing individual contributions to team achievements.

<sup>&</sup>lt;sup>1</sup> Dweck, C. S. (2006). *Mindset: The New Psychology of Success*. New York: Random House.

### 3. DESIGNING STEM PROGRAMS FOR TWEENS Impactful Program Design

Effective program design results in co-created and immersive experiences that benefit everyone involved, as well as the community at large.

### Key Considerations for Youth STEM Programming

- Allowing youth to co-design and include their voice in programs helps participants to build and direct program elements based on personal interests.
- Caring adults in the library create a safe environment for experimentation and socialemotional learning.
- When youth have opportunities to restate program goals during the program, it ensures equal understanding.
- Self-identities develop through experiences and socialization, while social identities form through group belonging and reinforcement.
- Hands-on learning allows youth to learn through divergent styles and can help translate information learned at school into new skills.
- Reflection closes the learning cycle and allows students to use critical thinking to connect experiences and learning.
- Providing meals or healthy snacks reduces barriers to participation.
- Flexible program scheduling increases access for all community members.
- Participants are credible promoters of programming and can expand program audiences through word of mouth.



#### Essential Discussions for Planning Your Tween STEM Programs

STEM (Science, Technology, Engineering, and Math opportunities continue to be an issue of equity, diversity, inclusion, and accessibility. An "achievement gap" persists between low- and high-income students, and women and people of color are still underrepresented in STEM Careers'. Libraries can play an important tole in a tween's development by tapping into their interests and providing a safe place for them to explore STEM concepts and



Working with tweens is both a challenge and a joy. They are changing physically, cognitively, are emotionally, and have a deep desire for autono However, they still display kid-like behavior and like to play! Here are some tips on tailoring you

programs to meet tweens' unique needs and sho casing the value — and fun — of STEM learning in their lives.

MAKE YOUR CASE FOR STEM & TWEENS Are your saff members initinidized by working with tweens? Talk as a team about the unique characteristics of veens and how you can tap into the hipsful side for fun and engaging STEM programs? Be sure to try at least one hands-on STEM activity — and have fun learning for yourself!

O TO WHERE THE TWEENS ARE nlike young adults, tweens still rely heavily on adults for supervision and transportation so they may not b siting the library on their own. Consider visiting nearby schools, afterschool programs, and faith organiza-

#### Essential Discussions for Planning Your Tween STEM Programs

#### *From:* The Space Science Institute's National Center for Interactive Learning

Use this tip sheet to make your case for STEM and tweens, go to where the tweens are, talk to your tween patrons, create a tween-friendly space, challenge STEM stereotypes and embrace diversity.

#### ACCESS RESOURCE -----

urbanlibraries.org/SSI\_STEM\_Tweens\_Tips

### 3. DESIGNING STEM PROGRAMS FOR TWEENS Library Program Case Studies

Driving outcomes through strategic partnerships and community outreach allows libraries to reach new middle school audiences and host successful STEM programming. Here are four program models piloted by libraries in ULC's Partners for Middle School STEM learning cohort.



#### STEAMed and Chopped: Using Tween Advisory Groups to Design Programs

#### From: Chicago Public Library (III.)

Engaged middle schoolers in addressing engineering challenges in teams by using common craft supplies.

#### VIEW PROGRAM MODEL ---

urbanlibraries.org/ULC\_STEM\_Model\_CPL



#### TechVenture: Removing Barriers Through Outreach

#### From: Mount Vernon City Library (Wash.)

Gave low-income middle schoolers exposure to STEM concepts using hands-on learning and virtual reality activities.

#### VIEW PROGRAM MODEL --

urbanlibraries.org/ULC\_STEM\_Model\_MVCL



### STEM Pals: Using Technology as a Tool to Develop 21st-Century Social Skills

From: Prince George's County Memorial Library System (Md.) & Pioneer Library System (Okla.)

Connected and engaged tweens across the U.S. in inquiry-based STEM challenges.

#### VIEW PROGRAM MODEL ---

urbanlibraries.org/ULC\_STEM\_Model\_PGCML\_PLS



### STEM *En Español*: Language Diversity in STEM Programming

#### From: Gwinnett County Public Library (Ga.)

Engaged whole families in bilingual Spanish/ English STEM opportunities that blended science and art learning activities.

#### VIEW PROGRAM MODEL ---

urbanlibraries.org/ULC\_STEM\_Model\_GCPL

### 4. LEVERAGING STRATEGIC PARTNERSHIPS Why Partnerships Are Important

Intentional, strategic and sustainable partnerships between local education leaders are vital not only for expanding the library's capacity, reach and growth opportunities — but also for strengthening the community as a whole.

#### Local Government Partners Can:

- Set the tone and open doors for communitywide education partnerships.
- Serve as catalysts for transformational action.
- Provide the authority, voice and respect to bridge community connections and elevate the visibility of partnered efforts.
- Support programming as mentors and presenters on STEM in the context of local government (e.g, water treatment, firefighting).

### Nonprofit/Community Organization Partners Can:

- Create pathways to reaching new audiences.
- Help youth develop voice and choice.
- Serve as ambassadors for engaging caregivers.
- Provide assistance with overcoming language and cultural barriers for outreach.

#### STEM Industry Partners Can:

- Help build capacity for managing change and developing critical skills in the library.
- Support staff through training and coaching.
- Expand the library's available resources and capacity to reach more youth.
- Deepen access to a wider network of science and technology professionals.
- Enhance the library's credibility as a STEM education leader in the community.

#### **School Partners Can:**

- Provide important educational data.
- Effectively promote programs to youth.
- Help libraries develop targeted learning outcomes based on community needs.
- Bridge connections between the library's resources/programs and school curricula.



#### [Video] Why Are Partnerships Important?

Learn why intentional, strategic and sustainable partnerships between libraries and local leaders are vital for expanding the library's STEM capacity and strengthening the local ecosystem.

WATCH NOW ···→

youtu.be/xX1Wi7w2QMo

### 4. LEVERAGING STRATEGIC PARTNERSHIPS Identifying Promising Partners

With the wide breadth of possible partners, libraries must focus on identifying and pursuing partnership opportunities with the greatest strategic value and potential for success.

#### Step One: Look Inward

Before your library can identify strong external partnership opportunities, you first need to take a close look inward at your organization to clearly define the library's:

- Mission, vision and values.
- Current strategic priorities and timelines for achieving them.
- Areas of greatest need.
- Strengths that partners may find valuable (never forget that partnerships are two-way streets).

It will not be possible to determine the strategic alignment of potential partners without first mapping out these strategic pillars.

#### **Developing a List of Potential Partners**

- Start by listing the library's existing connections and then ask:
  - Are there opportunities to build on those relationships?
  - Are there similar organizations/leaders in the community who might also be potential partners?
- Then, think about the library's target audiences for services and ask:
  - Where do those individuals meet?
  - Who are organizers in their community?
  - Who else is deeply invested in their success?



#### [Video] Identifying Potential STEM Partners

Ensure your library is focusing on partnership opportunities with the greatest strategic value and potential for success.

#### WATCH NOW ···→

youtu.be/HJTyckFy\_Zo

### 4. LEVERAGING STRATEGIC PARTNERSHIPS Building Strong Partnerships

Much like establishing a successful internal team, successful partnerships require planning, engagement and effective communication.

#### **Action Steps for Library Leaders**

#### Adapted from: ULC's Leaders Library Card Challenge Strategic Guide

The following action steps offer a framework for library leaders to launch and sustain partnerships around shared education goals:

- Establish a baseline for action (e.g., a memorandum of understanding or letter of understanding).
- Clearly define partner roles and responsibilities.
- Regularly reflect and evaluate the partnership openly and honestly.
- Announce the partnership and the shared goals to the target audience and other library stakeholders.
- Work with partners to establish jointly agreed upon planning and assessment methods.
- Develop a data-sharing strategy and agreement.
- Be patient, persistent and flexible.

#### **Establish Strong Communications**

Regular, effective communication is an especially critical cornerstone of partnership success. New projects will always have things that don't go as planned, but keeping communication open between you and your partner will help prevent these challenges from getting out of hand.

When entering into a new partnership, be sure to establish:

- Contact persons. If a member of the partnership needs something, who should they contact?
- Preferred communication methods. What methods are partners most likely to check and use to communicate?
- Meeting times and formats. How often will you meet and how? What are scheduling conflicts that may impede you from meeting?



#### [Video] Building Strong Partnerships

Learn strategies for launching and sustaining partnerships with an infrastructure and mutual respect that will empower the partnership to stand the test of time.

WATCH NOW …

youtu.be/mMxUN8gLMj4

# 5. ASSESSING/REFINING THE LIBRARY'S WORK

Functioning as an organic part of programs, informal evaluation closes the learning cycle by asking youth to reflect on learning.

#### **Methods for Informal Reflection**

- Individual interviews.
- Pre- and post-surveys with the same one to two questions asked at the beginning and end.
- Exit question/feedback slips.
- Surveys including talk back boards, online polls and group surveys.
- Group discussions and debriefs.

#### **Measures for Informal Reflection**

- Understanding a connection to larger learning.
- Thinking in complex ways.
- Being comfortable with ambiguity.
- Becoming more open-minded and able to work in teams.
- Basic attainment of knowledge, interest, critical 21st-century skills and alignment to Common Core State Standards (where applicable).





#### Evaluation Guide for Public Libraries

#### Created for ULC by: HG&Co

Discover tips and tools for every stage of the evaluation process, including:

- Planning your evaluation.
- Designing the instruments.
- Collecting, entering, cleaning and analyzing data.
- Interpreting results.
- Reporting on results to stakeholders.

#### ACCESS RESOURCE -----

urbanlibraries.org/KHG\_Evaluation\_Guide

### 5. ASSESSING/REFINING THE LIBRARY'S WORK Formal Program Evaluation

Formal evaluation is a hallmark of responsible program management and allows for effective storytelling around impact. Moving to outcomes-based evaluation aligns programs to desired outcomes, provides accountability to stakeholders and promotes a continuous improvement process.

#### Formal Evaluation: Logic Model

- Graphically organizes cause and effect of specific programs.
- Provides a clear framework for program development.
- Helps define a program structure and guide staff towards continuous improvement.
- Components include:
  - Goal(s).
  - Process objectives.
  - Inputs.
  - Activities.
  - Outputs.
  - Short-, intermediate- and long-term outcomes.

#### Formal Evaluation: Theory of Change

- Models a vision for community support and a long-term change.
- Provides a structure for planning, implementation and evaluation.
- Aligns to the library's mission and strategy.
- Components include:
  - Impact or systemic change which the library is working towards over time.
  - Goal outcomes, including short-, mid- and long-term improvements.
  - Planned outputs that are measurable results of activities.
  - Activities that are needed to reach the goal outcomes.
  - Inputs that are the resources and investments needed for activities.

oals	WORKSHEEL	• Project:		
Inputs	Activities	Outputs	Outcomes	
Audience(s)				
Assumptions				

#### **Logic Model Worksheet**

#### Created for ULC by: HG&Co

Use this worksheet from the *Evaluation Guide for Public Libraries* to create a logic model for a specific STEM program at the library.

#### 

urbanlibraries.org/KHG\_Logic\_Model\_Worksheet

### 5. ASSESSING/REFINING THE LIBRARY'S WORK Formal Program Evaluation (contd.)

#### **Formal Evaluation: Survey**

- Measures the effectiveness of process objectives and activities for specific stakeholders.
- Reflects on short-term outcomes and program goals.
- Reaches the maximum number of participants through various strategies of distribution.
- Results are used for continuous improvement and to show the effectiveness of activities in individual programs as well as the overall theory of change.
- Components include:
  - Short statements or questions for stakeholder reaction.
  - Measurable metrics.

#### **Survey Tips**

#### Adapted from: Evaluation Guide for Public Libraries, created for ULC by HG&Co

- Keep the survey as short as possible.
- Be consistent with scales. E.g., don't use both four-point scales and seven-point scales within a single survey.
- Be sure to include "Other," "Don't Know" or "N/A" options when needed.
- Ask one question at a time.
- Check your question wording for bias.
- Be wary of hypothetical questions.
- Use clear, unambiguous terms. Don't use words like "most" or "often" if you can avoid doing so, since they are open to interpretation.
- Do not use unfamiliar words, abbreviations or jargon.
- Use questions and categories that you have used before, especially for demographics.
- Put demographic questions at the end (unless you are targeting or screening for specific users).
- Test surveys with pilot users/groups.

### 5. ASSESSING/REFINING THE LIBRARY'S WORK Further Reading

#### **GETTING STARTED**

- Bevan, B., Garibay, C., & Menezes, S. (2018). "What is a STEM Learning Ecosystem?" <u>https://www.informalscience.org/sites/default/files/BP-7-STEMLearning-Ecosystem.pdf</u>.
- Cherkowski, G. (2019, June 3). "Why Math and STEM Education Is a Social Justice Issue." Getting Smart. <u>https://www.gettingsmart.com/2019/06/why-math-and-stem-education-is-a-social-justice-issue</u>.
- McChesney, E. M., Wunar, B. W., & Musgrave, S. (2017). *Summer Matters: Making All Learning Count* (1st ed.). ALA Editions.
- Peppler, K. A. (2017). "Access and Equity in Out-of-School Learning" *The SAGE Encyclopedia of Out-of-School Learning*. SAGE Publications, Inc. <u>https://www.sesp.northwestern.edu/docs/publications/19463108458ed9a04e85c2.pdf</u>.
- "Why Cultivate STEM Learning Ecosystems?" STEM Ecosystems. <u>https://stemecosystems.org/</u> <u>what-are-stem-ecosystems</u>.
- "Y Is STEM Still So White?" [Video]. (2020, December 8). STEM Ecosystems. YouTube. https:// youtu.be/ibWxx0iSJOQ.

#### **BUILDING CAPACITY**

- Kurup, P.M., Li, X., Powell, G. et al. "Building Future Primary Teachers' Capacity in STEM: Based on a Platform of Beliefs, Understandings and Intentions." IJ STEM Ed 6, 10 (2019). <u>https://doi.org/10.1186/s40594-019-0164-5</u>.
- Meixi, Hill, C., Herrenkohl, L.R. (2015) "STUDIO: Building Capacity for STEM Learning and Identity for Low-Income and Immigrant Youth." Fablearn: 5th Conference on Creativity and Making in Education at Stanford University, September 26-27, 2015. <u>http://fablearn.org/2015/wp-content/uploads/2015/10/FL2015-Poster-MeixiHillHerrenkohl.pdf</u>.
- "Teaching Science as Inquiry." 2012 Year in Review. Curriculum Research & Development Group. University of Hawai'i. (2012). <u>https://manoa.hawaii.edu/crdg/year-in-review/year-in-review-2012/teaching-science-as-inquiry-3</u>.

## Further Reading (contd.)

#### **DESIGNING STEM PROGRAMS FOR TWEENS**

"Activities." STEM-Works. http://stem-works.com/activities.

"Design Principles" STEM Ecosystems. <u>https://stemecosystems.org/design-principles</u>.

- "Involving People Most Affected by the Problem." Community Tool Box. Center for Community Health and Development at the University of Kansas. <u>https://ctb.ku.edu/en/table-of-</u> <u>contents/participation/encouraging-involvement/involve-those-affected/main</u>.
- Pattison, S. (2021, January 15). "Sharpening Our Focus on Equity: Reflections from the Storybook STEM Project." Informal Science. <u>https://www.informalscience.org/news-views/sharpening-our-focus-equity-reflections-storybook-stem-project</u>.

#### LEVERAGING STRATEGIC PARTNERSHIPS

- "Creating and Maintaining Coalitions and Partnerships." Community Tool Box. Center for Community Health and Development at the University of Kansas. <u>https://ctb.ku.edu/en/</u> <u>creating-and-maintaining-coalitions-and-partnerships</u>.
- Snow, J. (2012) Engaging Your Community: A Toolkit for Partnership, Collaboration, and Action. Washington, D.C.: Department of Health and Human Services, Office of Adolescent Health. <u>https://publications.jsi.com/JSIInternet/Inc/Common/\_download\_pub.</u> <u>cfm?id=14333&lid=3</u>.

#### ASSESSING/REFINING THE LIBRARY'S WORK

- "Assessment Tools in Informal STEM (ATIS)." The PEAR Institute: Partnerships in Education and Resilience. <u>http://www.pearweb.org/atis</u>.
- Wilkerson, S.B. and Haden, C.M. (2014). "Effective Practices for Evaluating STEM Out-of-School Time Programs." *After School Matters*, 19(1), pp. 10-19. <u>https://files.eric.ed.gov/</u> <u>fulltext/EJ1021960.pdf</u>.

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#### **About the Urban Libraries Council**

The Urban Libraries Council is an innovation and impact tank of North America's leading public library systems. ULC drives cutting-edge research and strategic partnerships to elevate the power of libraries as essential, transformative institutions for the 21st-century. Over 150 member libraries in the U.S. and Canada rely on ULC to identify significant challenges facing today's communities and provide new tools and techniques to help libraries achieve stronger outcomes in education, digital equity, work-force and economic development, and race and social equity.