



**THE
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The Franklin Institute's Museum-Community Programs 1993–2014

Lessons Learned



Prepared by
Kirsten Büchner, M.A.
Insight Evaluation Services
Fairfax, VA

Contact Information

Minda Borun
Director of Research & Evaluation
mborun@fi.edu

Executive Summary

The Franklin Institute (TFI) engaged Insight Evaluation Services (IES) to conduct a review of TFI museum-community partnership programs in connection with TFI's new strategic plan, which calls for a focus on building relationships with the Philadelphia community over the next five years. In support of this effort, IES reviewed research studies and evaluation reports for fourteen programs in which TFI was a partner in a long-term collaborative relationship with one or more community-based organizations, informal learning organizations, or other education-oriented public service institutions. These programs include the following in alphabetical order:

- The Bridges Conference (Bridges)
- City Skies
- Community Ambassadors in Science Exploration (CASE)
- Communities of Learning for Urban Environments and Science (CLUES)
- Families Exploring Science Together (FEST)
- Girls at the Center (GAC)
- Grow Up Great with Science
- Keystone Science Network (KSN)
- LEAP into Science (LEAP)
- National Science Partnership (NSP)
- Parent Partners in School Science (PPSS)
- Partnerships for Achieving Careers in Technology and Science (PACTS)
- Philadelphia Science Festival (PSF)
- The Science Learning Network (SLN)

The goal of the literature review is to identify the “lessons learned” from each of these museum-community partnership programs, both the successes and challenges of working together to achieve a common goal. TFI was also interested in any relevant recommendations that were made in terms of next steps for the current program or future endeavors to build a new programs. Many of the lessons and recommendations discussed in the different reports IES reviewed are at a programmatic level; however, there were also a number of insights that

address the broader issues of partnering. Taken together, the following main messages rise to the surface:

- Spend time understanding the culture and needs of community-based organizations, including who their audiences are and the personal barriers to participation that may need to be removed.
- Create a welcoming environment and provide a variety of activities at different venues to ensure there is something for everyone.
- Present science in an accessible way on topics that are relevant, fun, and hands on and that offer a multi-generational experience for families.
- Provide host sites with ongoing training and support that give program facilitators the skills to lead activities on their own, adapt them as needed, and ultimately build community capacity.
- Continually seek and respond to feedback in order to address persistent challenges such as recruiting families and sustaining participation.
- Partner with organizations that share the similar goals and have a desire to collaborate in meaningful ways to accomplish these goals, establish partner roles and expectations early on, and foster regular, face-to-face communication that is open to discussing successes and failures.

Clearly, there are many messages that can be taken away from TFI museum-community partnership programs; these messages are also fairly consistent across each program. However, as each program had unique goals and activities, with some having very different contexts for their implementation, IES made the conscious decision to present each program separately.

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The Bridges Conference (Bridges)

Grant: National Science Foundation

Dates: June 20-22, 2008

Partners: The Philadelphia-Camden Informal Science Education Collaborative (PISEC) museums and ten partner community agencies.

Main goal: Lay the foundation for the creation of a museum-community outreach network and formulate a set of best practices for programs that specifically serve families to be shared with the broader informal science education (ISE) community.

Activities: Hold a national conference, present at professional meetings, conduct national networking for family outreach programs, produce a website, and develop a manual of best practices.

Audiences: Professionals involved in long-term museum-community partnerships.

Number of people served: 65

Lessons Learned

Conferences offer networking opportunities. Individuals who represented 25 organizations, including museums, community programs, advisers, and funders from across the country, attended The Bridges Conference. The ability to network with colleagues served to extend conversations beyond the duration of the three-day meeting, and to improve existing partnerships or build new ones.

Conferences offer a space to address common concerns and present practical solutions. Bridges consisted of rich discussions between participants to share ideas, brainstorm, learn from others, and reinforce their commitment to engage underserved families in science enrichment activities through museum-community partnerships. Attendees indicated that the strategies that came out of their discussions were relevant and applicable to their needs or the needs of their institutions. These strategies are listed below:

Strategies for Creating Mutually Rewarding Relationships Between Museums and Community Groups

- Take time to observe prospective partners in action, get to know them fully, and consider the possibilities for collaboration before leaping into a formal partnership.
- Ensure that partners share common goals. An appropriate partner depends on the goals of the relationship. While two or more organizations may have similar or complementary programs and resources, this is not enough to establish a solid collaboration.
- Generate a memorandum of understanding (MOU) that describes the nature and goals of the collaboration and provides detailed information about the rights and responsibilities of each partner, as well as any financial agreements and processes to be followed in the event that one or more parties wishes to end the association.
- Develop clear and regular procedures for communication, which include opportunities for both formal interaction and social gatherings.

Strategies for Addressing Broader Cultural Issues that Affect the Development of Long-Term Museum-community Partnerships

- Know the audience with whom you are working. Be aware of differences that exist within a cultural group, and take their needs and wants into account when designing exhibits and programs.
- Develop a key group of individuals who are part of the target community to serve as ongoing advisers.
- Engage members of the target audience in program planning and development.
- Provide diversity training to museum paid and volunteer staff .
- Diversify museum staff so everyone feels at home in the museum.
- Be cognizant of significant barriers to visiting the museum.
- When appropriate, consider taking programs out to the community.

Strategies for Attaining Financial Sustainability

- Consider the financial sustainability of a museum–community partnership project early in the process.
- Be aware that grant funding may be available for museum–CBO collaborations, but that such support may only finance the start-up phase of a program.
- Explore many options for ongoing support, including city, state, and federal government programs, as well as charitable foundations, corporations, and individuals.
- Consider charging for services, renting out space, and building program costs into the museum’s operating budget or annual giving program.
- Partner with schools, universities, nongovernment agencies, and other organizations to write grant proposals and raise funds.
- Develop contacts with corporations, celebrities, and wealthy individuals; personal relationships can lead to ongoing financial support for a worthy program.
- Think creatively about unusual sources of funding that may be interested in your programs, and explore donor lists from other programs and institutions.

Strategies for Converting Subsidized Program Participants into Museum Visitors

- Start slowly by developing neighborhood programs, which gradually draw new guests to the museum. Building trust in the community is essential for increasing museum patronage.
- Offer free or low-cost coupons and passes to bring first-time visitors into the museum. Various models for such passes may encourage multiple or group visits.
- Once inside the museum, nontraditional visitors generally need to feel a sense of personal connection to the exhibits and staff. Staff should reflect the diversity of the community. Exhibit materials should be vibrant and diverse, with content relevant to the community.
- The facility should be easy to navigate. The entrance should be visible, and the floor plan clear and inviting.

- Content should be explained in the languages that are prevalent, or there should be staff members or volunteers who have the appropriate language skills.
- Volunteers and staff in the museum need to feel comfortable hosting a diverse group of visitors. Front-line staff should be prepared to welcome new guests to the museum and to answer their questions.

Recommendations

Make notes and publications that resulted from conferences available soon after they take place.

Bridges Sources

Borun, M., Garelik, K., & Kelly, B. M. (2011). *Museum-community partnerships: Lessons learned from the Bridges Conference*. Philadelphia, PA: The Franklin Institute.

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City Skies

Grant: National Aeronautics and Space Administration (NASA)

Dates: 2012–Present

Partners: The Franklin Institute (TFI) and numerous CBO's including Asian-Americans United, Housing Authority of the City of Camden, Frankford Group Ministries, Indo-Chinese American Council, Ivy Leaf School, Imani Education Circle Charter School, LEAP Academy Charter School, Norris Square Neighborhood Project, African Episcopal Church of St. Thomas, West Philadelphia Partnership, Youth Service, Inc.

Main goal: Point out that the night sky is available to everyone, everywhere, without special equipment.

Activities: Professional development for educators of community-based organizations (CBOs) and middle schools, who then conduct workshops for families.

Audiences: Members of the local community.

Number of people served: 72 CBO Presenters across 16 CBOs and 13 middle school teachers across 9 schools have been trained, as of the writing of this review. Since 2012, trained CBO Presenters have conducted approximately 70 workshops for audiences that range from 10 to 50 people at each workshop. Approximately another 700 people have been served by a Traveling Science Show (TSS) that was developed by TSS and City Skies staff and presented by trained educators.

Lessons Learned

Create activities that are fun and educational and that families can do together.

Create activities on topics participants can relate to. Participants appreciated having exposure to something new that at the same time relates to their everyday life experiences, Not only suburbanites or people who live in rural areas can look up at the sky, but urban dwellers can as well.

Create activities that can be incorporated into other programming already being done by a CBO. Provide CBOs with continuous support. CBO staff appreciated the ability to email TFI staff about questions and report on how activities went.

Recommendations

- **To improve program delivery:** While CBOs prepare and receive training to conduct workshops, they do not necessarily follow through on offering them to their audiences. Determine what the obstacles are and find ways to motivate CBOs to offer the activities.
- **To improve training:** Provide CBO staff with enough training so they feel comfortable facilitating the activities on their own. CBO staff should, in turn, offer program participants “more supervised practice” to increase their feelings of competence in doing the activities.
- **To improve attendance:** Publicize programs well, often, and with plenty of time for target audiences to plan on attending; find appropriate venues; address concerns for safety at night by offering free transportation to venues; determine what times are convenient for target audiences; offer incentives to attend; leverage family relationships by making the activities open to families’ friends and neighbors.
- **To extend learning:** Provide additional resources for facilitators and audiences so they can do activities at home, including apps and links to websites, as well as information on where to get binoculars, flashlights, and other materials; also make workshop presentations available online and share “best practices” for similar programs that have been successful.

City Skies Sources

The Franklin Institute. (2012, November). *City Skies Introductory Workshop: Telescope Making*. Unpublished evaluation report. Philadelphia, PA.

The Franklin Institute. (2013, January). *City Skies Sunspotter Workshop*. Unpublished evaluation report. Philadelphia, PA.

The Franklin Institute. (2013, March). *City Skies Astronomy Night Preparation Workshop*. Unpublished evaluation report. Philadelphia, PA.

The Franklin Institute. (2013, April). *City Skies Introductory Workshop (Cohorts 1 & 2): Telescope Making*. Unpublished evaluation report. Philadelphia, PA.

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The Franklin Institute. (2013, September). *City Skies Fall Sky Orientation*. Unpublished evaluation report. Philadelphia, PA.

Community Ambassadors in Science Exploration (CASE)

Grant: National Science Foundation

Dates: 2003-2009

Partners: Philadelphia-Camden Informal Science Education Collaborative (PISEC)—The Academy of Natural Sciences, The Franklin Institute (TFI), The Philadelphia Zoo, New Jersey Academy for Aquatic Sciences, and eight local community-based organizations: Center for Literacy, Falomi Club/Campfire, Indo-Chinese American Council, Imani Education Circle Charter School, LEAP Academy Charter School, Norris Square Neighborhood Project, African Episcopal Church of St. Thomas, Frankford Group Ministry

Main goal: Recruit and train a corps of “Science Ambassadors”—local teens and adults to provide hands-on science programs for families at their community sites in the languages they speak.

Activities: Professional development sessions to train the Science Ambassadors, who then led four types of science inquiry workshops using curricula developed by the museums: (1) community-based organization (CBO) workshops, (2) museum workshops, (3) career events, and (4) special workshops.

Audiences: Teens and adults from underserved communities; families of diverse ages and backgrounds.

Number of people served: 144 “Science Ambassadors” reached approximately 12,000 people.

Lessons Learned

Publicize events through various methods of communication. At first, families who attended a CBO Workshop were more likely to hear about it through the CBO or a flyer. Families who attended a Museum Workshop were most likely to hear about it through a personal invitation. Over time, families heard about CASE events through the CASE website, emails, and letters sent by the CBOs more than via any other sources of information.

Present a variety of topics. Families indicated that they enjoyed the workshop topics, which numbered 38 across the five years of the program. Children had the opportunity to explore

science topics that are not accessible in urban neighborhoods. As CASE evolved, Science Ambassadors recommended including more topics that related to everyday life, such as the ozone layer, alternative energy, recycling, pollution, community gardens, and kitchen chemistry.

Removing personal barriers increased participation. CASE eliminated many barriers that would prevent underserved families from attending, including cost (by offering free admission), time conflicts (by conducting workshops on Saturdays), large family size (by offering extra passes to museums), lack of knowledge about science (by creating a welcoming environment and offering workshops on family-friendly topics), as well as language barriers (by conducting workshops in the languages they speak).

Facilitate easy access to museums. Free admission to museums was another benefit of CASE for Ambassadors and participants alike. Given that many participants had large families, Ambassadors suggested that more passes be available to accommodate additional family members; passes available through the CBOs should also be better advertised.

Create activities that are fun and educational and that families can do together. Year after year, the main reasons families indicated for attending CASE events were to have fun, do something as a family, learn about science, and support their children's schooling.

Participants appreciate audience diversity. CASE served a very diverse audience, which gave CASE families the opportunity to interact with people of different cultures and backgrounds, and to see other people's children excited about science.

Family programming should offer a multi-generational experience. One goal of the workshops was to facilitate family interaction; once it was clearly communicated that parent involvement was required, with adults and children having roles in the activities, this goal was achieved. Indeed, participants said they were looking for ways to spend "quality family time," and families that were heavily involved in CASE said they especially appreciated the opportunity to focus on science, as well as to connect with one another.

Hands-on experiences are an extremely popular feature. At the outset of CASE, there was some variability across workshops with regard to the overall format, in particular, the relative time allocated to doing interactive activities and discussions or lectures. Participant and Ambassador feedback revealed that the number of hands-on activities and materials should be increased, in particular at Career Events and Special Workshops. Over time, workshops became very interactive; highly engaged families noted that they enjoyed being able to touch/feel/do/make: "It's not just someone teaching or talking at you."

Provide ways to continue learning at home. Participants enjoyed the ability to continue doing science together after CASE events were over by using the at-home activities they were provided, as well as trying the ideas that were shared with them.

Take the time to understand the experiences of highly involved participants. As CASE continued, an effort was made to determine the impact of the program; of particular interest was the perspective of families who attended five or more events per year. Program staff learned what it meant to be a “CASE family,” which helped staff to understand how CASE played a role in family science learning and the benefits of sustained involvement in the program.

Train workshop facilitators to conduct workshops on their own. Ambassadors felt the training they received prepared them to organize a workshop, as well as gave them the skills and knowledge to run the workshops confidently. CASE staff was perceived as doing a good job of explaining concepts and taking the time to discuss past workshops to identify tips and strategies that could be applied in future workshops. Later, training included opportunities to observe others’ workshops and then meet to reflect on lessons learned.

Teams of facilitators that include adults and teens work well. Specifically, adult Ambassadors engaged parents, while teenage Ambassadors acted as a bridge between children and adults. However, team dynamics became strained when high-school-age Ambassadors were not able to be present at workshops that conflicted with their schedules, and older Ambassadors questioned their commitment to the program. Ambassadors found it challenging to conduct workshops on their own.

Provide facilitators with ongoing support. Ambassadors reported that CASE staff was approachable, flexible, supportive, and responsive, with museums following up and making themselves available to answer questions and solve problems promptly. Evaluation revealed that the strongest leadership came from those CBOs that had good support from museums.

Maintain flexibility in program implementation. Workshops could be adapted to audience needs, interest, and learning styles. Ambassadors did not necessarily stick to a script; moreover, they had the freedom to show initiative and make changes as the situation warranted.

Regular communication goes a long way to making the collaboration successful. Evaluators noted that strong partnerships between museums and CBOs were built on good communication.

Provide skills that build individual and community capacity. Ambassadors received in-depth training to present science workshops to families in their communities. In this manner,

Ambassadors gained personal and professional skills, as well as experience solving logistical and financial problems, and negotiating relationships with other Ambassadors. CASE gave Ambassadors the opportunity to feel useful in, and be recognized by, the community, and many families reported that having a community member lead the workshops made the experience more interesting for them.

Help facilitators understand the time commitment involved. In particular, Ambassadors found the trainings to be extremely time-consuming. They had to find ways to fit the workshops into their already busy schedules. The unexpected time commitment required to be an Ambassador led to some attrition in the program.

There can be variability in the confidence and skills of incoming facilitators. In the early years of CASE, younger Ambassadors were observed to speak a little softly and generally appeared to be less confident than older Ambassadors. Not all Ambassadors remembered to repeat workshop participants' questions and answers, so there were times when information was missed. Furthermore, participants were not consistently and explicitly instructed to participate as a family; thus, in more than one workshop, the adults sat away from the children, thus limiting the amount of family interaction that could take place.

Monetary incentives can result in mixed reactions. CASE instituted a bonus pay system for Ambassadors upon completion of their first year as an incentive to continue participation. Younger Ambassadors saw the stipend as a benefit, while older Ambassadors felt it was too low.

Continually seek and respond to feedback. CASE was evaluated every year, and the feedback obtained helped to shape the program and support the accomplishment of CASE goals. The Ambassadors' perspective was especially useful for making improvements to Science Ambassador training more concise and streamlined, workshop materials more hands on, family focused, and appropriate for the wide variance in ages and levels of education, and workshop logistics more efficient.

Recruitment and sustained participation can be a challenge. Ambassadors found it frustrating to have workshops scheduled, only to have low attendance or none at all. Not only had time been spent preparing, but food and materials had already been purchased for the event. Over time, CASE sites developed a number of strategies to encourage participation, including preregistering participants, which included asking them to provide their name and contact information so site staff could personally follow up, as well as asking them to pay a small fee to attend, which further increased commitment to attend; making personal phone calls to

remind participants of an upcoming event; and involving repeat participants as facilitators, recruiters, or mentors.

Logistical issues can get in the way of effective program delivery. In the early years of CASE, there was a lot of variability in the ways CBOs coordinated workshop schedules with Ambassadors and CASE staff, which led to occasional confusion and miscommunication; scheduling efforts were also hampered by the lack of a regular location for events for some CBOs and the busy lives of Ambassadors who had other commitments. Other issues included that venues were sometimes too small and workshops became crowded; workshops took place during other CBO events; language barriers among the audience meant having to stop and translate; there was insufficient adult supervision to manage children’s behavior; and paychecks were not sent in a timely manner.

Recommendations

- **To improve attendance:** Ambassadors suggested eliminating the sign-up requirement for attending a workshop, offering fieldtrips, giving parents recognition or an incentive for participation such as a badge or a free trip, and offering refreshments. To engage parents in particular, Ambassadors proposed a social event.
- **To improve training:** Ambassadors thought that video-recording new Ambassadors conducting a workshop would be useful for offering them ideas on ways to improve their communication and public presentation skills. They also suggested offering team-building sessions, including support for relationship challenges in collaborating with younger or older Ambassadors; increasing awareness of science, technology, engineering, and mathematics (STEM) careers; and creating an online blog that will help Ambassadors share ideas for workshops.
- **To improve workshops:** Ambassadors suggested decreasing the number of participants at each workshop, allocating more time for the activities, providing better spaces and food, and incorporating videos into the workshops.
- **To address absences among Ambassadors:** Ambassadors felt that CASE should maintain a “network” of substitute ambassadors who could be called upon to help conduct workshops that have already been planned.
- **To extend the Ambassador experience:** Ambassadors thought that once they have completed the program, younger Ambassadors especially should be given opportunities for internships with the museum partners; a scholarship or reward for younger Ambassadors to

pursue science education in college or a career in science was also suggested. The hope was also expressed for expanding the program locally and nationally to include more community-based sites and museums.

- **Next steps:** Develop the identity of CASE that is separate from the CBOs where they are held. Not all families realized they were a “CASE family” or that CASE was an ongoing program. In addition, not all participants came to events as part of a family; observations also revealed that Ambassadors did not give consistent introductions or descriptions of CASE to participants. The lack of differentiation between general CBO programming and CASE events further highlighted the need for CASE to be more consistently and clearly branded and to communicate the unique value and benefits of being a “CASE family”.

Both museums and CBOs should encourage community building so that CASE families can become better acquainted with one another. It was noted that CASE families did not always know they lived in the same community as other CASE families. One suggestion was to host a “CASE family” reunion; another was to make CASE t-shirts for every participant to increase the sense that they were part of something bigger.

CASE Sources

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Communities of Learning for Urban Environments and Science (CLUES)

Grant: National Science Foundation and Institute of Museum and Library Services

Dates: 2009-2013

Partners: Philadelphia-Camden Informal Science Education Collaborative (PISEC) and ten local community-based organizations: Congreso de Latinos Unidos, Falomi Club/Camp Fire USA, Folk Arts-Cultural Treasures Charter School, Indo-Chinese American Council, Imani Education Circle Charter School, LEAP Academy Charter School, Norris Square Neighborhood Project, African Episcopal Church of St. Thomas, Puerto Rican Unity for Progress, Youth Service, Inc.

Main goal: Create a new model of family learning and professional development for members of underserved communities by building the capacity for science education within community organizations.

Activities: Museums train community members to run science workshops and plan events through an intensive Apprentice program. The Apprentices, in turn, train part-time community-based organization (CBO) Presenters to become workshop leaders. Apprentices and Presenters are involved in family programming, including workshops and family events at the museums, local outdoor activities and community workshops, and take-home activities.

Audiences: Community members and local underserved families.

Number of people served: 17,000 individuals.

Lessons Learned

Create activities that are fun and educational and that families can do together.

Families said CLUES provided them with access to events that are fun, educational, family-oriented, and supportive of their children's schooling. Other reasons families gave for attending CLUES events were to have fun, to learn science, because events are free, because someone recommended it, and because they had enjoyed a previous CLUES or PISEC event. CLUES also gave parents opportunities to interact with their children in a new way such as the Sleepover at the Aquarium and Astronomy Night.

Present topics to which audiences can relate. CLUES families enjoyed exploring environmental issues affecting their neighborhoods. This audience was found to be more concerned about, and involved in, global warming than the national average; they saw that low-income families are disproportionately affected by environmental catastrophes, and they wanted help.

Facilitate easy access to museums. In addition to enjoying free admission to CLUES events, families also enjoyed free admission to PISEC museums.

Provide ways to continue learning at home. CLUES offered take-home activities that were enjoyed by, and were useful to, families so they could continue to learn science together after workshops were over.

Sustained participation has many benefits. For example, the more CLUES events families attended, the more gains they made in their knowledge of environmental science.

Train facilitators to conduct workshops on their own. Apprentices overall felt the CLUES professional development sessions prepared them to run workshops, develop new workshops, support museum staff at events and workshops, and mentor others. Presenters said the training, coaching, and mentoring they received improved their public speaking, communication, and teaching skills. As CLUES evolved, Mentors conducted workshop practice sessions for Apprentices before presenting them to families; this allowed them to test ideas, reflect on what worked, and give one another feedback and share resources to include in their lessons.

Provide skills that build individual capacity. In CLUES, Apprentices had the opportunity to gain leadership skills, as well as to hone their presentation and communication skills. They also had the opportunity to attend an Association of Science-Technology Centers (ASTC) conference, at which they networked and attended topical sessions.

Provide ongoing support. CBO liaisons, Apprentices, and Presenters reported that CLUES staff was very responsive, answering questions and concerns when needed and always ready to provide problem-solving support. At the same time, Apprentice feedback indicated there was variation among museums in terms of the amount of independence and hands-on support they gave Apprentices.

Diversity of participants brings fresh perspectives. Museums appreciated the diversity in ethnicity, language, and educational background that CBOs and Apprentices brought to

CLUES. On a practical level, Apprentices also provided an extra set of hands and budgetary relief to museums.

There can be variability in the skills of incoming facilitators. Apprentices arrived at museums with different knowledge, skills, and abilities. Moreover, Apprentices did not have the same job skills or technical background as did other museum staff. Thus, museums had to spend time “bringing them up to speed.”

Continually seek and respond to feedback. CLUES was continually evaluated and the feedback obtained was used to make changes to various aspects of the program. For example, the Apprentices’ perspective informed decisions to modify Apprentice training and communication. Changes to the program were then periodically reassessed to ensure they were having the intended effects. Of note, evaluation efforts were sensitive to the large percentage of English Language Learners, modifying survey language to be appropriate for each group.

Maintain flexibility in program design and implementation. As CLUES evolved, learning goals and outcomes for families were modified to better align with workshop objectives. CLUES was flexible in redesigning program elements to enhance their effectiveness and optimize outcomes for families, Apprentices, Presenters, CBOs, and museum partners. For example, after the program had begun, it was decided that the Year One Apprentice cohort should stay on for a second year to further their professional development so they would be competitive candidates for professional ISE positions; this resulted in a revision of the professional development curriculum.

Take the time to understand the characteristics that create successful facilitators. After the first couple of years of CLUES, museums and CBOs came to have a much clearer idea of the types of candidates who are best suited to benefit from, as well as to contribute substantially to, the CLUES program. The Year Three Apprentice cohort was described being a notably mature and enthusiastic group. The candidates with these characteristics had positive effects on other Apprentices and Presenters, CBOs, and families.

Logistical challenges can get in the way of effective program delivery. There was a lot of variability among CBOs in the methods they used and the amount of effort they put into communicating with and helping Apprentices to get workshops scheduled and publicized. CBO liaisons did not realize the large time commitment needed. Apprentices had a difficult time attending formal professional development sessions and fulfilling their museum responsibilities due to busy schedules; museums found it challenging to find time to train and mentor

Apprentices. There were also issues with communication between CBOs, museums, and Apprentices about workshop coordination and wide age ranges within audiences.

Recruiting families and sustaining participation can be a persistent challenge.

Family recruitment was an ongoing issue with CLUES, especially at some of the CBOs and the smaller events. The primary challenge was attracting new families to get them to their first event. Some successful strategies included having flyers to give out ahead of time, asking people to call ahead to find out who was coming, and offering refreshments and door prizes for people who attended. In addition, CLUES partner meetings began to include cross-CBO brainstorming sessions on recruiting families to CLUES events, with the goal of coming up with a set of best practices and principles for recruitment.

Partner with organizations that share the similar goals and have a desire to collaborate in meaningful ways to accomplish these goals. Museums noted the importance of making sure that stakeholder agendas are compatible and that all involved are active participants in the collaboration. At the same time, they indicated the importance of devoting adequate staff time to managing the collaboration, including assigning a person who has the respect of all partners and can manage the collaboration. Museums said they appreciated the collaborative relationship they had with CBOs in CLUES, and felt it was founded on mutual respect and a common vision.

Establish roles and expectations early on. In the first couple of years of the program, CLUES worked to clarify, in writing, the expectations of all CLUES stakeholders, including roles and responsibilities of Apprentices and museum staff in developing CBO workshops, and of Apprentices and CBO liaisons in scheduling and setting up workshops, publicizing events, and recruiting families. CLUES also made an effort to establish explicit structure, deadlines, and workplace policies including performance evaluation for Apprentices to help them understand what was expected of them.

Regular communication goes a long way to making the collaboration successful. CBOs said they appreciated the opportunity to meet face-to-face with museum staff once a month to discuss progress and share resources and strategies; CBOs also found these meetings valuable for networking and learning what other CBOs were doing. CBOs noted that they also communicated with museum staff via weekly emails and a website. As CLUES evolved, a weekly reporting system was instituted to improve communication between Apprentices, CBOs, and museums.

A strong structure helps to weather difficult times. For example, staff turnover occurred at both the CLUES museums and CBOs. While replacements did not always get the information they needed to pick up where their predecessor left off, staff changes were weathered because there was a stable structure and a strong partnership in place. At the same time, the recommendation was made to prepare for attrition, and to prevent loss of institutional memory by keeping a logbook of important CLUES minutes, schedules, and programs.

Recommendations

- **To increase participation:** Offer refreshments, institute a loyalty program to encourage families to attend multiple events. Have each CBO set up and share their family database, increase advertising of workshops and CLUES in general, and establish reminder phone calls for those who have preregistered.
- **Other specific ideas that were tried at some CBOs:** Tie workshops to existing activities that CBO members already attend; have workshops be even more hands on with more opportunities to create something tangible; prominently post photographs of children and families enjoying themselves at workshops to draw others in; vary the workshops so that they are related, but not identical; make connections with other community organizations such as child care centers that serve families.
- **To improve training:** Apprentices should have additional professional development in the area of training, coaching, and mentoring Presenters, including systematic observation and feedback. Presenters requested more training and mentoring by and with Apprentices, as well as additional networking events to meet Apprentices and Presenters from other CBOs, and to share workshop and recruitment ideas with one another. Additionally, new Apprentices should observe a mock workshop by current Apprentices to get presentation tips and strategies.
- **Next steps:** keep building the identity of CLUES in the community.

CLUES Sources

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Families Exploring Science Together (FEST)

Grant: National Science Foundation

Dates: 1999-2003

Partners: Philadelphia-Camden Informal Science Education Collaborative (PISEC)—The Academy of Natural Sciences, The Franklin Institute (TFI), The Philadelphia Zoo, New Jersey Academy for Aquatic Sciences—and eleven local community-based organizations: Asian-Americans United, Housing Authority of the City of Camden, Frankford Group Ministries, Indo-Chinese American Council, Ivy Leaf School, Imani Education Circle Charter School, LEAP Academy Charter School, Norris Square Neighborhood Project, African Episcopal Church of St. Thomas, West Philadelphia Partnership, Youth Service, Inc.

Main goal: Provide science activities designed to stimulate, encourage, and enrich families' interest, involvement, and learning in science.

Activities: Four types of programs that range from introductory museum experiences to in-depth science inquiry activities: (1) orientations, (2) family science events, (3) family workshops, and (4) special projects.

Audiences: Families from culturally diverse neighborhoods in the Philadelphia/Camden region.

Number of people served: 11,900 individuals.

Lessons Learned

A variety of activities and venues ensures that there is something for everyone.

With FEST, families found a range of experiences, which provided varying levels of intensity that were useful to them to meet their family learning needs. While FEST was designed to move families along a continuum of activity types toward increasing interaction and participation, families preferred to pick and choose among the programming options.

Publicize events through diverse methods of communication. Information about FEST events was shared via announcements on community-based organization (CBO) bulletin boards, flyers sent to the community partners by the museums, publications that originated directly from the community partners, and the FEST newsletter, a major vehicle for informing FEST

members about the Family Workshops and Special Projects. As FEST evolved, families were encouraged to invite their neighbors, friends, and extended family so that word-of-mouth also worked to reach new audiences.

Create a welcoming environment. FEST events were offered at no cost to participants; when registering, participants were able to self-define “family”; at the events, staff were welcoming and well-informed; and participants were encouraged to bring others. This increased opportunities for families to meet other like-minded families, and ultimately extended the reach of the program.

Family programming should offer a multi-generational experience. FEST participants were looking for ways to spend “quality family time” doing activities together, and FEST delivered by offering something for every age; each event offered opportunities for different generations to connect with one another. Parent or caregiver involvement was required; if parents felt intimidated, activities were structured such that their children were the conduits for getting them involved.

Underserved audiences are not homogenous. The Museums learned that “nontraditional” audiences had varied motivations for attending FEST events. For example, frequent participants were found to have strong predispositions for science, museums, and family learning experiences, and were strong advocates for their children’s education, continually seeking to expose their children to unique learning opportunities; they were more interested in the smaller Family Workshops than the larger Family Science Events.

Take the time to understand the experiences of highly involved participants. As FEST continued, an effort was made to get to know more about the audiences it served; of particular interest was the perspective of frequent participants in order to understand how to recruit, stimulate, and engage these types of families.

The educational aspect of an experience is highly valued. Frequent participants in particular appreciated that events were educational for them, as well for as their children. For example, the Family Workshops provided an enhanced visit to the museum that participants could not experience otherwise—one that they felt was more educational than a typical, independent visit to the same venue.

Hands-on experiences are an extremely popular feature. For frequent participants especially, the hands-on aspect of FEST events was closely linked to their perceived educational value and had lasting effects; participants recalled them long after they had taken part in those experiences.

Activities that are perceived as fun encourage repeat participation. Frequent participants said they found the events enjoyable, which is what motivated them to attend a large number of events.

Repeat participation can increase identity with a program. Frequent participants of FEST were much more likely to identify themselves as a FEST member than were moderate and infrequent participants. Presumably, frequent exposure made them aware that the events were not isolated but part of a larger program. Their awareness of FEST as a larger program may have, in turn, led to higher attendance rates.

Partner with organizations that share the similar goals and have a desire to collaborate in meaningful ways to accomplish these goals. Partners must have a clear understanding of what each can offer in terms of resources and support, and identify ways to build on each other's strengths. In FEST, the museums collaborated with CBOs that already understood what might motivate specific audiences and had an infrastructure for involving them in their activities; museums capitalized on pre-existing forms of communication or events to reach new audiences.

Establish roles and expectations early on. Partnerships succeed when they are based on well-defined roles and every partner understands how each organization will share responsibility. It is also important to foster ownership by including community members in the creation of programs from the outset.

Spend time understanding the needs of the community-based organizations. The CBOs felt that the museums made an effort to listen to and understand their needs, and made a long-term commitment to work with them before developing programs. As a result, CBOs felt respected and that they could rely on the museums to follow through on their promises.

Foster personal, face-to-face interaction, especially in the beginning of the relationship. A community liaison and local project committee at each of the CBOs helped museums understand the diverse needs of the audiences they hoped to serve. By taking turns hosting monthly meetings at their sites, all partners could see the context in which their colleagues worked. Monthly meetings also helped institutions view the partnerships in terms of the individuals involved, which was essential to preserving the relationships between the organizations and getting through difficulties such as staff turnover.

Regular communication goes a long way toward making the collaboration successful. Proactively setting up ongoing communication channels and nurturing personal relationships via monthly meetings, as well as phone calls in between meetings, were essential

as partners continued to work toward the full potential of FEST. Communication contributed to a sense of commitment on the part of the institutions and their staff. The CBOs felt supported by the continued presence and availability of museum staff.

Partners should be open about discussing successes and failures. FEST partners were willing to talk with and listen to one another. Sharing information and knowledge, as well as discussing problems openly fostered trust and strengthened the partnership, resulting in sustained collaboration.

Recruiting families and sustaining participation can be a persistent challenge. Moderate and infrequent FEST participants reported that getting to FEST events was hindered by time conflicts and lack of transportation, not knowing about events, or thinking an invitation was needed to attend events. Even if families registered, they did not always attend. This was frustrating for frequent participants who mentioned trying to sign up for an event, only to be told that it was full and there was no waiting list, and knowing—from experience—that on the day of the event, there would be “no shows” who had prevented them from participating.

Lack of “institutional awareness” can get in the way of program implementation. Some museum staff felt as if they were the only ones in their organization who really understood why FEST was important and how it met organizational goals; they pointed out that the Principal Investigators “operate at very different levels at the museums; they have different access and weight.” PI status thus influenced the ways in which their organizations viewed the FEST agenda, devoted resources to FEST, and approved various aspects of the program. This was frustrating for these individuals and, on a broad level, hindered the decision-making process.

To be truly successful in the long term, ongoing commitment and support is needed. A sustainable partnership depends on establishing appropriate formal mechanisms to manage and sustain the partnership, institutional memory and trust, and a culture of cooperation that will outlast the involvement of individuals. On the other hand, the short-term success of the partnership depends on the individuals within those organizations. As such, these individuals need material and organizational support to do their work and do it well; those who received those resources and support from their organizations were generally more active in the partnership than those who did not.

Recommendations

- **To improve attendance:** Provide transportation for families, vary the times of the events so that more families can attend, streamline the registration process, find a way to remind families to attend events for which they have preregistered, encourage more families to take advantage of the more intensive programming options such as Family Workshops and Special Projects.
- **To sustain participation:** Merely communicating about or advertising events is often not enough—there is a need to market the goals of the program as a whole. Creating a sense of identity with the program helps in this regard, since families are more attentive to information that is perceived to come from a known and trusted source and that is personally important to them.

FEST Sources

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Girls at the Center (GAC)

Grant: National Science Foundation

Dates: 1996-2001

Partners: The Franklin Institute (TFI) and Girl Scouts of the USA (GSUSA)

Main goal: Involve girls and their adult partners who are traditionally underrepresented in Girl Scouts and museums in guided and unguided hands-on, inquiry-based activities to promote, encourage, and support girls' math and science learning.

Activities: (1) Sneak Preview Workshops held in local communities to recruit girls and adults to participate in GAC; (2) themed Discovery Days at museums; (3) Family ScienceFest, a culminating event to bring all GAC participants and their families together; (4) "GAC Packs," science activities for girls to do with their partners between events.

Audiences: Girl Scout girls up to 17 years old and their families; Girl Scout leaders.

Number of people served: 3,252 girls and 2,511 adults; 5,763 individuals total.

Lessons Learned

Get to know your audience. One of the most important findings that emerged from GAC was recognizing that not all communities and audiences could be engaged the same way by the same program. GAC found that a comprehensive effort is needed to find out about the interests, needs, and cultural practices of individual groups and use that information to inform development and implementation decisions for a community-based science education program.

Publicize events through different methods of communication. GAC sites developed a number of methods to get the word out about events, including the following:

- Advertising in Girl Scout council program information and at other Girl Scout events;
- Advertising through flyers, community newspapers, and radio public service announcements;
- Promoting the program at local events, such as back-to-school family nights;
- Promoting the program to science and women's organizations; and

- Developing programmatic and promotional pieces that can travel with other institutional outreach efforts, such as traveling vans, shows, and trunks.

Present science in an accessible way. Girls enjoyed doing “fun science” that emphasized science as a process in which girls asked their own questions and found the answers. They enjoyed doing hands-on activities on topics that connect science to everyday life. Active facilitation during the events by site staff helped to (1) define and advocate specific roles for girls and adults during the events, and (2) offer encouragement and guidance for adults to engage in activities and interact with girls. Sending out GAC Packs ahead of events helped adults prepare and feel competent when they arrived.

Make the goals of the program explicit to participants. In order to ensure that adults would get involved with working with the girls, it was important to advertise events as a girl and adult event, requiring that girls participate with an adult, and enforce that requirement by having girls and adults register together in advance. In addition, it was important to incorporate activities that were not only interesting and fun for adults, but which also specified roles and expectations for both girls and their adult partners to work collaboratively; during the activities. It was also helpful for site facilitators to model good techniques for supporting each partner, reinforce the importance of the adult–girl relationship, and create a level playing field for adults and girls.

Maintain flexibility in program design and implementation. GAC programs were designed to be flexible so that they could be adapted to include new topics or to reach new audiences, such as specific age groups or communities in other geographic areas. Programs could also be incorporated into other formats such as camps or afterschool programs.

Provide ways to continue learning at home. GAC Packs could be used as extension activities at home.

Help sites understand the time and costs involved. GAC sites found the time and costs involved in planning, implementing, and funding the program to be greater than expected; for example, to ensure repeat participation, some sites made personal calls to preregistered families, which was very time consuming. Similarly, sites had not anticipated the cost to cover materials, food, additional facilitators, facilities, transportation, etc., and ultimately had to identify strategies to address those issues, including:

- Internal institutional funds were used to buy supplies, pay location fees, and pay for staff time. The use of organizational funds reflected a strong commitment by that organization to support the program;
- Charge a small fee for events, but provide financial assistance upon request. The fee also helped participants stay committed to attending;
- In-kind donations. Volunteers from local organizations gave their time to help out with administrative or program tasks or contributed their expertise; food and other materials; and
- Donations from local businesses or foundations to help defray costs, such as materials and supplies, and general copying and mailing costs.

Think creatively about new sources of funding. GAC sites also made efforts to obtain financial support, as follows:

- Approached local businesses, organizations, and foundations that were interested in supporting efforts that serve the community;
- Identified specific aspects of an event that external funders could contribute to or sponsor, such as transportation, food, specific materials, or a site for an event. Some businesses or organizations ended up sponsoring a whole themed event that aligned with their organization's mission and interests; and
- Invited local media and potential funders to participate in events, and communicated the program goals and strengths to them at the events.

Recruitment and sustained participation can be a challenge. GAC sites developed a number of strategies to get girls and their adults involved in the program, including the following:

- Targeting a limited number of communities to pool resources more efficiently. Communities differ in terms of the types of programs and events that appeal to them, as well as the ways that are most effective for communicating and building interest and trust with them. By focusing on a few specific audiences, site staff successfully built long-term relationships, rather than spreading their efforts too thin by trying to serve many communities at once;
- Inviting community leaders to hear about the program and asking for their help in recruiting participants;

- Building collaborations with other community organizations, particularly those that already work with target communities, to tap into existing communication networks and build rapport with their audiences;
- Working closely with a personal contact who lives or works with the target community and serves as a trusted link between families and site staff at host institutions;
- Using short, hands-on activities to introduce programs to target audiences in their community, such as at a local mall, neighborhood school, or area community. This strategy serves to pique interest and increase comfort level in participating.
- Identifying event dates and times clearly with a message that “fits the audience” such as multilingual promotional pieces with emphasis on the family component and
- Providing incentives, such as food and transportation.

GAC sites also developed a number of strategies to encourage repeat participation, including the following:

- Advertising the program as a *series* of events right from the start, including distributing a calendar that reflects the entire series;
- Recognizing and celebrating repeat participation;
- Providing incentives to come back such as food, transportation, and small gifts;
- Establishing connections between home activities and Family Day themes;
- Providing interesting and fun activities that are part of a consistent program and promote enthusiasm for learning science; and
- Promoting new science programs for those interested in staying involved in science but needing a new way in which to do that.

Logistical issues can get in the way of effective program implementation. GAC sites reported challenges in scheduling events, recruiting and training volunteers, preparing materials, managing groups, and dealing with changes in staff. On a broader level, there were issues resulting from clashing individual personalities and styles, disparate visions of the program, conflicting schedules, and perceived one-sided commitment to the program.

Partner with organizations that share the similar goals and have a desire to collaborate in meaningful ways to accomplish these goals. In order to engage in a collaborative relationship, GAC partners and sites emphasized the need to understand each organization's mission and strengths and limitations, as well as to communicate clearly and honestly what each hopes to achieve by working together. In this manner, GAC directly served the goals of organizations it brought together.. In addition, the local museum or science center and Girl Scout council partnerships provided an opportunity to garner the expertise and resources of each partner. Other resulting partnerships: local schools, community centers, parks, clubs, churches, colleges and universities, service organizations, local businesses, gained more visibility in the general community.

To be successful in the long term, ongoing commitment and support is needed. In the short term, partners had to identify ways to successfully recruit and sustain participation in the program, as well as continuously provide host sites with ongoing training and support.

To sustain GAC, partners also had to make a concerted effort to establish and build a community infrastructure to support the initiative beyond one or two individuals or organizations, and to use multiple strategies to secure external funding including: in-kind donations, grants, donations from local businesses or organizations.

Recommendations

To ensure the sustainability of the program: Consider providing less direct financial support and other resources to host sites so they can build a strong local commitment to the program right from the start. This would also free up funds to provide more support to expansion sites over time, fostering a stronger national network and increasing the likelihood of sustaining the program long term.

GAC Source

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PNC Grow Up Great With Science

Grant: PNC Foundation

Dates: 2009-2011

Partners: The Franklin Institute (TFI) and five pre-schools: Children’s Village, North Philadelphia Head Start, Chester County Intermediate Head Start, Delaware County Intermediate Unit Head Start, and Delanco Head Start

Main goal: Collaborate with early childhood education providers to improve the quality of science programming for young children from low-to-middle-income families.

Activities: Provide teachers with (1) professional development; (2) classroom materials; (3) classroom visits, including presentations and individual mentoring; and (4) a field trip to TFI. In addition, TFI invited families to ten free “Community Nights” at the museum.

Audiences: Early education teachers and their students.

Number of people served: 25 teachers in 25 classrooms in 25 sites.

Lessons Learned

Provide specific learning and facilitation strategies that teachers can implement in their classrooms right away. Some of these strategies included introducing new toys and equipment, using inquiry-based techniques such as asking open-ended questions, and having students draw pictures and record what they are doing. Teachers perceived that these strategies would help students to think in new ways gain problem solving skills, and learn about new things they can do with materials.

Invite teachers to “become the student.” Teachers liked being able to explore, ask questions, and make observations, all of which helped them to retain information. Teachers also appreciated the participatory nature of the professional development training: hands-on experimentation allowed teachers to learn how to use equipment and materials, and gave them concrete ideas for how to teach a lesson.

Present science in an accessible way. Using common household objects to do science activities increased teachers’ comfort with teaching science.

Provide teachers with ongoing support. TFI instituted a mentoring program, and provided teachers with support via informal phone and email communication, a CD of preschool songs related to science themes, and the development of a Story Book Science program. In addition, TFI invited teachers to a preconference day for the Delaware Valley Association for the Education of Young Children, where information about the “Grow Up Great with Science” was shared.

Hands-on activities help young children observe and understand science concepts. The materials provided were valued for giving children new ways to explore science; teachers considered activities to be interesting and age-appropriate for students.

A variety of events and activities ensures that there is something for everyone. The opportunity to take a field trip was useful and enjoyable for both teachers and children. “Grow Up Great With Science” Community Nights were also popular with teachers because they encouraged parent involvement.

Recommendations

- **To improve training:** Teachers said the professional development felt like a “one shot” opportunity and expressed the desire for more or a series of training workshops. Some teachers felt they had limited science knowledge. Teachers also felt the need for additional skills—specifically, how to use the Internet to research science activities and how to identify community resources to support science learning.
- **To improve support for teachers:** Teachers expressed the desire for classroom visits so TFI staff could see how they were doing with the activities, one-on-one mentoring with specific feedback, more ideas for things to do with young children, and opportunities to communicate with museum staff . In addition, teachers requested additional materials and books to support science teaching, as well as extra supplies to make science kits for their colleagues.

Other recommendations to help teachers stay connected included providing them with ways to support one another through interest groups, blogs, e-newsletters, or social networking; inviting supervisors to participate in training, including special focus on how supervisors should evaluate science activities in the classroom and support teachers’ continued improvement; increasing parent engagement by providing more specific take-home activities.

Grow Up Great Sources

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Keystone Science Network (KSN)

Grant: National Science Foundation and Unisys Corporation

Dates: 199-2003

Partners: The Franklin Institute (TFI), the Commonwealth Department of Education, and 22 school districts in Eastern Pennsylvania

Main goal: Refine a model of science reform that could be scaled up in Pennsylvania and nationally.

Activities: Develop standards-based science kits that teachers are trained to use, and a website that provides teachers with background information on science kit topics, as well as ideas for extending and deepening kit activities.

Audiences: K-8 educators who teach science in the eastern half of Pennsylvania.

Number of people served: 185 elementary school teachers from 82 schools in 22 Eastern Pennsylvania school districts.

Lessons Learned

Invite teachers to “become the student.” Teachers saw firsthand the power and the complexity of the inquiry mode of learning by experiencing this technique as learners. The in-depth nature of the professional development via KSN summer institute and school-year colloquia allowed teachers to immerse themselves in this technique and thereby gain deep pedagogical knowledge of the inquiry process, as well as increased teachers’ comfort with, and knowledge of, new science content.

A website can be a useful resource. Teachers rated the KSN website highly as a resource. Pointing their peers to the website for additional information was a comfortable entry point for teachers who had been reluctant to assume a leadership position within KSN; emergent teacher leaders were confident their peers would find the website valuable.

Developing an online peer forum requires much thought. The part of the KSN website that was designed to elicit teachers’ reflections on their students’ learning, and share strategies as they learned to use the new curriculum materials in their classrooms, was underutilized. More thought and work was needed to conceptualize the forum.

Provide teachers with ongoing support. Web-based curriculum resources and intensive training provided by TFI, were strong supports to teachers. The *KSN Weekly* e-newsletter and Tips and Connections streamlined web usage for KSN teachers, helped them plan for instruction in their own classrooms, and helped them promote science instructional reform in their schools and districts. Teachers also appreciated KSN staff for their expertise and willingness to spend time discussing instructional practices like assessment strategies and ways to modify lessons to include inquiry elements.

Identify strategies to increase school participation. School districts were encouraged to adopt KSN kit-based curricula endorsed by the National Science Foundation in order to join the KSN. In doing so, TFI helped districts take a critical step toward standards-based science curriculum and instruction, even if not all district and school leaders followed through on their stated intention to supply classrooms with the science kits and networked technology.

In scaling up education reform, partners like TFI can play an important role. TFI brought needed expertise to KSN and was a major support in building capacity both at the individual teacher level and at the organizational level.

Recommendations

- Program developers need to consider how their professional development and online resources can work together to support teachers in establishing professional communities that facilitate their ongoing learning. In addition, programs should put students at the center professional development training to address teachers' consistent desire to improve and add new strategies to their practice for students' benefit.
- Program developers need to strengthen districts and schools directly by providing them with technical assistance so they can (1) develop and implement plans to increase their technology capacity; (2) work to align standards, curriculum, and assessment; and (3) coach administrators on what to look for in science classrooms as they observe teachers.

KSN Source

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LEAP into Science (LEAP)

Grant: National Science Foundation

Dates: 2007-2012

Partners: The Franklin Institute (TFI), the Free Library of Philadelphia, and in 2011-2012, ten additional sites, each consisting of a partnership between local institutions, for a total of 25 partners in the LEAP network.

Main goal: Promote science and literacy learning at local library branches, by inspiring exploration and questioning, as well as providing opportunities for children and families to think like scientists and investigate scientific phenomena with familiar materials and relevant children's literature.

Activities: Professional development training for workshop facilitators to conduct (1) afterschool workshops for children grades K-4 that integrate hands-on science explorations with children's literature, and (2) family workshops that encourage families to explore science and books together. Additional resources for the workshops included science bookmarks, exploration cards, recommended book lists, and materials for program training and evaluation.

Audiences: Library and other informal learning organization staff; children and families.

Number of people served: 20,208 children and 6,451 adults; 26,659 individuals total.

Lessons Learned

Training gives facilitators the ability to conduct activities on their own. LEAP staff indicated that the training and training resources helped them understand how to use the LEAP materials; they also appreciated additional advice such as suggestions for specific activities to use to get children started and ways to manage groups. It was found that when facilitators are trained by experts in their fields, they are more likely to feel confident in their ability to implement the program and might be more likely to use best practice strategies; non-expert trainers could lead to low confidence and lack of understanding of key teaching strategies among trainees, and eventually, a lack of motivation in facilitating future programs.

Invite workshop facilitators to “become the student.” TFI staff modeled activities and then gave LEAP program staff an opportunity to try doing the sessions themselves. LEAP staff

were very pleased to learn in a hands-on manner how to use the LEAP activities, because they were able to gain experience doing them and could troubleshoot any obstacles they might encounter.

Facilitators with high interest in and knowledge of science are more involved in the program. Thus, the program should capitalize on facilitators' motivation to participate. Specifically, LEAP training can be explicitly marketed as a way for staff to tap into their personal interest in science and to engage their children in science. When there is low interest and knowledge regarding science and scientific inquiry among program facilitators, there is a greater tendency to revert to known practices and activities that fall outside the original goals and intent of the program. Facilitators may also show less excitement in implementing the program, resulting in fewer workshops over time.

Provide skills that build individual capacity. Teen Leader Assistants got a chance to develop professional skills in helping with workshops; the program also offered “real life” teaching experiences to After School Leaders, who oversaw LEAP programming at libraries.

Workshop facilitators appreciate curriculum materials that are “tried and true.” LEAP expansion sites appreciated that curricula were well tested and came from an institution that is well respected. Indeed, these sites were provided with workshops and accompanying materials that had already been tried. The afterschool workshops generally lasted around 45 minutes, while the drop-in style family workshops lasted between one and two hours. LEAP staff also appreciated the “big picture” ideas, including scientific inquiry, interest-driven exploration and engagement, connections between science and prior experience, and connecting science and literacy.

Create building blocks of engagement. LEAP provided the 2011-2012 expansion sites with activities to build scientific processing skills. Once audiences gained those skills, the sites could go on to teach more complex concepts.

Create a welcoming environment. LEAP was a good way for the libraries to “market” themselves as a place to enjoy science activities, especially among teenage boys, a demographic whose attendance tends to drop off after having been to the library in their younger years.

Hands-on experiences are an extremely popular feature. LEAP staff dedicated the largest percentage of workshop time to the hands-on activities which helped children make connections between the book and every day science, as well as promoting observation, creative listening, thinking, predicting, collaborating, and problem-solving skills.

Logistical issues can get in the way of effective program delivery. In the first years of the program, librarians indicated that LEAP was not being integrated into the process typically used to plan and publicize library programming, which was affecting attendance at LEAP workshops. LEAP staff at the expansion sites indicated that they had insufficient staff and program materials.

Attendance can be a persistent challenge. In the afterschool workshops, children were observed to come and go. The family workshops did not have much success recruiting families. Families tend to run into the library to get what they need and then leave.

Conflicting agendas can get in the way of program implementation. Librarians indicated that many children go to the library to complete homework, and therefore perceived LEAP as a distraction.

It is important to get program staff on board. There was a lack of communication between The Office of Public Service Support at the Philadelphia Free Library and LEAP staff, which led to breakdowns in understanding what LEAP was about.

Continually seek and respond to feedback. TFI consistently gathered feedback about LEAP and was very responsive to problematic issues and suggested changes. To help librarians address recruiting and attendance issues TFI began offering them training along with LEAP staff.

Maintain flexibility in program design and implementation. LEAP staff understood that they had the freedom to make modifications to fit unique contexts. The flexible nature of the LEAP program thus lent itself to greater self-efficacy among facilitators who felt modifications would help move the program forward and improve its delivery.

Partner with organizations that share the similar goals and have a desire to collaborate in meaningful ways to accomplish these goals. In LEAP, there was respect and appreciation for what each partner brought to the program, i.e., science expertise from TFI and literacy expertise from the Free Library of Philadelphia. The goals of LEAP matched sites' existing institutional goals; thus, LEAP was perceived as a way to supplement existing programs—a way to think about doing something familiar in a new way.

Take the time to plan and communicate with partners. When partner sites do not invest time in shared collaboration and planning, there is less interest in implementing the program. Less communication results in partners having decreased understanding of one another's strengths and weaknesses.

Recommendations

- **To improve recruitment:** LEAP staff suggested using inexpensive incentives such as pencils, t-shirts, or the book that is highlighted in the workshop, to make LEAP seem fun and “not like school.”
- **To improve training:** Address concerns about specific activities. In addition, training should be customized to address the large variation in LEAP staff background and experience.
- **To support LEAP staff:** Provide ways for staff to ask questions and get feedback from one another, as well as from TFI, by setting up an online forum for idea and resource-sharing.

LEAP Sources

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National Science Partnership (NSP)

Grant: National Science Foundation

Dates: 1993-1996

Partners: The Franklin Institute (TFI) and Girl Scouts of the U.S.A.

Main goal: Establish partnerships between local Girl Scout councils and science museums around the country to promote science interest in girls, especially those from underrepresented populations. NSP provides an all-female environment for girls to work hands on with science materials and exposes them to basic scientific concepts and phenomena.

Activities: Train Girl Scout leaders to work with girls on patch or badge-related science kits, the contents of which correlate with Girl Scout program and badge work, supplementing leaders' and girls' knowledge about science without adding unrelated requirements.

Audiences: Girl Scout leaders and girls.

Number of people served: More than 11,500 leaders and more than 130,000 girls

Lessons Learned

Present science in an accessible way. Girls found NSP activities to be more fun than the science they experienced in school, where “all we do is read and take notes.” Moreover, the girls had an opportunity to earn badges once they completed an activity. The hands-on nature of the activities was enjoyable to both girls and adults, helping each to feel competent, especially for leaders who did not have background knowledge of science teaching.

Create a welcoming environment. For the girls participating in NSP, having peers who were “like me” was critically important. For the leaders, being around people who shared the same interests and were excited about science was a main influence in their path to increased participation in NSP. The “nonjudgmental nature” of the program gave these adults the opportunity to explore, make mistakes, and learn, which ultimately helped them to become “enthusiastic advocates and facilitators of girls’ science learning.”

Maintain flexibility in program design and implementation. NSP practices unite the various members, yet the program’s flexibility allows members to adapt resources and strategies to meet individual needs.

Training gives facilitators the ability to conduct activities on their own. TFI taught Girl Scout representatives and leaders how to use the NSP science kits showed them how to administer the program, conduct outreach efforts, and recruit and train leaders at their sites. Adults who became enthusiastic about NSP and participated in additional workshops were designated “NSP Trainers” who disseminated the kits and kit-based workshops to other leaders in their Girl Scout council. A video of a science kit in use also presented as part of the training was helpful in showing leaders how to conduct the activities.

Create building blocks of engagement. New leaders were recruited from past years’ workshop participants and Girl Scout staff and volunteers, thus “moving them from peripheral to active participants on an inbound trajectory towards core membership.” The benefit of this strategy was past participants’ ability to make suggestions and improvements to activities.

Older girls can serve as effective role models. In at least one site, older girls (Cadettes) led the activities for the younger girls; the Cadettes were enthusiastic and well prepared and the younger girls were “in awe” of them.

Logistical issues can get in the way of effective program implementation. In the second year of NSP, some partners had problems due to personnel changes, which meant having to redefine these partners’ responsibilities.

Partner with organizations that share the similar goals and have a desire to collaborate in meaningful ways to accomplish these goals. For a science center to most effectively address an entrenched national education issue, such as gender equity, it must develop a partnership with an organization having a national constituency and an established structure for the delivery of programs at the local level, or develop a national alliance of like-minded science center colleagues. NSP created a systemic partnership with the Girl Scouts, and cultivating alliances among science center partners and their local Girl Scout councils.

Conceiving a program as a community of practice (CoP) can ensure that it is more robust and all-encompassing than a simple series of STEM activities. In NSP the partners thoughtfully considered not only what girls will “do” in the program but also why they are doing it, and with whom they would meaningfully interact and participate.

Recommendations

- **To improve training:** While some leaders felt adequately prepared to use the science kits with their troops, a few said they would have liked more practice with the kits beforehand; leaders also wanted strategies for ways to get conversations going in the follow-up discussions to activities.
- **To develop similar programs:** Create multiple access points for engaging in the program you offer and continue to advise, mentor, and support participants after they leave the program.

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Parent Partners in School Science (PPSS)

Grant: National Science Foundation

Dates: 2001-2007

Partners: The Franklin Institute (TFI) and three Philadelphia elementary schools: Martha Washington Academics Plus, Olney Elementary, and R.B. Pollock Elementary

Main goal: Promote science teaching at the elementary level, cultivate home–school collaboration in support of students’ science learning, and document the role that a science museum can play in bridging the gap between home and school in an urban educational district.

Activities: Site Team Retreats and Professional Development Workshops for teachers; Parent Involvement Days, Legacy Projects, Discovery Days, and Exploration Cards for children and their families.

Audiences: K-4 elementary school teachers and their students and the students’ parents.

Number of people served: Approximately 1,600 individuals.

Lessons Learned

In terms of evaluation, the Ecologies of Parent Engagement (EPE) model¹ can be a useful way to understand parent engagement in urban elementary schools.

Specifically, EPE showed the ways in which PPSS successfully linked home and school in support of children’s science learning.

It is important to get school constituencies on board. TFI encouraged school buy-in and ownership of PPSS by providing teachers with resources and strategies for enhancing their science teaching. TFI conducted annual planning meetings for site team teachers, administrators, and parents, as well as annual Professional Development Workshops to enhance teachers’ understanding of developmentally appropriate science content and teaching strategies.

School cultures differ. TFI museum staff customized activities and events to fit the realities and needs of each school. The most successful events were those that built upon existing events within the partner schools.

¹ See McCreedy and Luke (2006) and Luke and McCreedy (2012) regarding this model.

Create programs that put parents and teachers on equal footing. PPSS offered parents and teachers ways to engage collaboratively in children’s science learning. For example, the Legacy Projects were spaces at school designed by teachers and parents that provided an alternative forum for parent–teacher conversations while involved in an activity. These forums helped to break down the traditional roles of parents and teachers and ultimately increased parents’ involvement in the school.

Create a welcoming environment. PPSS helped parents develop closer relationships with teachers and facilitated opportunities to connect with other like-minded parents, giving them a feeling of being part of a larger group. PPSS also provided free access to museums, including transportation to museum-based events and year-long family memberships, which led to an increased interest in visiting these settings.

Create activities that are fun and educational and that families can do together. Parents said PPSS was an educational, interesting, and worthwhile experience, as well as an opportunity for them to spend quality time working on activities as a family.

Hands-on experiences are an extremely popular feature. Parents described PPSS as “fun,” and they particularly enjoyed the hands-on aspect of the program activities.

Present science in an accessible way. PPSS was described as a program that “brought science to life” and “made connections between everyday life and science concepts,” thus helping children gain awareness that “science is all around us.” Program activities also helped parents feel competent to help their child do science and to do science themselves.

Create building blocks of engagement. For example, “Exploration Cards” were sent home by the teacher as “assignments” that required the student and an adult to complete the Card’s science activity using materials that are typically found around the home. Parents eventually became homework “facilitators,” rather than homework “checkers” or “supervisors.”

Sustained participation has many benefits. Parents who participated in four or more PPSS events perceived the program as having a significantly greater impact on them than did parents who participated in fewer than four events. Moreover, families understood the value of sustained participation when the overall goals of the program were made clear.

Community-based projects require multiple years and repeated efforts to demonstrate impacts. With the development of each program component and event over the five-year project period, TFI came to better understand effective ways of engaging parents,

encouraging science learning in the classroom and in the home, and building relationships among the students, teachers, parents, and community, including the museum.

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Partnerships for Achieving Careers in Technology and Science (PACTS)

Grant: National Science Foundation

Dates: 1993-Present

Partners: The Franklin Institute (TFI), West Park Cultural Center, United Community Clinic, Philadelphia Parks Alliance, Achievement through Community Service, Education & Skill Building (ACES), The Business Association of West Parkside (BAWP), Viola Street Residents Association (VSRA), Parkside Historical Coalition, and Mill Creek Center

Main goal: Provide Philadelphia minority middle- and high-school youth with hands-on science workshops and field-based research, as well as career development, mentorship, and leadership opportunities designed to build confident, skillful, and productive adults.

Activities: The PACTS program offers a variety of tiered learning opportunities, with six program components in which youth can participate. Six-week summer programs and school-year workshops allow youth to investigate areas of scientific interest, work in teams, and develop a presentation of their research. PEERS (PACTS Environmental Education, Research, and Service program) couples environmental research with community service by encouraging students to share their research with the general public. In the Robot Team, youth work as engineers, designing, building, and maintaining both simple and complex robots. As Explainers, PACTS youth are given both volunteer and paid opportunities to work with the public to interpret, demonstrate, and explain science exhibits at The Franklin Institute (TFI); explainers also serve as part of the PACTS leadership team, designing, planning, and hosting major TFI events throughout the year. Finally, PACTS youth can serve as mentors to younger participants in the program, offering an avenue through which they can continue their involvement with the program and TFI beyond their own program enrollment.

Audiences: 9-18 year olds from underserved audiences.

Number of people served: 1,200 youth (as of 2005).

Lessons Learned

Create a welcoming environment. Youth who already have an interest in science were attracted to PACTS, which was accessible to them because there is no cost to attend.

Participants appreciate the diversity of the audience. Parents liked PACTS because it provided their children with an opportunity to interact with people of different cultures and backgrounds.

Present science in an accessible way. Youth had the opportunity to learn science in accepting, relaxed settings. Science was made accessible by using plain language to present a variety of topics; youth felt comfortable asking questions and engaging in discussions about science. Topics were focused on issues relevant to the community and youth came to see themselves as competent learners—people who could go on to pursue science as a career.

Provide skills that build individual capacity. Parents appreciated PACTS because the program gives students an experience doing substantive work, from which they learned job skills. Youth were required to work cooperatively, learning to share ideas and be part of a group. The opportunities for mentoring, tutoring and supervising others helped youth feel trusted and responsible. Conducting presentations and interacting with diverse groups of people at community events helped them learn public speaking skills and improved their social skills; the TFI Awards Ceremony encouraged them to learn and apply professional skills.

Create an identity with the program. Youth wore a t-shirt or sweatshirt that made them feel part of something bigger, enhancing their sense of community. The friendships they made helped shape current and future interests through “positive peer pressure.”

Provide participants with ongoing support. PACTS youth interacted with accomplished adults. Their internships at the museums gave them access to staff, including male and minority role models who mentored and guided them. These relationships had great impact on participants’ confidence and friendships, and on their decision to go to college.

Sustained participation has many benefits. Participants who were involved in PACTS for three or more years perceived that the program had more positive impact on them than those who were involved less than three years; in particular, PACTS increased their awareness of career pursuits, social skills, personal identity, and science knowledge and interest.

Recommendations

Recommendations for PACTS include maintaining the high level of staff involvement in youth's lives, reinstating mentors as they existed early in the program; fostering continued involvement in the program and maintaining contact with youth after they graduate.

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Philadelphia Science Festival (PSF)

Grant: National Science Foundation

Dates: 2011-present

Partners: The Franklin Institute (TFI) and more than 200 local academic, scientific, civic, cultural, corporate, and community organizations

Main goal: Engage and inspire all facets of the general public in informal science learning.

Activities: An annual festival in Philadelphia for K-12 and informal audiences, a partnership network, and a website.

Audiences: Families, children, and youth ages 5-18, adults, professional scientists and educators in K-12 and informal science institutions, and underserved and underrepresented communities.

Number of people served: Over 300,000 participants from 2011-2013.

Lessons Learned

Science festivals provide equity of access. PSF has succeeded in attracting underrepresented groups, including minorities, women, young adults between 18-35 years of age, and low-income families due in part to events taking place all over the city. In the words of one PSF organizer, “We meet people where they are—in their own neighborhoods, and in places that are not intimidating.”

Publicize the event through diverse methods of communication. Communication channels include: school, work, festival website, newspapers, and social networking sites.

Interaction with STEM practitioners is associated with positive outcomes for attendees. The greater the number of different interactions attendees had with STEM practitioners, the more impact they reported on their science interest, fun with science, learning about science, and their connection to the science happening in their communities. For scientists and other STEM practitioners, the festivals also provided opportunities to establish connections with the public.

Prior science experience increases interaction with STEM practitioners. The extent to which attendees benefitted from the festival—in terms of their science interest, fun with

science, learning about science, and their connection to the science happening in their communities—was a function of their science experience before the festival, as well as their experience during the festival.

Hands-on activities are an extremely popular feature. Hands-on events fostered the most interaction with science professionals, compared to other events.

A variety of activities and venues ensures that there is something for everyone. Motivations to attend PSF varied by type of event. Of note, neighborhood event attendees and carnival attendees were more likely to go to the festival to support the experience or learning of others.

Continually seek and respond to feedback. TFI has evaluated every festival gathering and reviewed feedback from attendees to determine the effectiveness and impact of the annual event. Organizers conducted small group debriefings both internally with TFI staff and externally with partners to understand everyone’s perspective about the way the festival was organized and implemented.

Regular communication goes a long way to making the collaboration successful. TFI hosted monthly meetings with the festival steering committee to plan and foster collaboration among partners. Regular communication also contributed to a sense of commitment to the partnership, which required a high level of participation.

Site visits provide on-the-ground support. PSF organizers have travelled to other festivals where they can see other programming models and events that can be adapted to their own festival.

Be a resource. PSF is viewed as a leader in the science festival effort in part because it is the only festival in the country that is based out of a science center. PSF has documented the lessons it has learned from hosting annual city-wide science festivals and has shared these lessons with other cities who seek to organize their own festivals.

Conferences offer opportunities to network and get support. Festival organizers from TFI attended the International Public Science Events Conferences (IPSEC) hosted by the Science Festival Alliance. This was an opportunity for science festival organizers to meet face-to-face, discuss strategies, share information and resources, and form new connections and relationships.

Recommendations

- Philadelphia Science Festival organizers who were surveyed in 2012 by the Science Festival Alliance indicated that a number of proposed activities and resources would be helpful to them as they move forward in their own festival efforts, including:
 - An inventory of festival programming effective in engaging hard-to-reach audiences
 - An online catalog of innovative science festival event ideas and formats
 - Guides to share with scientists about what constitutes an effective exhibit
 - A hands-on activity database to share with festival exhibitors
 - Help establishing mentoring relationships with other festival organizers
 - Networking events associated with conferences and science festivals
 - Help establishing partnerships with national scientific societies
 - Strategies for using collaborations to extend science festival impacts across larger geographic regions
 - A guidebook for leveraging your existing science festival calendar system
 - A community organizing workshop
 - In-person communications workshops for scientists involved in your festival
 - A platform for disseminating new findings on issues of importance to the science festival community
 - A website that serves as a clearinghouse of science festival-related information

Philadelphia Science Festival Sources

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The Science Learning Network (SLN)

Grant: National Science Foundation and Unisys Corporation

Dates: 1995-1998

Partners: Six museums (The Exploratorium in San Francisco, The Franklin Institute [TFI], the Miami Museum of Science, Science Museum of Minnesota, the Museum of Science Boston, and the Oregon Museum of Science and Industry) and Unisys Corporation

Main goal: Support inquiry science teaching and learning in K-8 public schools through the integration of ISE resources with online technologies.

Activities: (1) The creation of a legal entity called Alliance, which gave TFI the role of lead institution and originator of the project; (2) a unique database and software package developed by Unisys called UniVERSE; (3) online science resources created by each participating museum; (4) Museum Network Resource Centers or networked computers designed to help museum staff, teachers, and the public use the online science resources; and (5) partnerships between each museum and a local school.

Audiences: K-8 educators who teach science at a school in each of the partner cities.

Number of people served: 139 elementary school teachers.

Lessons Learned

Under-defined goals and objectives make collaboration difficult. SLN did not specify how museum partners would work with teachers and schools, how much of the budget should be devoted to work with schools, or what roles museum staff should take in helping teachers to develop and implement their classroom projects. The decision-making process within the Alliance was also ambiguous. As a result, each museum began to blaze its own path and the common mission of the collaborative became less and less clear.

The development of a common product was a catalyst for communication and collaboration. Because each resource would carry an identifiable SLN logo and become part of the SLN website, the museums felt obligated to discuss the look and feel of the final product, its target audience, as well as its management and coordination.

In order to achieve project goals, museums had to move technology into the organizational center of their institutions. The project meant having to negotiate new

roles and status for SLN staff within existing departments and functions of the physical institution.

Cross-institution partnerships required museum staff to move out of their own world and into the world of their partner schools. In particular, museums realized that to achieve the project goal of whole school change they had to commit museum resources to intensive, ongoing, and on-site professional development to help teachers learn how to use technology and expand their pedagogy.

It is important to get school constituencies on board. TFI made substantial contact with their partner school and worked to develop a relationship through the hierarchical structures of the school district office. Some museums put their negotiated relationships in writing, which teachers were then asked to sign as a demonstration of their obligation to participate in SLN.

It is important to spend time up front understanding teachers' needs. The Science Museum of Minnesota identified someone on its SLN team to be the school liaison who would reach out to teachers to coordinate professional development efforts and the implementation of classroom projects. TFI staff visited their school often to understand where teachers were in terms of knowing about and implementing inquiry-based learning methods before developing resources for them.

ISE settings and schools may speak different languages. Notions of inquiry science derived from ISE settings did not translate easily into the structured routines and curricula of public schools. It was a challenge for museum staff to find entry points and pathways to support coherent teaching and learning at schools.

Multiple approaches were needed to implement effective professional development. Museums conducted inquiry workshops for teachers, modeled open-ended approaches to science teaching and learning, provided on-site mentoring, helped teachers develop specific action plans, and offered them extensive follow-up support. For teachers who had a limited background in technology, partnering museums also created electronic structures that supported the integration of online resources and inquiry approaches.

Museum and school staff have different concepts of time. Teachers' responsibilities consume their energy and attention most of the time they are in school. In addition, teachers develop daily routines that neither speed up nor slow down drastically from day to day versus museum staff, who are exhibit- and event-oriented and push extremely hard at the last minute to meet the deadline. At some schools, staff asked that museum people set up regular schedules for when they would be in the building.

Extensive face-to-face support of teachers is critical. Regular face-to-face interaction helped schools and museums work together across their cultural differences and set up clear expectations about their respective needs and ways they could work better together to achieve SLN goals.

Regular communication goes a long way to making the collaboration successful. Communication via regular face-to-face conversations was an important way to establish trust between and among partners, particularly at the beginning of the project. Over time, online communication also began to take place on a regular basis.

Partnering brings benefits to each member in terms of visibility and resources. The museums perceived that working together was a useful way to move the project, as well as their individual institutions, forward. The SLN increased museums' capacity by developing new resources, staff expertise, physical spaces, which, in turn, leveraged new grants and revenue.

Recommendations

Museum partners can play catalytic roles in creating spaces in which school leaders and principals can come together to discuss ways to develop long-range technology plans and a coherent vision of how technology supports curriculum. On-site professional development and mentoring was a necessary component in the development of online schools, but it was not enough to move schools forward in enacting whole school change.

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The Franklin Institute

222 North 20th Street
Philadelphia, PA 19103

www.fi.edu

