Lessons Learned from and for the Field:
Cultivating a National Network for Informal Science and Literacy through Leap into Science
December 2023

Overview

This document summarizes lessons learned from implementing *Leap into Science: Cultivating a National Network for Informal Science and Literacy* (Leap into Science) from 2017-2023.[1] This project occurred across varied informal education settings, sectors, and states. We offer these reflections so that others might understand the project's successes and most importantly, its challenges and apply them to your considerations when scaling an informal science or literacy education program. Through our learnings, we aim to support program directors, developers, implementers, evaluators, and funders as they plan for, design, and refine current and future programs.

Sharing What We Learned

To wrap-up the Leap into Science project, Education Development Center (EDC), the project's external evaluators, facilitated a three-hour virtual Writers' Retreat with key Leap into Science stakeholders. During the session, participants reflected on their role disseminating Leap into Science and considered lessons learned to share with the field. Nine participants attended,

---

Suggested citation: Stafford, E., Greller, S., Williams, D., Cox, T., Peterson, K., Early, E., Rawlins, S., James, S., & Foster, A. (2023). Lessons Learned from and for the Field: Cultivating a National Network for Informal Science and Literacy through Leap into Science.

including five members of the national project team, two state leaders, and two EDC evaluation team members. Participants then co-developed the following to share with the field.
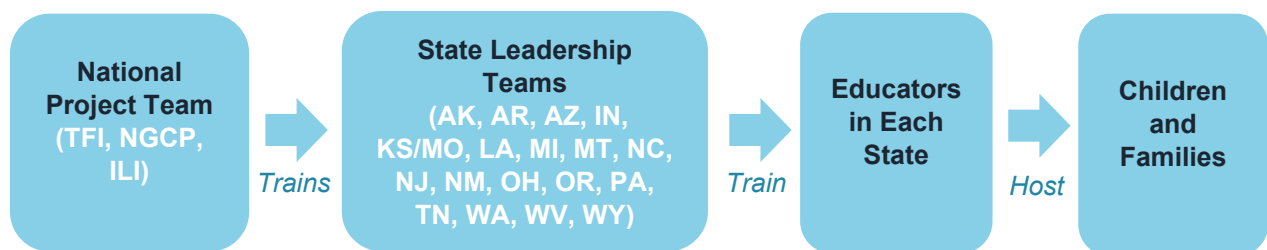
What is Leap into Science?

Leap into Science was a National Science Foundation (NSF)-awarded Advancing Informal Science Technology Engineering and Mathematics (STEM) Learning (AISL) project implemented from 2018-2023. Led by The Franklin Institute (TFI), National Girls Collaborative Project (NGCP), and Institute for Learning Innovation (ILI), the nationwide project sought to create a sustained national network of informal educational institutions that disseminate science and literacy programming to children ages 3-10 and their families in underserved rural and urban communities.

Based on a program initially developed and tested by TFI and The Free Library in Philadelphia, PA, the Leap into Science national project team (national project team) aimed to scale the project across the country by aligning with four dimensions of scale: depth, sustainability, spread, and shift in reform ownership (Coburn, 2003).[2] The program followed a train-the-trainer model, as the national project team trained state leadership teams who in turn trained educators from various organizations in their respective states to implement preschool, elementary, and family workshops with children and families. Workshops integrated open-ended science activities and children's books into programming. Activities were based on one of the curriculum themes: Balance, Wind, and Light and Shadows. Educators used the Core Four facilitation strategies to engage participants during activities which are:
Ask Questions, Encourage Scientific Thinking, Cultivate Rich Dialogue, and Make Connections.

About this Project

- ◘ 5 Years

- ◘ 20 States

- ◘ 18 State Leadership Teams

- ◘ State team members' sectors included: state library networks, museums, and state afterschool networks

- ◘ Educators' sites included: libraries, museums, afterschool programs, and childcare organizations

Project Model

| National Project Team (TFI, NGCP, ILI) | → *Trains* | State Leadership Teams (AK, AR, AZ, IN, KS/MO, LA, MI, MT, NC, NJ, NM, OH, OR, PA, TN, WA, WV, WY) | → *Train* | Educators in Each State | → *Host* | Children and Families |

---

[2] Coburn, C. E. (2003). Rethinking scale: Moving beyond numbers to deep and lasting change. Educational researcher, 32(6), 3-12.

Leap into Science: Top 10 Lessons Learned

Through examining data, reviewing evaluation findings, and engaging in critical self-reflection, we offer the following lessons learned from Leap into Science:

1. **Leap into Science workshops provided a low barrier to entry for children and families; however, distributing materials kits to educators nationally was a challenge for the national project team and individual state leadership teams.**

Workshops were designed around the Core Four facilitation strategies (Ask Questions, Encourage Scientific Thinking, Cultivate Rich Dialogue, and Make Connections) and emphasized exploring science over communicating complex science concepts. Balance, Wind, and Light and Shadows workshops involved simple science activities using low-cost consumable materials. Activities with a clear content theme centered the learner in exploring scientific phenomena and ways in which materials behaved and offered a low barrier to entry for children and families. Additionally, activities with a distinct content theme helped educators with varied experience facilitating science and literacy concepts feel confident facilitating.

The materials used in workshops were widely available and relatively inexpensive. To distribute materials kits, the national project team initially mailed kits to state leadership teams who then were charged with distributing kits to their educators during in-person trainings. While this process seemed straightforward in the planning stages, this distribution required that state leaders store tens of boxes of materials kits and transport them to educator trainings. This process proved expensive and time and resource heavy for both the national project team and state leaders. During the COVID-19 pandemic, the national project team shifted to curated resources lists which allowed state leaders to build materials kits and ship them directly to educators, reducing storage and transportation barriers.

Based on this lesson learned, next time we would:

- Provide a materials list for programs so they can order and organize their own materials.
- Ensure state leaders and educators know the size of materials kits to plan for storage.
- Consult with participants regarding the most effective distribution model for their needs.

2. **The Core Four facilitation strategies offered an accessible pathway for facilitating science and literacy activities.**

The Core Four facilitation strategies were highly regarded by state leaders and educators alike. These strategies were seen as vital to the program model and the workshops. While the three curriculum themes (Balance, Wind, and Light and Shadows) offered different activities and foci, the Core Four provided a pathway for educators to engage children and families in science and literacy activities regardless of the activity. These strategies were intentionally designed to engage participants in content and encourage their exploration of scientific phenomena. The Core Four are reported as a powerful way to scaffold science learning in informal settings.

Ultimately, the Core Four strategies were scaled across varied settings through Leap into Science. These practices seem to have continued, as state leaders report incorporating the

strategies into trainings that they lead with educators outside of Leap into Science, and educators continue to use these practices in other science and literacy programming they lead.

Based on this lesson learned, next time we would:

- Explicitly communicate how the Core Four facilitation strategies can apply beyond this project to other informal science and literacy learning settings.
- Encourage state leaders to share ways in which they are applying the Core Four outside of the project while the project is still active.
- Discuss how strategies could be used as a springboard for other science learning.

3. Emphasis on program fidelity unintentionally diminished state leaders' and their educators' abilities to adapt to the model to meet local needs.

At the start of the grant, the national project team strongly emphasized that state leaders and educators should maintain fidelity to the program model. While we intentionally designed the scale-up of Leap into Science to be applicable across varied settings including libraries, museums, and out-of-school time programs, there was tension between which project elements were flexible and which were essential for maintaining fidelity. The national project team could have given more explicit permission to state leaders and educators to make adaptations to better fit the context of their program. While the national project team allowed for adaptations midway through the grant, if state leaders knew at the time of educator trainings that they had leeway with structuring activities, they could have encouraged educators to be more flexible in how they implemented workshops (e.g., structuring programs for older youth, extending activities for daylong programs, incorporating project-based activities over multiple sessions).

Based on this lesson learned, next time we would:

- Engage sector specific stakeholders to help define the needs, interests, and realities of specific audiences (e.g., libraries vs. out-of-school time programs).
- Understand and articulate what children and families want to take from an experience.
- Map the multiple layers of the model and the potential areas for adaptation and flexibility.

4. Understanding children and families' needs and realities on the local level proved fundamental to ensuring equitable access to workshops.

Workshops occurred in a variety of settings and locations (e.g., embedded into museum programming, parent-teacher nights at schools, library programming). However, issues of equitable access were at play across these contexts, as not all children and families may have been able to attend programming at these locations or at the times offered, despite wanting to and valuing these activities. Barriers included financial constraints (e.g., entrance fees at museums), parent/caregiver work schedules (e.g., prohibiting them from attending midday library programs), and limited flexibility to drive far distances for programming when balancing financial responsibilities like the cost of gas. During the COVID-19 pandemic, some educators pivoted to offer online workshops which provided greater access for some communities who struggled to attend in-person. Yet, online programs introduced a new set of considerations for other communities who struggle with internet access or connectivity.

Educators aimed to address these challenges by being creative with workshop locations, timing, and format. Nonetheless, these complexities must be considered, and options for programming could have been more explicitly discussed during both state leader and educator trainings.

Based on this lesson learned, next time we would:

- Think about how and when participants will access the program from the start.
- Consider community needs and learn about the types of programming children and families are most interested in joining.
- More carefully consider children and families during every step of the program model.
- Build systems for educators to share best practices for access in their respective settings.

5. State leaders and educators struggled to identify which core groups of people they aimed to reach through Leap into Science, as the "intended audience" was ambiguously defined at the project level.

Leap into Science sought to serve families in underserved rural and urban communities. However, when this message was communicated to state leaders, the national project team left term definitions of rural, urban, and underserved intentionally ambiguous to allow for maximum flexibility in who state leaders and educators reached through their trainings and workshops. Further, the national project team struggled with naming the intended audience for workshops. As a result, educators focused on serving as many children and families as possible and did not consistently prioritize reaching specific groups of people. Children and families served by the program varied widely and included children and families in rural and urban areas, those already within educators' networks, and those in well-resourced or more affluent communities.

State leaders acknowledged that there was a tension in the efforts to reach educators and children and families who were most interested in and had limited access to science and literacy programming, while maximizing the number of people reached. Reaching more children and families in rural areas was particularly challenging, especially in towns with small populations. As a result, "underserved audiences" were not always centered as the intended users.

Based on this lesson learned, next time we would:

- Build time into the project for state leaders to make connections and build trust with new audiences, particularly if it is a group with which they have not worked.
- More specifically define and communicate who the "intended audience" is from the start.

6. The program model could have benefited from time dedicated to co-designing aspects of the scale-up with stakeholder representatives in the field.

The national program team designed Leap into Science based on their experiences with the local pilot program and their ideas of how workshops and trainings would translate across the country. However, assumptions made about what it entailed for state leaders to transport materials kits or reach new audiences with each training or workshop had different implications across and within states.

Additionally, if time to co-design the scaled implementation had been incorporated prior to training state leaders, there may have been fewer questions regarding flexibility and adaptations or reaching intended audiences during the project. For example, if there were representatives

from key stakeholder groups involved (e.g., librarians, out-of-school time implementers, museum staff, urban or rural community members), they could have contributed ideas about which components were best to replicate, and which should be left to adaptation based on local needs. The implementation and curriculum development timelines were fast-paced and did not allow for planning time upfront. As a result, this project was not set up to allow for co-design.

Based on this lesson learned, next time we would:

- Include ample time to examine the program model at the outset with stakeholder representatives from various communities and sectors.
- Set expectations with partners and funders regarding the time needed for co-design.
- Involve stakeholders in specific elements such as selecting books and materials.

7. State leaders and educators did not fully understand the purpose and benefits of being part of a national network, as these elements need to be continuously and clearly communicated for a network to be sustainable.

In scaling the program, the national project team thought that state leaders and educators would form a network across the country. During the program, the national project team held regularly scheduled community calls for state leaders to discuss topics of interest and share ideas, thereby fostering a community over time. However, state leaders did not consistently attend these calls, and when they did, they engaged in conversation at varying degrees. Further, state leaders were encouraged to host quarterly phone calls with their educators, and state leaders were left to determine the agenda and purpose of these calls. Overall, the idea of the national network was primarily applied to state leaders and was left undefined for educators. Educators may not have understood what the network was and that it was for them, in part because of ambiguous messaging about goals or intention from state leaders and the national project team.

While it is uncertain whether the network could have grown or deepened without the upending that the COVID-19 pandemic brought, the development of a national network could have benefited from a more evident definition of the goal and purposes, engagement of state leaders and educators purposefully and more deeply, and clearer communication about what state leaders and educators could get from and contribute to the network. This might have not only strengthened the network but provided a strong foundation for growing the network.

Based on this lesson learned, next time we would:

- Continuously communicate the purpose and benefits of network participation.
- Allow the network to evolve organically over time and serve network members' needs.
- Allocate a network manager to connect people, build buy-in, and manage the network.

8. Data collection requests proved burdensome for state leaders and educators, and at times proved to be a barrier to program participation.

Grant-funded programs such as this with research, evaluation, and programmatic components often require participants to provide regular information on the experience. Yet across the project there was tension between gathering enough information to be able to articulate the results of the project, and those data collection processes being burdensome, thereby preventing people from engaging in the project at all.

The national project team instituted multiple data systems and deadlines for inputting data. Along the way, the national project team heard feedback that the data collection systems were problematic and burdensome. Educators, who are busy and short on time, were also confused about data entry. While state leaders were interested in understanding educator reach, these data systems did not enable them to effectively track educator numbers at the state level or to understand how many workshops educators implemented in real time.

Based on this lesson learned, next time we would:

- Include more perspectives during design to determine the feasibility of data collection.
- Set expectations for participants and funders regarding the extent of data collection.
- Critically consider what data is necessary and how data will be used.
- Institute more straightforward systems for data collection.

9. Sustainability was central to the program model; however, it was unclear which program elements were intended for participants to sustain.

The national project team was challenged to consider which components were intended to sustain beyond the life of the grant. For example, were participants meant to sustain the partnerships they formed? Implementation of the curriculum? Both? Some state leaders and educators intend to continue trainings and implementing workshops with children and families, however; the national project team has considered how to intentionally create the foundation for sustainability from the start of the project. Through this project, they learned to be more explicit about sustainability goals and how those goals are reinforced throughout the model.

Based on this lesson learned, next time we would:

- Engage stakeholders during the design phase in defining sustainability.
- Empower participants to adapt the program with an eye towards sustainability.

10. The national program team's review of and reflection on evaluation findings resulted in an improved program model and allowed for project pivots.

As EDC conducted extensive evaluation activities, there were ample opportunities for the national project team and participants to review and make meaning of findings. EDC collected formative data following trainings and workshops, at the end of each program year, and after shifts in the program (e.g., the COVID-19 pandemic). As data were analyzed, the national project team actively engaged in making sense of the findings and applying what they learned to continually iterate on the program model. While there were many lessons learned along the way, the national project team was always invested in improving the program through interpreting data. Additionally, the national project team was transparent with state leaders about what they were learning and the changes they were making. The national project team's dedication to learning through data, building relationships with state leaders, and critical reflection enabled them to sustain momentum and improve the program model over time.

Based on this lesson learned, next time we would:

- Once again, prioritize time for ongoing review and reflection of evaluation data.
- Consider ways to engage participants in the evaluation data review (e.g., having an advisory board of participants).

Six Questions for Consideration

Based on our lessons learned, we offer the following questions for program developers, implementers, evaluators, and funders to consider when scaling programs.

1. **Are sufficient time and resources allocated to scale?** To support scaling Leap into Science, a set of cross-sector state leadership teams disseminated the program. Overall, the state leadership team model was critical to the success of scaling Leap into Science; however, state leaders did not anticipate the time or resources it would take to continuously disseminate the program within their state and engage people outside their direct networks.

2. **What exactly are you intending to scale?** For Leap into Science, the central focus of the scale was unclear. Potential scalable components included the curricula, the workshop structure, Core Four facilitation strategies, connections between science and literacy, or training practices. In the end, the Core Four facilitation strategies and the direct connections between science and literacy learning proved to be successfully scaled through the project.

3. **What components of the program model are essential?** State leaders indicated it was helpful to know what components of the program were essential or required. They also wanted to know where there was flexibility to adapt and meet their local needs (e.g., book selection, materials, training length). As the project evolved, the national project team shifted their thinking and more explicitly defined which aspects were essential to the model.

4. **Does your program model allow for local adaptation?** The national project team learned quickly that what works for a set of programs in one state might not work for other programs across many states. Participants demonstrated that they will adapt programs even when instructed not to do so (e.g., substituting designated books). While not all participants adapted the program without instruction, embracing adaptation would have alleviated confusion across the network.

5. **How do you reach the intended audiences who need and want the program?** State leaders and educators were able to reach many children and families through this project. However, state leaders and educators broadly defined who they intended to reach and as a result, served new audiences as well as children and families already in their networks. The timeline for program implementation was tight and as result, there was limited time for necessary relationship building.

6. **What should sustainability look like?** Evaluation results show that state leaders and educators continue to implement components of the program such as the Core Four and the curriculum; yet it is unclear if this means the program has been sustained. It is important to have a clear vision of what is reasonably sustainable after a grant concludes and funding ends and share that with program participants. Defining sustainability can help ensure that the programmatic elements that are most central to the life of the program are given significant attention so that they can be utilized after funding for the grant is over.